

WETSUS

**WETSUS**

Wetsus, European centre of excellence for sustainable water technology, is a facilitating intermediary for trendsetting know-how development. Wetsus creates a unique environment and strategic cooperation for development of profitable and sustainable state of the art water treatment technology. The inspiring and multidisciplinary collaboration between over 105 companies and 23 EU research institutes in Wetsus results in innovations that contribute significantly to the solution of the global water problems. Wetsus' scientific research program is defined by the private and public water sector and conducted by leading universities.

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TECHNOLOGY SEGMENT



CENTRE OF EXPERTISE WATER TECHNOLOGY (CEW)



CENTRE OF EXPERTISE WATER TECHNOLOGY (CEW)

The Centre of Expertise Water Technology (CEW) supports innovation by developing demand driven new products and processes in the field of water technology. CEW brings together governments, entrepreneurs and educational institutions. By collaborating with universities of applied sciences, support on all levels of experience and education can be provided. With our support technologies can be developed and demonstrated from lab scale to full scale. By conducting applied research and product development, CEW accelerates innovation. Our tailor made approach can support most needs of SME's, end users, industries etc.

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TECHNOLOGY SEGMENT



CIV WATER



CIV water

TECHNOLOGY SEGMENT

**CIV WATER**

The Centre for Innovative Water Craftmanship focuses on educating employees and students to a vocational level in the field of water. Working with educational institutions as well as governmental agencies such as Wetterskip Fryslân (the Frisian Water Board) and Vitens (a water organization based in the north of the Netherlands), we aim to contribute to the development of outstanding water professionals, not only in the region of Fryslân, but also nationally and internationally. We do so by organizing courses for professionals with our water partners. The knowledge of these professionals forms the basis of our courses; professionals share knowledge by educating each other. These new insights are used in our vocational courses.

CIV Water is located at the WaterCampus in Leeuwarden

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waterproof

wateralliance 10 YEARS

operating business with WaterCampus



BIOBIZZ HUB OFFERS KNOWLEDGE AND EXPERIENCE

WATER WAVES TESTS INNOVATION WITH GREENHOUSE FARMER

THE STORY OF CONVERGENCE TECHNOLOGY

10 YEARS OF WATER ALLIANCE!

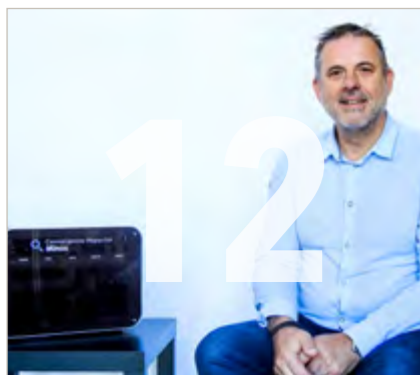
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WATER ALLIANCE PROJECT MANAGER



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COLOFON

WaterProof is the magazine of the Water Alliance, a partnership between government, research institutions and industry in the field of innovative and sustainable water technology. From its base, the WaterCampus in Leeuwarden, the Water Alliance builds on the 'water technology innovation chain'; a process whereby new ideas from universities, laboratories and test sites are converted into worldwide marketable products. WaterProof provides regional, national and global information on developments, results and background in the field of water technology.



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'CALL BONO' by Hein Molenkamp

These are uncertain times. By now, everyone, including those in the global water technology sector, has felt the direct or indirect effects of the COVID-19 pandemic. As such, I would like to begin by wishing you and your loved ones good health, both now and in the future.

In any case, aside from the paramount importance of health, it is primarily the laws of economics that keep us all in motion. Looking at the effects of coronavirus on the global economy, the outlook is grim. The pandemic has affected everyone, and will continue to do so in 2021.

However, as you may have come to expect from me by now, I do not want this issue of WaterProof, almost on the eve of a new year, to be dominated by negativism. "Prosperity is a great teacher; adversity a greater," said English writer William Hazlitt in the nineteenth century. Likewise, American industrialist Rockefeller once said that you can become great by turning every setback into an opportunity. I deeply respect all entrepreneurs who, perhaps out of the courage of despair, have tried to do just that. It takes guts and the ability to stay creative—this is what defines a real entrepreneur. In the water technology sector, we know that the mix between creativity, entrepreneurship and science is what drives innovation.

The question is, how do you do that? How do you stay creative, even when the outlook is bleak? I read a great interview with Jasper Udink ten Cate on the Dutch marketing platform 'Adformatie'. He is a chef, artist, musician and author of the book Creative chef. Jasper loves combining food with sound, art and design. He says: "An important part of the creative process is messing about. Loafing, dallying and slacking. Those are often times when your brain is empty and the creativity starts subconsciously." Another important aspect is staying positive. Jasper says that negativity is a creativity killer. "Brainstorming sessions are often full of people who only see hurdles", according to the 'creative chef'. "If you shoot down every idea because it is not initially plausible, you will never have a good idea. You want to organise a U2 concert for next week? Okay, let's look into that. Such a response will often achieve more."

Words to live by in 2021, in the water technology sector as well. Slacking is easier when working from home, after all. If we do not allow ourselves to be too distracted by the daily media avalanche, which only seems to focus on the number of new COVID cases, the brain has space to brainstorm again. If you feel that we can be of assistance, let us know. No matter how out of the box your idea may be, we are happy to help you move from idea to market. And we'll get Bono on the phone, if we have to! Or Matt Damon.

Hein Molenkamp
Managing Director, Water Alliance

'No matter how out of the box your idea may be, we are happy to help you move from idea to market'



Wetskills: water savings on the Wadden Islands



Wetskills is an international programme in which young talents tackle serious problems plaguing existing market players. To refine the processes further, the programme has a competitive element – there is a prize to be won. For the young talent, it is a great incubator for team skills and learning to work under pressure on solutions to real world problems.

The Dutch final was held at WaterCampus Leeuwarden on 22 September. The prize was won by a group of students who came up with a solution to help tourists save water on the Dutch Wadden Islands.



The winning team together with the case owner, the Province of Fryslân.

'WAFILIN, YOU ARE A GREAT COMPANY WITH AN INCREDIBLE CAPACITY FOR INNOVATION'

WAFILIN SYSTEMS WINS LEEUWARDEN BUSINESS AWARD



In September, Water Alliance member Wafilin Systems won De HET, the Business Award in Leeuwarden, where the WaterCampus is also located. The jury praised Wafilin Systems: "Wafilin, you are a great company with an incredible capacity for innovation. There is room for personal development, and the importance of a great team is self-evident. During the tour, we were introduced to excellent, passionate membrane specialists, and we see that Wafilin Systems sets itself apart through continuous improvement that benefits customers and suppliers. Wafilin Systems holds its own in a

competitive market through quality and innovative strength. Keep up the good work—we see a great future ahead of you!"

Henk Schonewille, CEO of Wafilin Systems: "Winning an award centered around innovation is exceptionally fitting for Wafilin Systems. The world is changing, and our membrane technology is changing the world. Together with our customers, we are making healthy food available. Our membrane solutions are also achieving considerable water and energy savings in production processes."

PRESTIGIOUS AWARD FOR ROYAL HASKONINGDHV

Great news from Water Alliance member Royal HaskoningDHV. The company was recently named winner of the Global Water Awards 2020 as Water Technology Company of the Year for its significant contribution to innovation in the sector. The prestigious award is issued by Global Water Intelligence (GWI), a leading publisher and event

organizer in the water industry. It's not the first time GWI has sung the Dutch company's praise—it previously described Royal HaskoningDHV's biopolymer product, Kaumera Nereda® Gum, as the breakthrough technology of the decade. Tom Scotney, editor at GWI: "In 2019, Royal HaskoningDHV took huge steps in the transition to a circular economy and paved the way for the recovery of raw materials. For example, it started the first large-scale production of its pioneering biopolymer product, Kaumera Nereda® Gum. The company also achieved impressive results with a new sludge digestion technology named Ephyra®, its Aquasite software and digital twin solutions."

THE COMPANY IS SEEING NATIONAL AND INTERNATIONAL INTEREST IN ITS INSPECTION TECHNIQUES

ACQUAINT IN ACTION WITH THE 'PIG'



'Preventing failure' is the slogan with which Water Alliance member Acquaint from Leeuwarden hopes to win over the world. It is starting to pay off—the company is seeing national and international interest in its inspection techniques. They started working shortly after the summer in Heerenveen (thirty kilometres south of Leeuwarden, where the WaterCampus is located). Following the rupture of a pressurized pipeline, the municipal council wanted to assess the condition of the entire pipeline. To that end, Acquaint conducted an internal pipe inspection with what is called a 'pig'—an intelligent

robot equipped with sensors that travels through the pipeline to inspect everything. It can test things such as wall thickness or the quality of couplings. "The results of the inspection provided the municipal council with valuable information", says Siemen van der Heide, Chief Operations Officer at Acquaint. "Things like insight into the risk of failure, as well as the remaining lifespan of the pipeline."

By inspecting infrastructure early and accurately, network managers can carry out extremely precise renovations, which reduces costs.

THE NEXT STEP IN BIOPLASTIC FROM WASTEWATER

Various water authorities, including Weterskip Fryslân, knowledge centre STOWA, technology company Paques (a member of the Water Alliance) and sustainable waste and energy company HVC have signed an agreement to build a pilot plant in Dordrecht for the production of PHBV, a fully biodegradable and sustainable bioplastic. PHBV is made of organic waste streams such as sewage

sludge, industrial wastewater and food waste. The aim is to "build a bridge to commercial PHBV production", according to a recent press release.

PHBV is a high-quality, natural polyester. It is fully biodegradable under natural conditions in soil and composting plants, as well as in fresh and saltwater. Various parties are now sharing their experiences from previous projects with Paques. Together with TU Delft, the company is developing a technology to extract PHBV from industrial wastewater. As previously stated, the pilot plant will be located at HVC's sludge processing plant in Dordrecht and is expected to be operational by the end of 2021.

Meanwhile, in South Korea

You may well be aware that the Water Alliance has been proactively promoting international knowledge exchange and trade with other international clusters for several years now. The Global Water Tech Hub Alliance, for instance, has been featured regularly in this magazine. These parties get on well with each other, even in times of coronavirus, as demonstrated in September, when Hein Molenkamp and Harro Brons from the Water Alliance, together with alderman Friso Douwstra and Evelien Walstra from the Municipality of Leeuwarden, connected live to Daegu in South Korea, where the World Water Cities Forum was being held. Mr Cho Myung Rae (Minister of the Environment of South Korea) and Mr Kwon Young-Jin (Mayor of Daegu) were also in attendance. Major water-related problems and solutions in cities were discussed during the #WCCF, and the Water Alliance never misses an opportunity to endorse the many excellent Dutch solutions. Molenkamp also spoke (digitally) at the World Water Leaders Forum held simultaneously in Daegu.

GreenTech Award for CE-Line

In October, Water Alliance member CE-Line won the GreenTech Innovation Concept Award with its CELINE technology. The CELINE technology was selected as the most promising innovation concept by the jury at GreenTech Live & Online, and received rave reviews: "It's a good idea that has not been solved yet, and a big step forward in very precise fertilization."



Wilco Dijkstra, director at CE-Line.

Scale up and go to market! That is what the WaterCampus Leeuwarden is all about. The latest addition is no exception: the BioBizz Hub in the Frisian town of Balk. The BioBizz Hub is a place where start-ups in the water and biotechnology sectors can achieve their business ambitions. Hosted by renowned company Paques, the organization offers knowledge and experience to young companies. The Hub is yet another important part of the WaterCampus innovation ecosystem. Although the inspiring environment is not quite finished yet, the first entrepreneurs are already hard at work.

Springboard to customers

INNOVATION ECOSYSTEM WATERCAMPUS EXPANDS WITH BIOBIZZ HUB

"Your main goal is to get to the market—that's why you start a company." Marissa de Boer, CEO of SusPhos, is a chemist as well as a thoroughbred entrepreneur. The Amsterdam start-up has found a way to recover high-quality phosphate products, such as flame retardants, from wastewater. "We knew we had to set up a pilot, but we lacked the in-house manpower, knowledge and expertise. The BioBizz Hub seemed like the perfect place. It's close to Paques, a big name with a lot of experience in the water technology sector, and you are part of the WaterCampus network." Fertipaq, another start-up in the Hub, has been affiliated with Paques for some time already. The company developed a method to produce an organic foliar fertilizer using sulphur from the Thiopaq, a Paques product. >



Marissa de Boer, CEO of SusPhos, just announced winner of the Rabo Sustainable Innovation Price 2020, category Circular Economy

'These facilities are already available and can be used by the start-ups until the new spaces are ready in 2021'

Joost Pâques, Director at Paques



> For years, Paques was unable to take the invention to the market. Elise van der Linde was enlisted to manage the product. Now, as an independent organization, it is working. "That is in part thanks to the BioBizz Hub", says Elise. "This is the perfect place. You have a lot of knowledge and resources at your disposal, and you can learn a lot from Paques and the other start-ups."

Sharing experiences

The idea of the BioBizz Hub emerged during an excursion to Boston organized by the WaterCampus in 2016. Stephan Bocken, director of Paques, was among the attendants. "While thinking about taking the WaterCampus to the next level, we came to the conclusion that there was a missing link", says Joost Pâques, also a director at Paques. "Wetsus is an incredible idea generator, CEW develops amazing products and the Water Alliance has positioned itself well in the world as a network organization. But scaling up and convincing clients was still a valley of death for many

start-ups, and everyone was trying to reinvent the wheel." After returning to Balk, an idea began to emerge: Paques could be of great assistance to start-ups. Joost: "We have been highly successful with thousands of plants all over the world, from India and China to Russia and Brazil, and we have learned a lot from our mistakes. We are eager to share that experience."

Two stages

With support from the European Union, the Ministry of Economic Affairs, the SNN, the Province of Friesland and the municipality of De Fryske Marren [in the south of Friesland], the BioBizz Hub project was launched in 2018. One of Paques' production halls is currently being transformed into a creativity incubator. "COVID-19 forced us to split the implementation into two stages", explains Joost. "By the end of this year, the offices for eight start-ups and the workshop complete with tools will be ready. The offices will also have conference rooms and spaces for network events and other activities.

We have opted for an industrial atmosphere, with our old argon gas meters still on the walls. It is an environment that fits within the theme of scaling up. Stage two comprises the lab and the test hall. These facilities are already available at Paques and can be used by the start-ups until the new spaces are ready in 2021.

Stepping out of university

Paques did not want to wait until everything is ready. In 2019, four companies were given the opportunity to work in a temporary space near the hall. EColoRO was first, followed by Water Knight, SusPhos and Fertipaq. "SusPhos really needed it", says Marissa. "Determining the next step in your company's growth is difficult. It's not like a green light suddenly switches on— you have to force yourself to step out of university and scale up. The BioBizz Hub provided the stimulus to do that." Joost fully agrees. "At some point, you have to step out of the research world. Innovation is great, but there comes a point where you have to



'you can't just sit in your office and wait for things to happen'

Elise van der Linde
Product Manager
at Paques

stop developing. The Hub puts you in a business environment. When you come here, you need to have a product. You can still conduct research to make improvements, but when I talk to you in the Hub, I am interested in things like turnover, costs and customers. Universities don't ask enough questions about that side of things." Elise is comfortable in the business environment, and considers the low thresholds to be a plus. "I can ask Paques employees about their experiences, such as in the technical field and regarding their international network. But you have to take steps yourself—you can't just sit in your office and wait for things to happen." For Marissa, the switch from the lab at the University of Amsterdam took some getting used to. "I initially thought, 'I'm not a business person'. But further developing a product and setting things up with your own team turned out to be a lot of fun."

Throughflow

The initial experiences are positive. Fertipaq has doubled its customers this year, from eight to sixteen. Elise has learned that establishing personal contact works best. "Just going out and talking to people, at trade fairs, for instance. I attended various trade fairs early in the year, before the coronavirus pandemic. We also took steps to improve Fertipaq's online presence. Our focus was mainly on product development in the past years, and the website was due for improvement." The company has customers all over Europe— in addition to the Netherlands, they serve customers in Belgium, Germany, France, England, Austria, the Czech Republic and Spain. Elise: "Because Paques introduced us to its North American network, someone from Canada contacted us. Our product is ready. In the coming period, I will be working in the Hub to see if I can attract more employees and look into the possibility of a mobile decanter, which is part of our method to develop organic foliar fertilizer."

Things have moved quickly for SusPhos. Marissa will be leaving the Hub at the end of the year. "We will be running a pilot at the demo site of Wetterskip's [wastewater utility] wastewater treatment plant in Leeuwarden. I would have liked to experience the new Hub environment, but we are ready for the next step. We are now going to prepare samples for our customers. At the end of the day, the Hub is an intermediate phase." Joost will say goodbye to Marissa with pride. "This is exactly what the BioBizz Hub aims to achieve. There needs to be throughflow. I initially expected companies to use the Hub for around three years, but Marissa has demonstrated that a year can also suffice. Four to five years is pretty much the limit. You should really have outgrown the Hub at that point. Elise will discover that once she has hired people and starts buying trucks."

biobizzhub.com

Water-documentary 'Brave Blue World' available on Netflix

On Wednesday 21 October the documentary 'Brave Blue World: Racing To Solve Our Water Crisis' premiered on Netflix. Directed by the British Tim Neeves, the film once again underlines how essential sufficient clean water is for the earth's future. Problems the world is currently struggling with are made unmistakably clear, but viewers are also shown inspiring solutions being developed all over the world. In addition to popular celebrities such as actor Matt Damon and hip hop star Jaden Smith, the film also features several Dutch people. One of the partners in the documentary is the Water Alliance, based on the WaterCampus, who received the film crew in Leeuwarden over a year ago.

At the WaterCampus, Sabine Stuiver from Hydralooop explains how they have developed an efficient water purification system with which any household can recycle its own water. Leeuwarden residents Jan-Willem Schoonen and Linda Kampschreur talk about how they save more than 30,000 litres of water per year with the system.

In addition to the innovation developed at WaterCampus Leeuwarden, viewers are also treated to a glimpse into how NASA astronauts recycle water in space, how water is recycled in a textile factory in India, how wastewater is

purified with algae in Spain, and how a children's home in Kenya produces clean drinking water with hardly any resources.

"This documentary was not intended to portray an apocalyptic doomsday scenario, but to offer inspiration", says producer Paul O'Callaghan. "We wanted to show that things are on the right track, and that technology can help us handle water sustainably worldwide." Actor Liam Neeson, who literally lent his voice to the film, is also enthusiastic about the film: "Everyone needs to see this. It should be shown

at schools. Children have all heard of climate change; this film emphatically links it to water, which we all deal with every day."

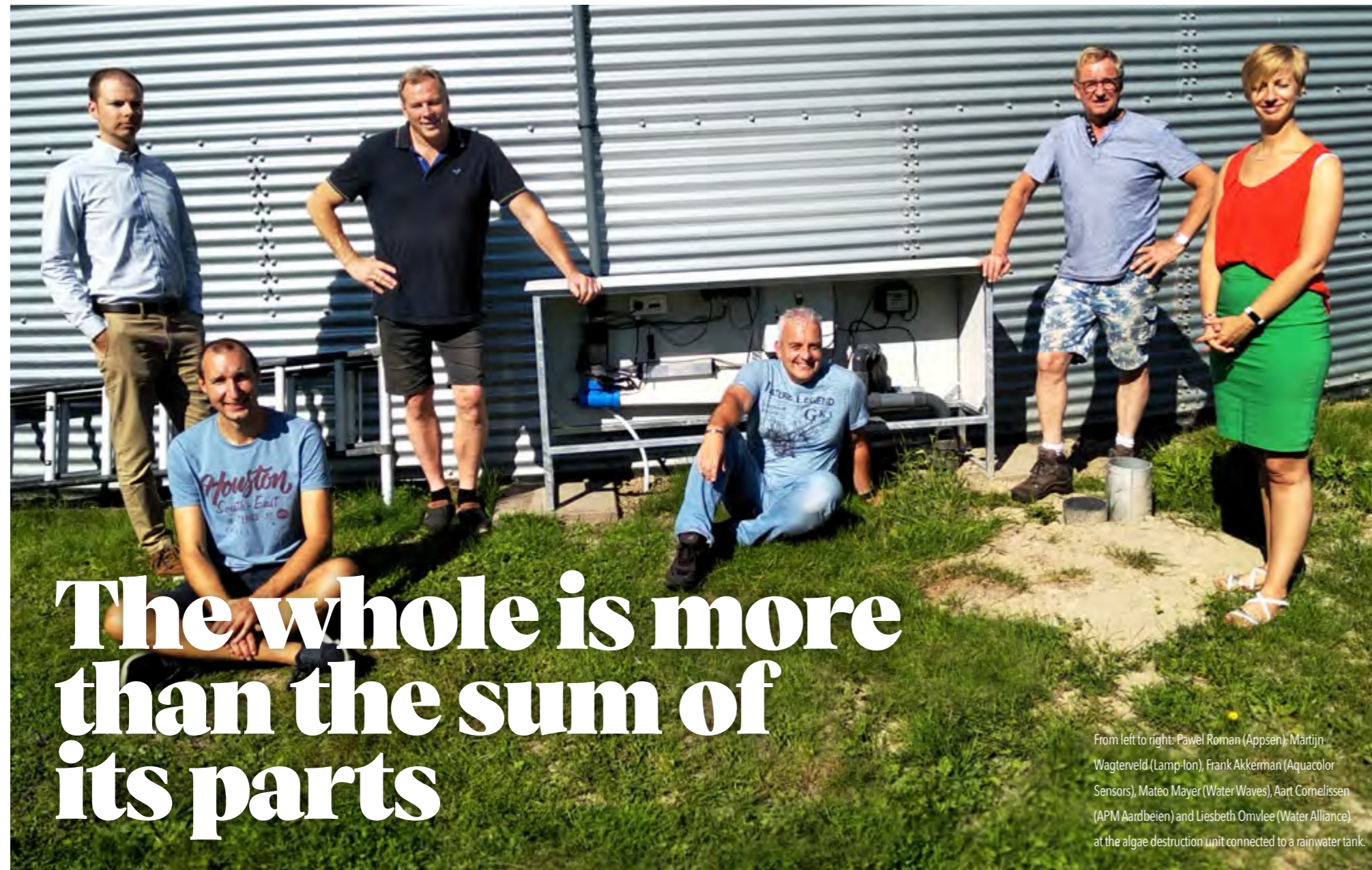
Water Alliance, the organisation that helps

Dutch companies with the sometimes long road from idea to concrete business, is pleased that the film can reach a large audience through Netflix. "We are proud that Water Alliance is a partner in this documentary and that our member Hydralooop is so prominent in the film", says spokesperson Agnes Dirksen. "The WaterCampus itself is also briefly featured, which is great. Most importantly, however, is that this documentary, through its format and the cooperation of many famous names, will be able to reach a wide audience. And that is necessary; everyone in the world needs to know that clean water is scarce and that we must use it wisely."

braveblue.world

Actor Liam Neeson:
'Everyone needs to see this. It should be shown at schools'





From left to right: Pawel Roman (Appsen), Martijn Wagterveld (Lamp-Ion), Frank Akkerman (Aquacolor Sensors), Mateo Mayer (Water Waves), Aart Cornelissen (APM Aardbeien) and Liesbeth Omvlee (Water Alliance) at the algae destruction unit connected to a rainwater tank.

The whole is more than the sum of its parts

Water Waves tests innovation with greenhouse farmer

Water Waves, affiliated with the WaterCampus Leeuwarden, is working hard to reduce the ecological footprint of greenhouse farming. It is currently testing a combination of advanced technologies at APM Aardbeien in the Frisian town of Berlikum [northwest of Leeuwarden]. It is an all-in-one concept, which includes the treatment of effluent. The step to this 'launching customer' was made possible by the Water Application Centre (WAC) and a financial contribution from the VIDA programme.

"Greenhouse horticulture involves high energy and water consumption", explains Mateo Mayer, director of Water Waves. "It also produces effluent which can contain nutrients and pesticides that can end up in the surface water and drinking water." Mayer has tackled the problem by ingeniously combining his own innovation, 'ultrasound', with common technologies which are already in use all over the world: UV-C and iron electrolysis. The result is significant savings in energy, investment and chemical costs. The overall concept also has applications beyond the purification of effluents in greenhouse horticulture. Mayer: "It can also be used to treat wastewater from hospitals,

which contains medicine and antibiotic residue, or for last-stage purification in wastewater treatment plants.

UV-C

Mayer began developing the ultrasound technology in 2008, using sonic vibrations to break up particles and disinfect wastewater. "At some point, I discovered that the process could be made even better and more efficient by combining it with other techniques. In 2014, I teamed up with Martijn Wagterveld from Lamp-Ion. I already knew him through Wetsus, where he had conducted research into crystallisation through ultrasound. Ultrasound keeps the quartz protection tubes of the UV-C

lamps clean. Without the vibrations, the lamps would be covered with a thick layer of calcium carbonate scaling, and the light output would diminish quickly."

VIDA programme

Water Alliance member Water Waves has been testing its all-in-one concept at APM Aardbeien since this summer. In the Frisian town of Berlikum, wastewater is disinfected, pesticides are removed from effluent using advanced oxidation, algae is destroyed in thousand-cubic-metre rainwater tanks using ultrasound, UV radiation and an algae sensor from Aquacolor Sensors, and a sodium sensor from project partner Appsen minimizes effluent. "The whole is more than the sum of its parts", says Mayer. According to Aart Cornelissen, director of APM Aardbeien, the initial results are promising. "All the samples sent to the lab so far have been positive." Cornelissen and Mayer have been working together since the beginning of this year. They were introduced through Cornelissen's neighbour, tomato grower Van Marrewijk. Water Waves completed a two-year purification pilot there in 2018. "Mateo got in touch at the beginning of this year", says Cornelissen. "The timing could not have been better, as I was looking for a system like that." The pilot at APM Aardbeien is expected to finish in December. Cornelissen: "It is going well. Fortunately, coronavirus has not caused much of a delay." The step to the launching customer was made possible for Water Waves through a voucher from the international VIDA programme (Value-added Innovation in food chains). Mayer and Wagterveld received a nice cheque in February. "These vouchers enable SMEs like ourselves to accelerate the market launch of our products", says Mayer. "With the assistance of Matthijs Plijnaar of Water Alliance with our application, we were able to secure the voucher."

Collaboration in the WAC

Before the step to APM Aardbeien, Water Waves conducted extensive

testing at the WAC in Leeuwarden. Two prototype reactors were tested. The first was a batch reactor, followed by a continuous flow reactor. The latter was to test whether Water Waves' treatment concept could also be applied in wastewater treatment plants. The idea was that the scalability of the techniques should make it possible to combine continuous flow filtration systems with UV-C and ultrasound. "Testing the continuous flow reactor was a rather large pill to swallow, financially", Mayer admits. "But we wanted to tap into more markets in the future, and that made it worth the investment. Fortunately, part of the development costs for the wastewater treatment technology was financed by the VIA 2018 Plus grant programme run by SNN [the Northern Netherlands Cooperative]." Water Waves and Lamp-Ion worked together with Water Alliance member Brightwork, which has unique knowledge in the field of filtration. The desire to collaborate with other parties is one of Water Waves' strengths, says Koos Oosterhaven, director of the WAC for the past two years. "Mateo not only installed the system here, but he also sought contact with other customers. He is an extremely nice guy." Conversely, the WAC also had a lot to offer him, says Oosterhaven. "We have high-tech lab facilities which companies like Water Waves can use to test their innovations in a model environment before scaling up to a launching customer. That saves a lot of money. In addition, start-ups and SMEs don't have to arrange all the permits, and they can enlist the help of employees at the Centre of Expertise Water Technology (CEW) and students at Van Hall Larenstein."

See also: pages 16 and 17

Broens started the company as a spin-off of his graduation project at the University of Twente. He researched the automation of a lab set-up that eventually resulted in OSMO Inspector (Optimal Saving in Membrane Operation). The company grew from there. Gerard Wiecherink, Commercial director of Convergence: "Today, we deliver fully-automated test systems for characterising and testing membranes. This involves characterisation during studies or research and development, and final testing in the production stage, for example. We deliver a fully-automated concept based on our proprietary Inspector Software. These products are primarily of interest to universities, research centres and commercial research and development departments. We have a large number of standards which we use as a basis. From there, we look at the individual requirements of each customer. We supply tailored products and help and guide our customers from idea to implementation."

Creativity and coronavirus

The coronavirus pandemic has not left the business operations at Convergence unscathed. "We have had to adjust

No university without the Convergence Inspector

You know it the minute you see it— this is *Convergence technology*. The unmistakable design by the company from Enschede [a mid-sized Dutch city near the German border] means that there can be no doubt. That was an important principle for company founder Felix Broens ten years ago. The technology not only needs to work well, it must also be user-friendly and look good. The result is a unique, distinctive look. A look inside the world of fluid handling systems.



our expectations, goals and budgets in response to coronavirus", says Wiecherink. "That will have an effect. We meet most of our new contacts at trade shows and conferences; postponing or cancelling those directly affects that input. We now have to be creative in approaching and following up on potential customers. The same goes for our Water Alliance membership. The Water Alliance's network provides insight into short to mid-term market needs. It is the perfect platform to follow these developments, preferably through network meetings. I prefer in-person meetings, but that is not an option for the time being. We will need to find creative alternatives to this, as well."

Every request is a gift

When asked about what he likes about his work, Wiecherink does not need long to answer. "Every new customer request is a gift. Working with customers all over the world to find a solution for their specific application makes this a great job. It's not a webshop where you choose a standard product and we ship it to you. Every project is unique, every product is tailor-made." Convergence is working towards a great goal. "Our aim is to ensure that our Convergence Inspector is running at every leading university and research centre. We are well on our way, but we need the international network to reach and serve them locally. Every area has its own local customs, which is why we are looking for regional partners who can look at the market through the eyes of the local users. The coronavirus pandemic has made that more difficult, but we will not let it distract us from our goal."

'Every project is unique, every product is tailor-made'



Convergence Founder Felix Broens



A few examples from the Convergence line up.



Game-changing technology makes wastewater treatment circular

Regional Dutch water authority Vallei en Veluwe has decided to go ahead with a game-changing new technology for municipal wastewater treatment. In contrast to conventional activated sludge treatment based on biological oxidation, the new technology separates and concentrates the organic material and nutrients. The process involves a series of physicochemical steps, resulting in clean, reusable water and several substreams that can be refined to recover commercially viable materials. A small-scale pilot showed promising results, and the water authority announced it would build a first scaled-up version with a capacity of 50 m³/h.

From May 2019 to June 2020, water authority Vallei en Veluwe and the Dutch Water Refinery consortium (Witteveen&Bos and Royal HaskoningDHV) ran a 2.5 m³/h pilot installation with a unique series of existing physical and chemical technologies that included a coarse filter, a sieve for cellulose recovery, electrocoagulation, flocculation, dissolved air flotation, nanofiltration and ion exchange. The resulting effluent was clean water without nutrients, heavy metals, micro-plastics, and micro-pollutants such as pharmaceutical residues.

Refinery of substreams

Conventional activated sludge treatment degrades organic matter and converts nutrients, causing greenhouse gas emissions. The remaining surplus sludge is difficult

to handle, as it is highly diluted and contains heavy metals. The tested series of physicochemical technologies takes a completely new approach; instead of oxidizing the organic matter and nutrients, it extracts materials that can be re-used. For example, the toilet paper is filtered through a sieve and refined to recover cellulose. The recovered cellulose can be used in asphalt to thicken the mixture and prevent the bitumen from dripping off the aggregate during processing, transportation, and paving. Another example is a concentrated ammonium stream that can be used to produce specific fertilizers or proteins.

The new technology has no direct CO₂, methane or nitrous oxide emissions. However, the pilot showed that the process still uses more electricity, and the costs are higher compared

to conventional wastewater treatment. All test results of the pilot plant were within the specifications set by the water authority.

Clean water

A capillary nano-membrane filter removes most micro-pollutants, leaving only an ion exchange step to remove ammonium and the last remaining pollutants. The water authority wants to use this clean effluent for drought prevention by feeding it into a small brook that runs dry during the summer. Using the clean, recovered water, the brook can meet the strict standards of the European Water Framework Directive all year round. Another possibility being considered is to recharge the water to raise the groundwater levels, to use it for irrigation, or for industrial applications.

Full scale

The water authority is now studying a business case around a full-scale, newly-built Water Factory Wilp. It seeks to optimize the design to recover materials from the substreams that meet the specifications of potential customers. The intention is to scale up the technology and gradually increase the capacity from 50 m³/h to 150 m³/h. The consortium sees high potential for the global wastewater treatment, resource recovery and freshwater production industries. It intends to roll out the concept of the 'water and resource factory' internationally for centralized and decentralized applications.

'The consortium sees high potential for the global wastewater treatment, resource recovery and freshwater production industries.'

The Water Technology Innovation Chain

The WaterCampus brings together a complete chain of innovation for water technology, from first idea, research, specialized laboratories, various demo sites, launching customers to commercial international applications by commercial companies. Indeed from knowledge to business. It is driven by the idea that technological development and innovation is needed to develop new markets and create new business opportunities.



Accelerate the steps from knowledge to business with the WaterCampus innovation ecosystem

Water Waves, founded by entrepreneur Mateo Mayer, develops an innovative, ultrasound-based technology together with Wetsus.
 Water Waves and Lamp-Ion meet through Wetsus. Together, they accelerate research and development.

Extra funding from the EU project **VIDA** is arranged by Water Alliance and CEW for further research at the Water Application Centre on the WaterCampus. The Northern Netherlands Alliance (SNN) also provides support. The companies **Brightwork, Aquacolor Sensors and Appsen** join.
 The innovation proves extremely successful. The result is significant savings in energy, investment and chemical costs.

The next step: finding a demonstration site to test everything on a full scale, preferably with a launching customer that can explain exactly what it needs in practice. With the help of the Water Alliance and a voucher from project **VIDA**, a pilot is organised at **APM Aardbeien in Berlikum**, an important player in the horticulture industry. As of December 2020, the initial results are promising. The customer is seeing improved efficiency and cost savings.

Note: there is a journalistic article about this project by Water Waves on pages 10 and 11 in this edition of WaterProof.



André Mepschen, National Business Developer for the Water Alliance, knows what is going on in the water sector, especially when it comes to membrane filtration. He has worked in filtration for more than twenty years in a variety of positions; sometimes as an R&D manager, but also as a process manager and salesman, as was the case in his last job at NX Filtration. He has worked for Water Alliance since January this year. Despite all the coronavirus restrictions, WaterProof found a way to safely sit down with him over a cup of coffee to talk about his vision on the relationship between the food industry and water.

'The time of the infamous *Wasserbombe* has passed'

You have worked extensively for beer brewers in the past, as well as other players in the food and beverage industry. What trends do you see in that segment?

It sounds like a cliché, but quality is becoming increasingly important, compared to quantity. Experience and taste are becoming more important. Take the Dutch tomato, for example; a few years ago, it was somewhat condescendingly referred to as 'the Wasserbombe' [water bomb], but that time has passed. Nowadays, shops are selling a variety of really tasty tomatoes. Looking at the beer industry, where I have worked extensively over the years, I see the same trend. Craft beers with special flavours and organic beer are gaining ground over the more traditional pale lagers.

What trends should we consider in terms of the production process?

The 'linear' process, in which raw materials are used and then considered waste, is no longer tenable, from an ecological point of view as well as an economical one—consumers are placing increasing value on sustainable production. The industry is well-aware of that. Take the beer industry, for example; in Denmark,

brewer Carlsberg has already announced its ambition to use just 1.4 litres of water per litre of beer in a test brewery by 2021. For decades, that has been around 7 litres of water per litre of beer, so we really are making great strides.

You mentioned the linear process, which is no longer tenable. That will have to be replaced by circularity, but that won't be easy for many industrial parties.

That is certainly true, and it would be naive to expect the industry to reinvent itself in just a few years. Nevertheless, that is where we need to go, and there are already many wonderful examples of industries turning their waste into new products. One such example is protein from potatoes, which is used as a structure enhancer in vegetarian meat replacement products. Another is the possibility of using the nutrients from sugar beets left over after sugar production as an agricultural fertilizer.

Water is cheap in the Netherlands, so we can imagine that the sense of urgency is low for the Dutch industry.

The relatively low cost of water in the Netherlands makes the payback period for investments quite long, but this will become less

relevant as water becomes scarcer. Recent summers have shown that water scarcity can also affect the Netherlands, which makes saving a good option. Even better is circular deployment. Nothing is more circular than a water molecule, as it always returns in the same form, under normal circumstances. All we have done is pollute it with components that we do not want to see in our product. The key, then, is recovering the water and making new things with the pollutants. That technology is already there, most of the time.

Those processes will be costly. How will you get the food industry to do that, for example?

Let me start by stressing that I believe the food industry is well on its way. They already have numerous great recycling processes. As a link between knowledge institutions, government and business, we can also often provide assistance. We can connect supply and demand, for example, or notify parties of subsidy options. Because I have worked in that industry for years, I also know that the complexity of the challenge must never be underestimated. I believe that the greatest challenge lies in changing the mindset and uniting various technologies such as sensors, AI and the Internet of Things. It's no

easy task, especially because many of the factories we are talking about are unique and will, therefore, require unique solutions.

You mentioned the role you believe the Water Alliance can play. Can you tell us more about that?

Ambitions are great, but they still need to be achieved, which is only possible if knowledge, government and business join forces in tackling the challenges. This is exactly what is happening at the WaterCampus Leeuwarden, where the Water Alliance is based. The Water Alliance is focused on driving the water industry in the Netherlands, and we do so with 110 members and a large international network that extends beyond our members. This enables us to think along very broad lines and put companies in touch with the right partners. The great thing is that these are not just empty words; the Water Campus already has many examples of water technology companies whose innovations are helping the food industry become more circular and, thereby, more efficient.

If you have a case study, André Mepschen: a.mepschen@wateralliance.nl

Liesbeth Omvlee has worked as a project manager at the Water Alliance since June 2020. She is responsible for the VIDA and EEN projects. A brief introduction to the relatively new project manager and her new field of work.



Liesbeth Omvlee: 'I love coming up with innovative and sustainable solutions to existing problems'

Who are you and what drives you?

Liesbeth Antje Geesje Omvlee, born in Emmen in 1985, named after both my grandmothers. I am an enterprising and creative woman. I love coming up with innovative and sustainable solutions to existing problems. In doing so, I hope to contribute to the quality of life of the people in our region and the world.

Why did you specifically choose to join the Water Alliance?

There are several elements which I consider to be important in my work. Firstly, doing what I am good at, which is project management. I also enjoy helping companies with my background in business administration, and working towards a more sustainable world is important to me. I found all of that in the Water Alliance.

At the Water Alliance, you are primarily responsible for two key projects, which we know by their abbreviated names: VIDA and EEN. For the latter project, we would like to direct the readers' attention to the info box next to this article, but can you explain what VIDA is?

VIDA stands for Value-added Innovation in food chains. It is a European project for SMEs that want to innovate in the food chain. The project has been running for a year and a half now. Various vouchers have been issued to SMEs recently. The vouchers provide funding that is used for activities in the various stages of innovation: research, testing and demonstration. This could be anything in the food chain. Those innovations almost always result in water and energy savings. At the Water Alliance, I am responsible for supervising Dutch SMEs. This includes giving feedback on the reports to be submitted, or helping out when a project is not going as envisaged and planned.

Have you already encountered anything particularly inspiring during your relatively short time at the WaterCampus?

Oh, for sure! Last September, I sat in on the closing meeting of the WaterFuture project. In cooperation with a tomato grower and an installation company, they have developed and demonstrated a new, efficient, ion-selective desalination system. This system makes it possible to produce food without emission of water, nutrients and pesticides, and with an increase in earnings for the grower. Through their participation in VIDA, they were able to demonstrate their system and make improvements in collaboration with their project partners, which has brought them considerably closer to the market.

**EEN in a nutshell
Liesbeth, what is 'EEN'?**

Enterprise Europe Network: EEN is divided into two regions in the Netherlands: North (Friesland, Groningen and Drenthe) and the rest of the Netherlands. Together with the New Energy Coalition, the Hanze University of Applied Sciences, and Business Development Fryslân, we work for EEN North. The network supports entrepreneurs looking to set up activities internationally. Enterprise Europe Network is established in over 50 countries and has 600 points of contact.

What are the benefits for companies, exactly?

Each point of contact has its own regional network of companies and intermediary organizations. The EEN points of contact provide access to many regional networks and companies. It presents the perfect opportunity to find the right business partner and increases the chance of international success.

To contact Liesbeth, send an email to:
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Ronald and his daughters at the WaterCampus' entrance

In the summer of 2020, *Ronald Wielinga* started as Manager of Entrepreneurship at the WaterCampus. Wielinga has already earned his stripes in the Netherlands by helping numerous water technology projects advance along the path of business development through his companies, *rEAUnald Consultancy* [a creative incorporation of his first name in the company name] and *Delta Learning in Water*. High time for an introduction.

Step by step towards more entrepreneurship

What does a Manager of Entrepreneurship do, exactly?

My main task is establishing connections. Together with a large group of colleagues, I am responsible for increasing activity on and around the WaterCampus in the Northern Netherlands.

How do you do that?

There are three routes available. First, by helping the existing companies on the campus grow further. Second, by increasing the number of spin-offs—such as start-ups—from the ecosystem. Third, by acquiring companies and start-ups from outside the ecosystem. All of these companies have a certain need or specific request in their development process. This could be financing, knowledge or access to a testing facility. In almost all cases, the WaterCampus can offer these companies the help they need. My role in that is to know the ins and outs of all the companies and make the right connections.

Why is that important?

That question can actually be answered on several levels. First of all, the water sector plays a crucial role in solving global issues such as climate change. We will only be able to tackle this global challenge if we are able to successfully put our inventions into practice. In addition to solving societal challenges, the water sector is incredibly important to our economy, both at a national and certainly also at a regional level. By focusing on growth,

spin-off and acquisition, we can make the sector even stronger, with clear effects on employment, among other things.

‘the most important opportunities lie in the interfaces with other sectors’

How would you characterise the water technology sector?

The majority of the people working in our sector are extremely passionate and, above all, strongly driven by content. There are only a few larger players active in the sector—the majority consists of small companies that want to market one or more niche solutions and do so with these incredibly passionate people. And that's the way it should be. All too often, however, I see fantastic products that lack a well thought-out business case, or knowledge of how an organization should be set up. More entrepreneurship would do the sector a lot of good, and that is where we are trying to take steps, such as, by having researchers and more experienced entrepreneurs think about how their research results can be translated into concrete products at an early stage.

Where do you see opportunities for Dutch companies?

The water sector is a sector which, especially in developed countries, has its affairs in order. In my opinion, the most important opportunities lie in the interfaces with other sectors, such as agriculture and industry. The development of new raw materials such as PHA, which Paques [large, successful Dutch water technology company] is currently working on with various water authorities and HVC [large, innovative waste and energy company in the Netherlands], is a good example of this. I also have high expectations for companies like SusPhos and CE-Line in the coming years. In short, there are plenty of opportunities!

What do you like best about your job?

I love seeing a start-up really develop, and knowing that it is partly due to the support we have been able to give. I don't like being in the spotlight, but I am very result-oriented; seeing good results from the work I do is extremely motivating. I also love variety—new environments, new people, new projects. And that's all in a day's work for me. It's amazing.

To get in touch with Ronald Wielinga, send an email to: r.wielinga@watercampus.nl



THE RIGHT STUFF

The name Kalsbeek [Tynaarlo, near the city of Groningen] has long been associated with water quality. Albert Kalsbeek founded the company in 1948. At the time, he treated water in central heating systems by combating the corrosion that occurred in the cast iron systems. More than seventy years later, Kalsbeek's portfolio and expertise has been greatly broadened and deepened. WaterProof interviewed Managing Director Edwin Kool. "There are ready-made solutions for many problems, but they are not always the best solutions. We go further for our customers to find a fitting, tailor-made solution." A brief introduction to a remarkable Water Alliance member.



The company grew quickly from the late nineties. Kalsbeek proved to have the right knowledge to prevent legionella and quickly became the market leader in that field. From there, the company has continued to grow into a fully-fledged consultancy firm for water safety and water quality. "We aim to provide our customers with comprehensive solutions, from problem definition to final solution. We still work in legionella prevention, but we also offer much more. We make water suitable for the desired use from the water meter to beyond the wastewater treatment plant."

S@nsor

Kalsbeek thinks along with the customer. The company works from the premise that existing solutions to existing problems are not necessarily the best solutions. As a result, the company is continuously innovating. One example of this is S@nsor. "Legionella prevention measures are carried out manually. It costs a lot of time and money, and results in extra travel movements, which is far from ideal during the ongoing coronavirus pandemic. S@nsor makes that a thing of the past. The device measures temperature and throughflow.

Using that data, customers can prevent water wastage and keep legionella management fully under control. In addition, we also offer our proprietary T@pper application, with which legionella management can easily be registered using a tablet, smart phone or laptop."

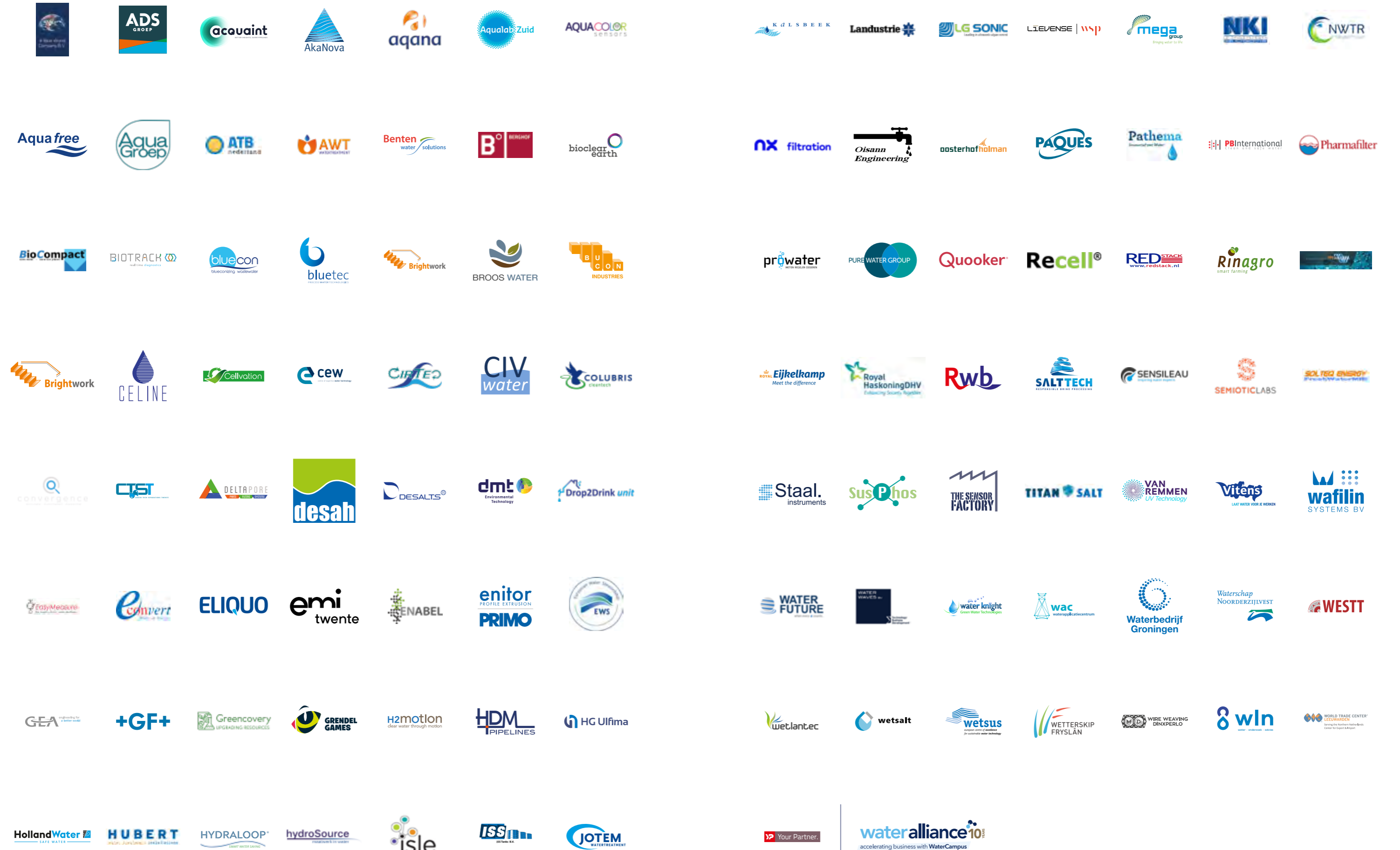
Kalsbeek also offers ECAPROplus, which renders pathogenic bacteria, biofilms, viruses and other micro-organisms harmless without the use

of hazardous and environmentally damaging chemicals. It works with anodic oxidation, electrolysing water and salt to create a disinfectant: Anoxyl. The product is biodegradable and produces water that is safe for drinking and bathing.

Our people

"All these developments were made possible by our people. I am proud of that. Our consultants are given the space to work with clients to come up with their own solution. Seeing the resulting amount of creativity is a beautiful thing. We have grown considerably in recent years, to almost 70 employees. Because we hold matters such as mutual respect, personal growth, involvement, mutual support and responsibility in high regard, our corporate culture has remained intact despite rapid growth. I started out as Financial Director but became more and more generally involved along the way and have since grown into the role of Managing Director. The world of water is a very interesting one. All the processes and legislation involved make it very dynamic. Water is always there, and is everywhere."

'Seeing the resulting amount of creativity is a beautiful thing'



wateralliance¹⁰
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accelerating business with WaterCampus

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