European Water Association

Yearbook 2020|2021

EUROPEAN WATER ASSOCIATION

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Bjørn Kaare Jensen
EWA President 2019 - 2021

COVID-19 as a game changer for the water sector

There is no doubt that the COVID-19 pandemic is a game changer also for the water sector, and many things have been written already about this fact. But let us recapitulate the situation. It is clear that the corona virus is not waterborne in the classical sense that people can be infected through waterborne transmission and subsequent drinking water consumption[1]. COVID-19 is mainly thought to be transmitted between people who are in close contact spreading from person to person in respiratory droplets or aerosols released when someone with the virus coughs, sneezes or talks. It can also spread from a person who has the virus to any surface he or she touches.

The virus has been identified in wastewater[2], but it is not surprising giving the fact that human excreta will contain such virus in areas with widespread outbreak of the disease. Concerning drinking water, WHO has stated that the, "presence of the COVID-19 virus has not been detected in drinking-water supplies and based on current evidence the risk to water supplies is low."[3] Today research has started to investigate the possibility whether there is a chance to install an early warning system using the wastewater facilities. Nevertheless, it will be a long way and a lot of research will be necessary. But if it works there will be chance to use such knowledge also for other virus pandemics. The IWA has formed a working group to collect and to share the international experiences on this topic.

Another aspect, which in this situation has attracted attention, is the fact that the COVID-19 pandemic will severely worsen the health threat among people with water scarcity and lack of freshwater sources for hygienic purposes. Regular hand-washing is the most effective way of preventing the virus from being transmitted, but it requires a water supply of a certain standard to do so. Sadly, the COVID-19 has just made the lack of freshwater sources even worse to such vulnerable communities across the world.

In addition to the health threats of COVID-19, the virus has changed the world and the way we as water professionals are interacting. In the coming years we will see an increase in the use of digitalized meeting fora and a more risk adverse approach to all types of meeting and professional exchanges which require physical presence. This is for the good, because it will speed up the use of more sustainable ways of interacting thereby reducing the CO_2 footprint and resources in general. On the other hand, it might also severely hamper professional cooperation across borders, which evidently is crucial to develop and implement new solutions for a better water environment and for safe water for all. Therefore, we have to find new and innovative ways of international cooperation to avoid a major set-back in the fulfillment of the SDG 6.

The EWA would like to thank all of the contributors to this issue of the Yearbook, especially some of the EWA's newly appointed research members, who have been willing to write articles on some of the challenges and outlooks on the water sector. We are extremely grateful for the view from Veronica Manfredi, Director for Quality of Life at the DG Environment, for their view on the impacts of COVID-19 on the European Green Deal. Digitization has come to stay in the water sector. The river management association of the Emscher and Lippe have written an interesting piece on their experiences with "Building Information Modeling".

The EWA would like to dedicate this issue to all the members who have stayed with us during these difficult times! The cancelling of IFAT 2020 and the Brussels Conference and many other face-to-face events makes a big impact on the EWA, which would have given you the possibility to exercise what the EWA stands for in person. Now we are working very hard to offer you the same; a platform and a turntable for discussion, exchange and transfer of information and know how in Europe, by offering our next events online (www.ewa-online.eu/events). Hence, with your continuous dedication and support, we are confident that we can take on the challenges of the future and ensure Clean Water for Europe.

Keep safe and stay healthy,

1 Guiseppina la Rosa, Lucia Bonadonna, Luca Lucentini, Sebastian Kenmoe, Elisabetta Suffredini. Coronavirus in water environments: Occurrence, persistence and concentration methods - A scoping review. Water Research 179, July 2020, https://doi.org/10.1016/j.watres.2020.115899.

2 Willemijn Lodder, Ana Maria de Roda Husman. SARS-CoV-2 in wastewater: potential health risk, but also data source. The lancet. Volume 5, ISSUE 6, P533-534, June 01, 2020. https://doi.org/10.1016/S2468-1253(20)30087-X

3 World Health Organization. 2020. Technical Brief. Water, sanitation, hygiene and waste management for the COVID-19 virus. March. Website: https://www.who.int/publications-detail/water-sanitation-hygiene-and-waste-management-for-covid-19. Reference number: WHO/2019-NcOV/IPC_WASH/2020.1

Content

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Facts about EWA

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THE EUROPEAN WATER ASSOCIATION
Clean Water for Europe

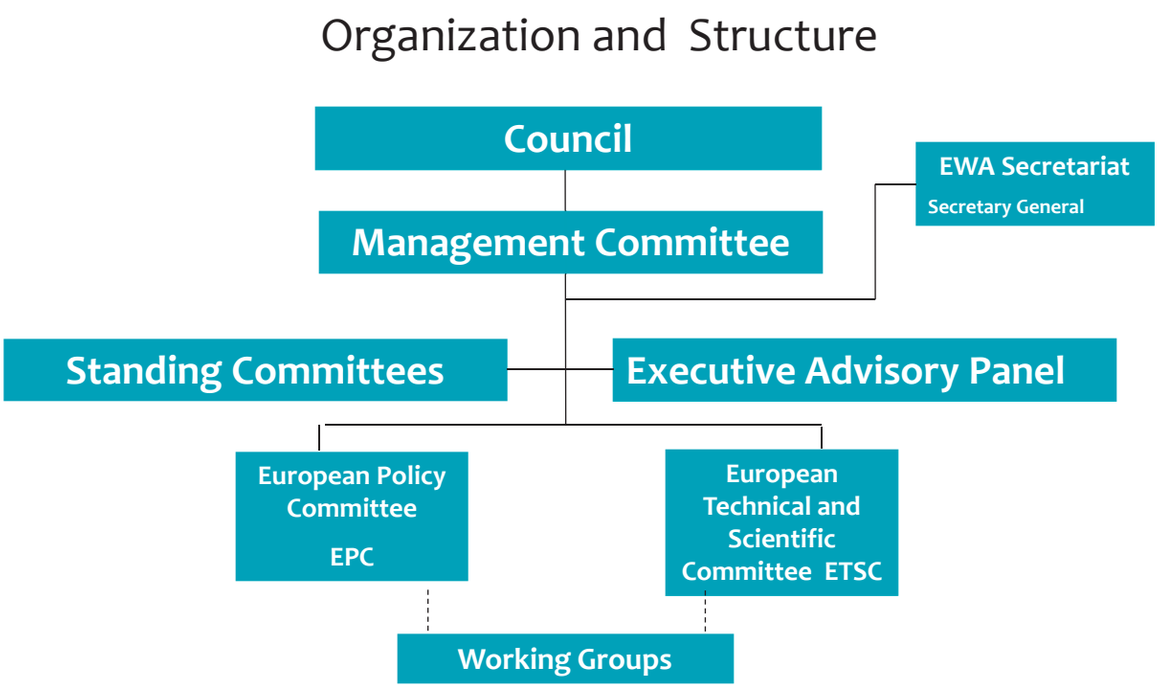
European Water Association (EWA) is the pan-European, non-governmental, non-profit-making, technical and scientific umbrella organization of and for national, corporate and research member associations bringing together all professionals involved in the water cycle. Simply, it is the voice of water in Europe. It is the platform and turntable for discussion, exchange and transfer of information and know-how in the European Water landscape on technical and scientific level, not only between the national member associations and with the corporate members, but also for distribution of information from the EU to the members and from the members to EU. EWA's national members and all their working groups and specialized members will build a real task-force to analyse, discuss, translate and communicate the European Agenda to their national, regional and local authorities, the involved consultants, the industry, the contractors and even the general public. Thus; the EWA represents about 50,000 professional individuals working in the broad field of water and environmental management.

Organisation and Structure

The highest authority of the EWA is the Council – it has the executive power of decision. Each member association (21) is represented on the Council and these representatives meet annually to discuss and plan the activities of the association. The smaller Management Committee has responsibility for developing policy and is in charge of the daily work of the association, supported by the Secretariat. The Association is represented by the President, who chairs the Council and the Management Committee. The Secretary General executes the day-to-day operations of the Association. In addition, Standing Committees and Working Groups support the work of the Association.

The EWA Standing Committees

From its initiation, the Association has laid emphasis on the exchange of information and knowledge between professional experts. Through this exchange of knowledge, the EWA contributes to a sustainable water management: safe water supply and the protection of water and the environment. Numerous conferences and workshops are a result of the EWA network. These exchanges of knowledge take place all over Europe and covers a very broad range of water related topics such as current European water legislation (covering the Water Framework Directive, the Urban Wastewater Directive, as well as the Groundwater Directive, Sewage Sludge Directive etc.). Moreover, technical questions such as the significance of small wastewater treatment plants in rural areas, or scientific conferences and other topics of the European agenda, which are directly or indirectly involving the water cycle, add to the areas of expertise of the organisation. The European Water Association organizes conferences and symposia at regular intervals, on events such as the International Trade Fair (IFAT) in Munich, as well as its own annual EWA Brussels conference. An increase in the number of members from Central and Eastern Europe (accession countries), has raised the interest for events dealing with water protection issues.



The different EWA Committees and Working Groups are the basis of the organisation's relentless goal to achieve Clean Water for Europe. They rely on the voluntary work of experts deriving from the various European National Member Associations and work together on various subjects of current interest in the water and environmental field.

The committee follows the work of the European Commission and arranges regular meetings with officials in the Commission, responsible for activities of relevance to water management. The committee gives comments and advice to official European institutions on behalf of its members. The EWA is attending meetings of the Strategic Co-ordination Group under the WFD Common Implementation Strategy. Furthermore, the EWA is in close contact with other European associations and institutions, which has some interdisciplinary contact with the field of water and wastewater.


EM80, pixabay

European Policy Committee (EPC)

The objectives and responsibilities of the European Policy Committee (EPC), under the guidance of the governing bodies of the European Water Association, and within its rules of procedure, are the following:

- Organise and coordinate relationships of EWA with European level bodies, and especially with bodies of the European Union;
- Facilitate and create the necessary and useful flows of information amongst the persons and groups representing EWA towards European level bodies, as well as between the former and the National Associations (NA), members of EWA;
- Identify emerging issues and important trends in water related European policies and issues, which are of interest to EWA and its members, in order to allow EWA to anticipate future changes and to contribute efficiently to European policy development;
- In consequence, and in conjunction with the European Technical and Scientific Committee (ETSC), propose the evolution of thematic activities and actions of EWA.

European Technical and Scientific Committee (ETSC)

As a particular and "historic" EWA standing committee, the ETSC, European Technical and Scientific Committee provides a unique European point for the discussion, the exchange and evaluation of knowledge and information, and the comparison and definition of positions on key technical-scientific issues and aspects affecting water, wastewater and the related environment at the European level.

The ETSC activities are a product of voluntary and passionate work and contributions of water and wastewater specialists having a qualified technical and/or scientific profile that are active in the different European countries. Under the ETSC, specific task groups gather to discuss topics or aspects that are relevant and strategic for the water and wastewater management at the European level. The ETSC produces technical and scientific papers and strategic position documents. Furthermore, the ETSC is able to cooperate with any national member association within EWA in response to specific national technical-scientific topics or issues to be discussed, evaluated and compared at an appropriate European level.

The ETSC is also responsible for the organization and sponsorship of EWA workshops, seminars, conferences, and symposia having a defined technical-scientific profile (including the well-established International Water and Wastewater Symposium during the biennial international trade fair IFAT in Munich, Germany).

Members of the EWA Management Committee (MC) for the period May 2019 - May 2021

Vice president
Bjørn Kaare Jensen (DK)

Vice president
Raymond Erpelding (LU)

MC Member
Olivier Chaix (CH)

MC Member
Harsha Ratnaweera (NO)

MC Member
Mara Pavelić (HR)

Honorary Treasurer
Otto Schaaf (DE)

Past President
José de Saldanha Matos (PT)

Chairman „European Technical and Scientific Committee“ (ETSC)
Fabio Tatàno (IT)

Chair Woman of the “European Policy Committee” (EPC)
Wendy Francken (BE)

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The William Dunbar Medal

This prestigious medal is awarded to an individual of a member country of the EWA, in recognition of his or her outstanding contribution in applied technical development in the field of sewage and waste treatment and disposal. This Award, donated by IFAT, the international trade fair for water, sewage, refuse, and recycling, which is organised by the Messe München International, has been adopted by the European Water Association. It was previously presented every two years on the occasion of the EWA Symposium held in conjunction with the IFAT event, however, has now become a highlight at the EWA Brussels Conference where the merit occasion is given its spotlight it deserves.

The award consists of a gold medal and a certificate. The medal bears the portrait of William Dunbar on one side and on the other the logos of the EWA and IFAT. It is given in remembrance of William Philips Dunbar, born in 1863 in Minnesota (USA), who was appointed as Director of the Government Hygenic Institute in Hamburg in September 1892 to assist in managing the disastrous cholera epidemic. Dunbar improved the detection procedure for cholera and other pathogens and his pioneering improvements in city sanitation made him an authority that is still internationally recognised in the sector.

William Dunbar Medal Award Winners 1975 - 2019

Year	Award Winner	Country
2019	Prof. Jean Berlamont	BE
2017	Prof. Dr. Milenko Roš	SI
2015	Prof. Dr. László Sómlyódy	HU
2013	Prof. Dr.-Ing. Karl-Heinz Rosenwinkel	DE
2012	Philippe Duchène	FR
2010	Prof. OBE, PHD, FCIWEM, CWEM, CEnv Peter Matthews	UK
2008	Prof., MSc, PhD, DSc Jiří Wanner	CZ
2005	o. Prof. Dipl.-Ing. Dr. techn. Helmut Kroiss	AT
2002	Prof. Dr.-Ing. Rolf Kayser	DE
1999	Prof. Mogens Henze	DK
1996	Prof. Dr.-Ing. E.h. Klaus R. Imhoff	DE
1993	Geoffrey Ashworth Truesdale	UK
1990	em. o. Prof. Dr.-Ing. habil. Franz Pöpel	DE
1987	Prof. Dr.-Ing. Wilhelm von der Emde	AT
1984	Herbert A. Hawkes	UK
1981	Prof. Dr. sc. nat. E.A. Thomas	CH
1978	Dr. Ir. Aale Pasveer	NL
1975	Dr. A.L. Downing	UK

The recipient of the William Dunbar Medal 2019: Jean E. Berlamont

Professor Jean Berlamont was born in Bruges and lives currently in Leuven. He completed his studies as a civil engineer at the University of Ghent in 1969, where he also obtained his PhD degree in Engineering Science in 1975. In 1982, he was appointed professor at the KU Leuven where he also served as dean of the Faculty of Engineering Science from 1993 to 1999. Since October 2012, he has been professor emeritus.

Professor Berlamont is the founder of the Hydraulics Section of the Department of Civil Engineering at KU Leuven, Belgium, as well as the laboratories for hydraulics at UMSS in Bolivia and at the Anton de Kom University of Suriname.

Professionally, he has contributed to the challenges of water management and hydraulic engineering. For example, he is the founder of the 'Code of good practice for the design of sewerage systems' in Flanders. His research has focused on daily practice, driven by social issues and technical challenges. Last, but not least, he was one of the founders of VLARIO - the consultation platform and knowledge center of and for the sewerage sector in Belgium.

Prof. Jean Berleamont, winner of the Dunbar Medal 2019

Recent Activities

1st EWA Innovation Workshop "Design of Modern Wastewater Treatment Plants"

The initial EWA Innovation Workshop was held from 25 to 26 April 2019, in the beautiful city of Prague, the capital of the Czech Republic. Professor Jiri Wanner moderated the workshop where around 45 participants from all over Europe, and he informed about the water management situation within the Czech Republic in general, new approaches and new challenges for the design of wastewater treatment plants. The EWA decided on Prague as the venue of the workshop because in September of 2018 the City of Prague started a trial operation of a new "water line" of the Central Wastewater Treatment Plant. This new line is exploiting several processes and operations which are still not common in large wastewater treatment plants, e.g., chemically enhanced primary treatment, cascade D-N activated sludge process with an in-situ bio-augmentation of nitrification bacteria or tertiary phosphorus precipitation. The design and construction of the plant had to deal with the requirement of the city to protect the new plant from floods comparable to the historical disastrous flood in 2002. In addition to listening to the lectures on the Prague project and on the newest trends and challenges in wastewater treatment plant design, the workshop participants had the opportunity to explore the technology of the New Water Line, which is completely hidden in a concrete containment.

Prof. Jiri Wanner during his opening speech

Lectures at the beginning of the workshop

Field visit in the afternoon

14th EWA Brussels Conference "Current Developments in the EU Water Policy"

On 4-5 November 2019, the 14th the EWA organized its 14th Brussels Conference. The representation of the State of North Rhine-Westphalia to the EU in Brussels hosted, as in previous years this occasion. The first session "Achievements and Challenges in the Water Sector" was moderated by the chairwoman of the EWA European Policy Committee, Wendy Francken. Her session included three highlights. Starting with a presentation from Prof. Uhlenbrook with the title "Leaving No One Behind – International Water Policy in Europe and beyond" followed by a presentation from Ronan Uhel from the European Environment Agency in Copenhagen, on "Water bodies in Europe: Condition, Trends and Prospects". Veronica Manfredi, Director for Quality of Life in the DG Environment of the European Commission held the last presentation during this session "Water on the New Commission's Agenda: Challenges and Opportunities". The first session was followed by a presentation and hand over of the EWA position paper on the Urban Waste Water Treatment Directive, which was an important topic of the 3rd session. Fabio Tatàno, the chairperson of the EWA European Technical and Scientific Committee, moderated the second session. During this session Bettina Doeser, Head of the Unit 'Clean Water' at DG Environment Quality of Life, spoke about the evaluation of the Water Framework Directive. "How to Achieve Real Progress on Water Services and Face Emerging Challenges?" was the title of the presentation from Dr. Jaime Baptista, Coordinator of the Lisbon International Centre for Water (LNEC / LIS-Water), Portugal. "Organic Farming – benefits for the water environment" was a very well recognized contribution from Eric Gall, Deputy Director and Policy Manager of IFOAM (International Federation of Organic Agriculture Movements) EU-Group in Brussels. The third and last session, "Urban Wastewater", was moderated by the EWA President, Bjørn Kaare Jensen, who also gave the closing remarks. The sessions starts again with a presentation from the EU commission. Nele Rosenstock from unit Water Industry and Marine Environment in the directorate Quality of Life spoke about "Main Lessons Learnt from the Evaluation of the Urban Waste Water Directive". Her presentation was followed by a speech from Stephan Luther from the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety in Bonn, Germany, about Micropollutants. The last presentation came from Belgium and dealt about Smart Asset Management. Dr. Jan Goossens, CEO of Aquafin in Aartselaar, Belgium, impressed the auditorium with the experiences of his company.

Wendy Francken, chairwoman of EWA European Policy Committee

Veronica Manfredi speaking about Water on the New Commission's Agenda

From left to right; Johannes Lohaus, EWA; Bernard de Potter, VMM; Wendy Francken, EWA/VLARIO; Veronica Manfredi, DG Env.; Jean Paul Lickes, Lux. Env. Agency.

Dunbar Medal Award Ceremony

On the eve of the EWA Brussels Conference the Dunbar Medal Award Ceremony 2019 was handed over to Professor Jean Berlamont. This merit occasion will be described in the William Dunbar Medal chapter.

2nd EWA Conference on Water Management in Cold Climates (WMCC)

Water and wastewater management in cold climate requires specific design and operational requirements, and the impacts of climate change is even more challenging in the future. Participants at the 1st Water Management in Cold Climates conference, which was held in Spitsbergen, Norway in 2016, proposed to continue to hold the conference regularly. Thus, the 2nd WMCC conference was organised on 12-14 January 2020 in Harbin, China – the city where the world famous ice sculpture festival takes place annually. The conference delved into challenges in regions with seasonal cold climates, as well as extreme cold climates. The Harbin Institute of Technology hosted the conference, co-organized by the EWA and sponsored by the International Water Association (IWA). The conference opened officially on Sunday, followed by a remarkable visit to the Harbin Ice and Snow Festival 2020. The range of topics of this conference increased since the initial conference in Spitsbergen. The aspects of climate change were the focal point of nearly each presentation. Furthermore, the conference offered topics on new challenges regarding micropollutants, anti-biotic resistant genes and micro plastic, as well as economic aspects of cold climate operations. The nearly 100 participants were very grateful for the remarkable program, the fruitful discussions and the perfect organisation of the conference. EWA is highly appreciative to Prof. Harsha Ratnaweera, the representative of the Norwegian member of EWA, for his enormous commitment to organise and host this conference.

EWA president, Björn Kaare Jensen, during his opening speach

Group photo at Harbin Institute of Technology

Prof. Harsha Ratnaweera

16th International Conference on Environmental Science and Technology (CEST 2019), Greece

From 4-7 September the 16th International Conference on Environmental Science and Technology took place in Rhodes, Greece. EWA was one of the contributors to the conference with a keynote speech and an information desk. The conference has been a success for 30 years. Main organiser and conference chairman was Demetris Lekkas from the Department of Environment from the University of the Aegean and an distinguished EWA research members. 420 participants from 81 countries attended the conference. The 17th CEST is scheduled for 2021.

Upcoming Activities

EWA Water Innovation Workshop Series

The new EWA event series will tackle technical innovations and developments in the water sector. New treatment plants and installations, which have the potential to set trends, will be presented by the very same experts who are the pioneers in this area. The EWA Innovation Series will contain the following topics:

16 September: Water Reuse

Background: Water scarcity is a challenge in Europe. Hence, the topic of water reuse will lessen the burden on stress on freshwater supply. On 13 May the EU Parliament approved the Water Reuse Regulation. The EWA Water experts will delve into the challenges and opportunities of Water Reuse at the 2nd Innovation Workshop.

- Phosphorus Recovery
- Micropollution
- Mobile Flood Protection Systems

EWA series on how to prepare for the upcoming WorldSkills

The EWA series on WorldSkills will help you to prepare 360° for both the 46th World-Skills competition, which will take place on 22-27 September 2021 in Shanghai, China, as well as the 47th WorldSkills competition on 12-17 September 2023 in Lyon, France.

A1: WorldSkills Basics for Beginners

9 September 2020 at 12:00 CET

A2: Skill #55 "Water Technology – Learning from WorldSkills 2ß19 in Kazan, Russia

21 October 2020 at 12:00 CET

A3: Insight 1: How to Build Up a National Structure for WorldSkills Competition

25 November at 12:00 CET

EWA Online Course: EU Policy and Legislation
6 and 7 October 2020

Online course in 2 sessions, which introduces you to EU water politics. An EWA certificate will be issued to participants completing the course.

15th EWA Brussels Conference Online/1st EWA Webinar
The European Green Deal and Blue Challenges

The European Commission has committed themselves to tackling climate and environmental-related challenges which is this generation's defining task. How the Commission will consider the topic of water in its Green Deal strategy is the very heart of this webinar series.

- 27 October 2020: Day 1: The European Green Deal and Blue Challenges
- 10 November 2020: Day 2: Research and Developments for the Water Environment
- 24 November 2020: Day 3: Water Framework Directive beyond 2027
- 8 December 2020: Day 4: Future Challenges of the Water Framework Directive

4th EWA Spring Conference: Micropollutants in the Water Sector

5 May 2021, Luxemburg

Micropollutants are a challenge, for waste water operators whose mission is to treat waste water to ensure the protection of the environment and ecosystems, and for drinking water operators, who have to rely on drinking water resources to produce drinking water. The 4th EWA Spring Conference will discuss the European approaches to the challenges of these organic or mineral contaminants which are of anthropogenic as well as natural origin.

International conference on Drinking Water Supply & Technologies

November 2021 (tbc), Delft, the Netherlands

Delft University of Technology, The European Water Association (EWA) and KWR Water Research Institute herewith are organising the International Conference on Drinking Water Supply & Technologies. The topic for the conference is Drinking Water Supply & Technologies for domestic purposes

7th JSWA/EWA/WEF Speciality Conference: Resilience of Water Service

7-10 December 2021, Sendai, Japan

The joint JSWA/ EWA/ WEF conference have identified four principal topics, which will shed a light on Resilience in the Water Sector. All the sessions and individual presentations grouped in these themes align with the Sustainable Development Goals SDGs. The situation of refugee and evacuees in the world, which brings challenges for the water sector will be discussed at this event as well.

The intention of the programme is to share experience s from across the world covering real life examples of lessons learned from major events, innovative technologies and practices and technical scientific research, which strengthens resilience of water service.

Joint Conference Themes:

- Theme 1: Resilience in the round
- Theme 2: Resilience of water services for refugees and evacuees
- Theme 3: Smart water strategies to strengthen resilience
- Theme 4: Lessons learned from real life disruptions

For more information, visit the EWA website.

Veronica Manfredi
Director for Quality of Life, Directorate General for Environment, European Commission

Veronica Manfredi is the Director for Quality of Life in DG Environment since February 2018. The Directorate plays a pivotal role in leading Europe towards a Zero-Pollution ambition and contributes to tackle the Climate and Biodiversity crisis, as well as to the transition to a Cleaner and Circular Economy, also through enhanced water efficiency.

Veronica and her team are responsible for key EU policies for Clean and Well-Managed Water (including the protection of EU Freshwater and Marine environments, water reuse, prevention from Floods, compliance with high health standards for Drinking Water), Clean Air, control on Industrial Emissions and prevention of Industrial Accidents.

The Place of Water in the Green Deal in a post-COVID 19 world

The COVID-19 pandemic has created an unprecedented public health emergency. Whereas the extraordinary, yet necessary, measures taken by Member States and the European Union saved thousands of lives by slowing down the virus' spread, the undesirable "side effects" of these very same measures are estimated to come at a high cost to society and the economy. Thus, as the worst of the health crisis appears to be subsiding in the EU, a global economic crisis, the second in only a decade, raises its ugly head. The question naturally arises: do we have a plan? Obviously, immediate measures are being implemented to reduce, as much as possible, the economic shock. Next to these, I can confidently say that yes, we do have a plan.

In December 2019 the European Commission presented "The European Green Deal", a roadmap for making the EU's economy sustainable by turning climate and environmental challenges into opportunities and making the transition just and inclusive for all, fully in line with the UN 2030 Sustainable Development Goals. The Green Deal Investment Plan was announced shortly after. Since December however, within a matter of months, the world as we knew it seems to have changed a lot. After all, to paraphrase an old adage, "when man plans, nature laughs". Not this time though. Because this time we have a plan that epitomises working with nature instead of operating at nature's expense. We have a plan for today and for tomorrow, when also the worst of the economic crisis will have passed.

Indeed, the European Green Deal inter alia aims to protect, conserve and enhance the EU's natural capital, and protect the health and well-being of citizens from environment-related risks (infectious diseases being one) and their impacts. We want to achieve this by transitioning as quickly as possible from a linear, carbon-based economy to a circular, sustainable, pollution-free and carbon-neutral one. Still, in the post-COVID-19 world, neither the water cycle, nor the utter importance of water as a significant resource for creating wealth and jobs across the EU – and as a consequence pressure on water bodies (e.g. from agriculture, industry or energy production) – will have altered.

At the same time, we can reasonably expect that the post-COVID-19 world will be one where a strong sense of community will co-exist with a heightened feeling of vulnerability. Many citizens (particularly the younger ones) will have realised that individual responsibility and solidarity are inseparable, but also that what is a given today may fundamentally change tomorrow, for better or for worse. It is therefore absolutely necessary that we (be it policy makers, professionals, researchers or managers) contribute towards further increasing the sense of unity and reducing the uncertainty at the European, national and local levels. The means to this end depend on the service each of us provides to society.

At the European Commission, one of our tasks is ensuring the proper implementation of policies agreed at the Union level. Thus, on the one hand, we will redouble our efforts on this front, including existing EU water legislation and its enforcement. On the other hand, because the climate and environmental emergencies will not go away, we are convinced that the European Green Deal, our new growth strategy and the actions that underpin it, should accelerate. With the Green Deal Investment Plan flanked by Next Generation EU, an emergency temporary recovery instrument, Europeans should feel confident that the future will be more sustainable and resilient than the past.

European leaders agreed in their joint statement of 26 March that both the green and digital transitions should be integrated in measures aiming at getting back to a normal, and actually improved, functioning of our societies and economies, entailing more sustainable way of living, producing and consuming. For such a shift to take place, both public and private investments will have to play a central role in relaunching and modernising Europe's economy. On 28 April, President von der Leyen liken-

ded the European Green Deal to a motor for recovery and to a compass to turn the crisis into an opportunity to rebuild our economies differently, make them more resilient, and to make our society and planet healthier.

These positions dovetail with the societal, economic and environmental importance of water. Fittingly, there is hardly an initiative under the European Green Deal that is not water related. To begin with, we have a Zero Pollution ambition to live in an environment where water, air and soil are toxic-free. This will entail strengthening existing legislation (for instance on drinking water, urban wastewater treatment and industrial emissions), designing targeted, additional actions (for instance in the area of freshwater, chemicals and flooding), creating new monitoring and prediction tools, and promoting cross-cutting initiatives such as on pharmaceuticals, digitalisation and stronger engagement of citizens.

Several Green Deal initiatives announced in March 2020 bear relevance for water policy. Preserving and restoring ecosystems in line with the 2030 Biodiversity Strategy will directly contribute to the good ecological status of water bodies. Supplying clean, affordable and secure energy and accelerating the shift to Sustainable and Smart Mobility will reduce emissions that end up in water and aggravate its chemical status. The Farm to Fork Strategy address inter alia the use of pesticides and fertilisers with a view to reduce their negative impacts on water. Building and renovating in an energy and resource efficient way holds promises to cut the consumption of water and in parallel to retain water and reuse it. Besides increasing water efficiency and helping in tackling emerging pollutants and micro-plastics, a Clean and Circular Economy also enhances Europe's strategic autonomy by promoting the recycling of materials and nutrients, for example through the recovery of nutrients from sewage sludge and bio-waste. Therefore, as outlined in the Circular Economy Action Plan, the Commission will, amongst others, consider reviewing current provisions on sewage sludge.

Finally, increasing the EU's Climate ambition for 2030 and 2050, apart from reducing emissions, will improve the chances of mitigating the severity of floods and droughts and provide for more resilient societies and economies.

The cumulative impact of these forward-looking policies, combined with a more effective trade and development policy, can only strengthen also Europe's water industry, making it fitter to provide its services, in a cost-effective manner, world-wide too.

So, despite the health and economic crises, the European Green Deal is as relevant an as necessary as ever, containing the appropriate ingredients to put the economy back on track, on the right track, while promoting those environmental and climate actions that will stave off another crisis. We look forward to you being our companions on this ambitious journey – with clean and efficiently managed water at the heart of our joint efforts, not just in the EU, but across the world.

Andreas Dudzik

heads the engineering technology division within the engineering and construction department of the "Emschergenossenschaft und Lippeverband". (the Emscher and Lippe river management association) The division executes the engineering services for projects. He is responsible for the introduction of BIM methods within the design and execution processes of the association.

Farain Saidabadi

is working as a BIM Manager in the engineering technology division within the engineering and construction department of the "Emschergenossenschaft und Lippeverband". There he supports the project management and the internal design department with the application of BIM methods in projects.

Building Information Modeling - a (Practical) Experience Report

Introduction

"Building Information Modeling (BIM)" has become an important component in the field of digitization and is associated with high expectations at the political level. The EU BIM Task Group assumes in its „Handbook for the introduction of Building Information Modeling (BIM) by the European public sector" possible cost savings of 13- 21 % in the design and construction phase and up to 10- 17 % in the operation phase of a building.

While the BIM approach is already widely applied in structural engineering, the implementation of BIM in the water sector still appears to be rather an exception nowadays. Considering the background of the ongoing digitization and thus the opportunities derived from a consistent data management throughout the entire lifecycle of a facility, it is highly recommended to abandon the current hesitant approach towards BIM gradually.

In the light of these considerations, the Emschergenossenschaft (in short, EG) launched a pilot project in 2013 in order to examine whether the advantages of the BIM methodology can be generated. Another reason was to identify and formulate the relevant questions for a broad implementation of BIM.

A pilot project for the application of BIM methods The Emscher region is transforming - yet again. With the decline of the mining industry, a structural change forces the traditional heavy industry to yield for products derived from high technology and the service sector. By terminating the subsidence method, the wastewater is discharged in closed underground channels and

the rivers as well as its tributaries are converted into near-natural waters – an intergenerational project.

The EG has been and still is investing approx. 5.6 billion € in this intergenerational project from 1992 to the end of 2021. A significant part of this investment is spent on facilities requiring substantial equipment, such as stormwater treatment plants or pumping stations. When searching for a suitable pilot project for implementing BIM, the pumping station of Oberhausen, which is connected to the Emscher sewer was selected. In the near future, this pumping station will be pumping up to 15.3 m3 of wastewater per second to an elevation of more than 42 metres high. The ten installed pumps require an electrical output of 10MW. The total investment for the pumping station amounts to approx. 66 million €.

Figure 1 shows the 3D model of the pumping station.

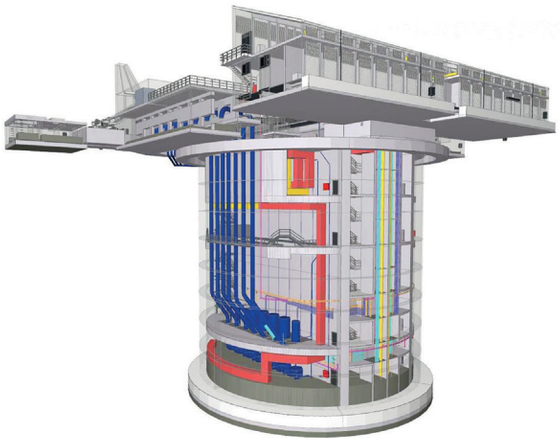

Figure 1: 3D-model of the pump station in Oberhausen

The pilot project was carried out taking into consideration specific boundary conditions that did not represent the "typical" procedure when using BIM methods.

The most relevant "atypical" constraints were:

- in order to avoid delays, constructions are carried out using conventional 2D design. The phase of construction and documentation is supported with BIM tools for the structural, mechanical and electrical engineering trades. For this purpose, in each individual trade, models with a lower level of detail were created in order to localize as-signed information geometrically.
- The BIM implementation plan (BIP) was introduced while the project was already in the execution phase.

BIM tools to be used should not have prerequired any special (IT) knowledge by the project staff. Required methodological and technological competencies will be gradually built up with-in the EG over the next few years. In order to successfully carry out the pilot project, an external BIM consultant was contracted. For getting an insight into the expectations, ideas and reservations of all stakeholders involved in the project, ten workshops were performed within the EG.

First experiences

When the underground construction began, all parties involved were equipped with a BIP with already defined roles and responsibilities of the project, as well as a browser-based collaboration platform. The EG provided the project participants with pre-configured tablet PCs, which were ready to document the construction work directly. After minor start challenges, the pro-vided tools were routinely used by all stakeholders. Some documentation processes required fundamental changes in order to be implemented. Others, however, sufficed minor adjustments.

In the design phase, the 3D model that was created by contracted technical engineering consultants and could be used for detecting clashes between structural- and technical equipment components.

This method enabled spatial conflicts to be resolved prior to the execution on the construction site, which may have caused delays and additional costs during assembly using a conventional approach.

Figure 2 shows a section of the detailed engineering model.

The greatest added value for the operators of i.e. water management plants is the availability of data and documents generated during the construction and installation. A prerequisite for a successful transfer to the operational phase is well-structured data and documents. The data structure has already been defined for the Oberhausen pumping station, and the transfer into an operation management system is scheduled for the near future. In order to generate the greatest possible benefit from the data in the operation phase, every adjustment to the plant must be reflected in the documentation accordingly.

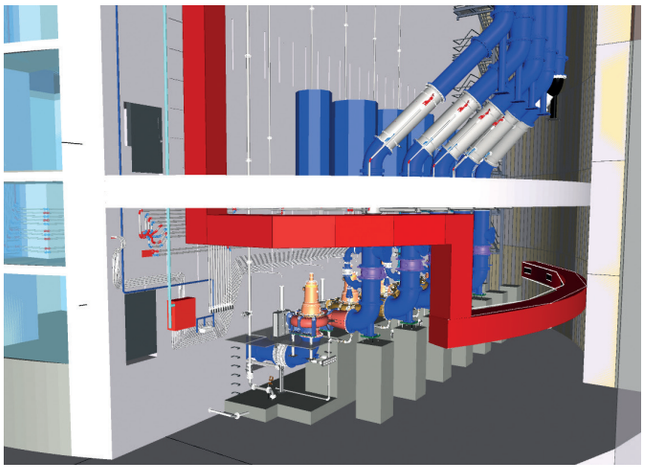

Figure 2: Section of the 3D model for the detail engineering

The path beyond

The previous experience of EG with BIM shows the great potential of the method as an integral part of the company's digitization strategy. Associated with these opportunities are challenging requirements imposed on involved people, processes and technologies. In order to avoid overburdening stakeholders, the BIM methodology will be introduced within manageable pilot scaled projects. Changing requirements in terms of processes, roles and responsibilities can be identified and implemented in small steps. The employees involved in the pilot projects can act as multipliers throughout the whole company.

EG is convinced that BIM offers opportunities, despite of all the challenges that still exist.

Sanitary Environmental Engineering Division (SEED)

Sanitary Environmental Engineering Division (SEED) of Department of Civil Engineering develops, since 1992 at University of Salerno, its research, teaching and consulting activities in the field of Environmental Engineering, nowadays directed by professor Vincenzo Naddeo.

In the National ranking made by ANVUR (Italian National Agency for the Evaluation of the University and Research System) SEED meets the highest standards according to the quality of the research in the field of Environmental and Sanitary Engineering.

Over the last years, the centre has supported the development of numerous experimental plants at pilot and lab scale, as well as many B. Sc., M. Sc. and Ph. D. theses. Among the investigated innovative processes, special attention has been given to pollutants removal from water and wastewater (AOPs, membrane filtration, ozonation, MBRs, biological denitrification, etc.), odor control and municipal solid waste management. The facility is equipped with full instrumentation to perform in situ monitoring activity. The SEED has also a mobile analytical laboratory, to conduct research and environmental monitoring activities for local governments.

Water Energy Nexus: Assessment of the Impact Deriving from the Use of Water Resources in the Energy Sector

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Abstract

Water and energy are strongly interconnected. Water is used in all energy production processes. Without forgetting that taking sample, purifying, transporting, disposing or treating water need a considerable energy consumption.

The concept of „Water Energy Nexus“ analyzes the life cycle of this relationship, assessing how water is a fundamental element for the energy production.

In this study, the impact deriving from the use of water resources in the energy sector was evaluated in order to have an estimate of the water resource quantity that is required to satisfy the current energy needs.

Finally, possible future scenarios were studied by providing estimates on the variation of water-energy bond considering the growing development of renewable sources.

Keywords: Water, electricity, impact, environment, renewable sources, sustainable development

1. Introduction

„Water Energy Nexus“ is an indissoluble bond that reflects the interdependence between natural resource systems. Water is used in all energy production processes and, at the same time, energy is used in the collection, purification, transport, disposal and water treatment phases (Spagni et al., 2016).

The International Energy Agency (IEA) has calculated that electricity production requires 15% of global water withdrawals and that this share is expected to increase by 20% in the next 20 years (IEA, 2016).

In this historical period, when drought and climate change are becoming increasingly intense, the needs for water and energy are constantly increasing. This phenomenon will have an impact on the water sector, which should not be underestimated, since only 3% of global water reserves are made up of fresh water and two thirds of this quantity are trapped in polar ice caps and glaciers (Mancini, 2018).

Understanding the links between water and energy is, therefore, indispensable in order to anticipate future stress points, and to identify the policies, technologies and practices suitable and useful for solving the possible risks associated with this phenomenon.

2. Material and Methods

The „water intensity“ is an important indicator of environmental pressure as it determines and quantifies the impact deriving from the use of water resources for the electricity production.

The analysis of energy production schemes, both from renewable and non-renewable sources, is essential in order to determine the phases in which the water is used, both during operating phase and during its life cycle.

From the previous analysis it was possible to estimate the quantities of water consumed, analyzing the water consumption needed both during the operating phase for the production of electricity and during the useful life of the treatment plants. These data were compared with the data relating to the electricity produced using the „Terna“ database.

The data used for the analysis of water consumption in the treatment plant life cycle are taken from the scientific literature and, in particular, from the „World Energy Outlook 2016“. While the estimate of the evolution of the use of water resources for electricity generation according to the electricity demand until 2060 was carried out with reference to the data provided by the „World Energy Council“.

3. Results and Discussion

Table 1 shows all the data relating to the analysis which were conducted to identify the water-electricity relationship for each energy source.

Table 1. Water quantities used in electricity generation processes (Fthenakis and Kim, 2010, Meldrum et al., 2013)

	Water Intensity: Total water consumed per unit electrical energy produced (l/kWh)	Water Intensity: Total water consumed in the installation and disposal phases of the plants (l/kWh)
Coal	1.06	3.78 x 10-3 < x < 0.09
Oil	1.19	3.78 x 10-3 < x < 0.02
Natural Gas	0.26	3.78 x 10-3 < x < 0.01
Nuclear Energy	1.59	3.78 x 10-3 < x < 0.02
Hydroelectric Energy	5.71	0.10
Biomass	0.21	3.78 x 10-3
Geothermal Energy	16.16	7.58 x 10-3
Solar Energy	Negligible	0.12 < x < 0.60
Wind Energy	Negligible	3.78 x 10-3 < x < 0.03

As regards to the values relating to solar and wind energy, they are clearly low since in electricity production, water does not have a primary role compared to other plants.

By using these values for the calculation of the „water intensity", it was possible to estimate the water consumed for the production of electricity in Italy, in Europe and in the world.

For the analysis of the evolution of water consumption, three different scenarios presented in the „World Energy Council 2016" were analyzed.

In the „Modern Jazz" scenario, the world is characterized by the improvement of the life quality which will lead to the production of more electricity to satisfy the ever increasing energy needs.

In the „Unfinished Symphony" scenario, there will be global collaborations with the aim to protect the environment. This will lead to a marked increase in the use of renewable sources, which will cover around 60% of global electricity production in 2060.

In the „Hard Rock" scenario, the world will be fragmented, therefore each state will implement its own electricity production, avoiding entering import-export commercial relationships.

Starting from the data relating to the evolution of the electricity production from the main energy sources, estimates of the relative water consumption in the world were therefore identified.

These estimates are shown in Figure 1, 2 and 3.

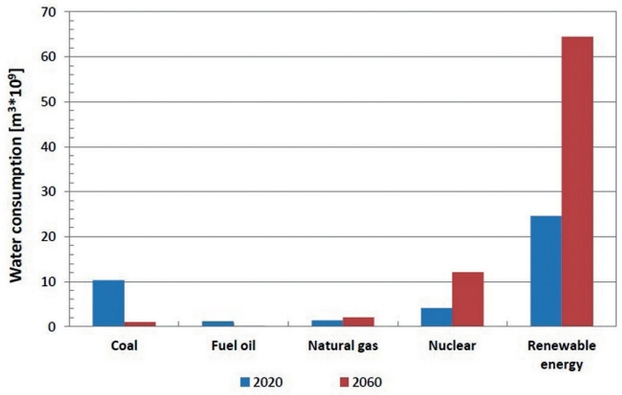

Figure 1. Water consumption for the main energy sources, "Modern Jazz" scenario

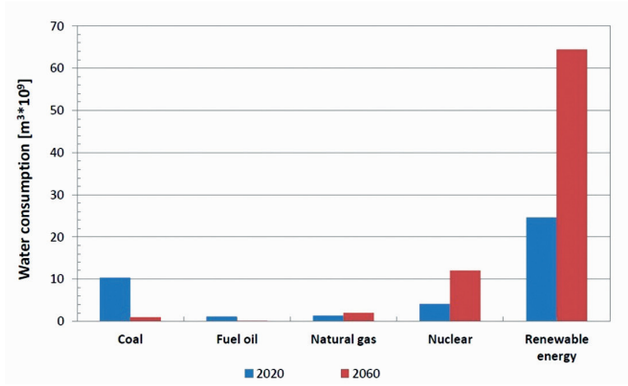

Figure 2. Water consumption for the main energy sources, "Unfinished Symphony" scenario

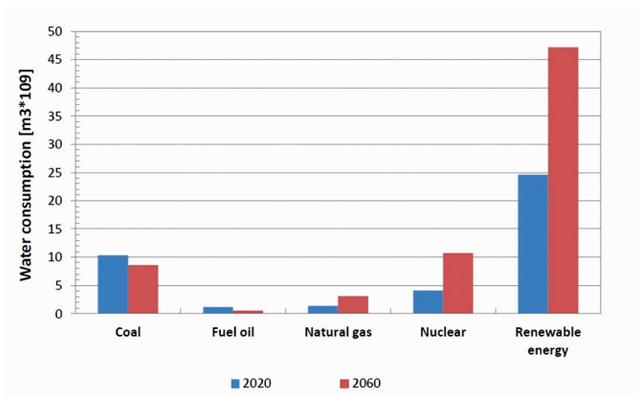

Figure 3. Water consumption for the main energy sources, "Hard Rock" scenario

Figures 4 and 5 show the total water consumption for each scenario and the estimated total energy produced for each individual scenario, in 2020 and in 2060.

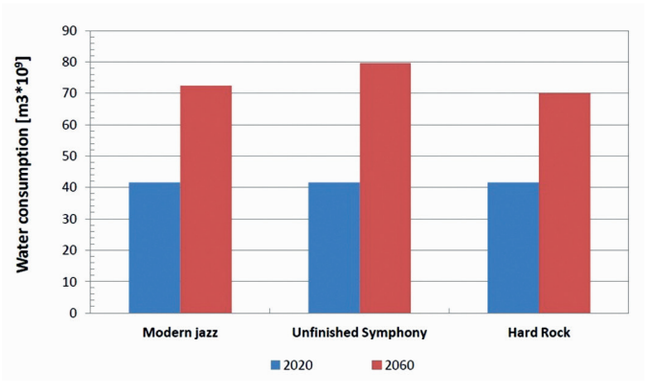

Figure 4. Total water consumption by 2020 and 2060 for the three scenarios analyzed

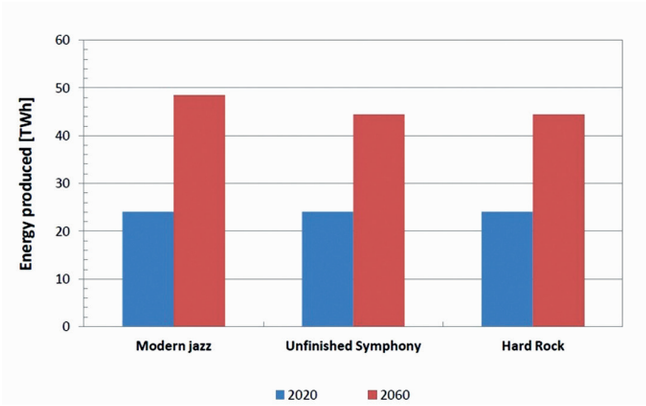

Figure 5. Energy produced in 2020 and 2060 for the three scenarios analyzed

From the analysis of the data obtained, it is possible to anticipate that the highest energy production will be recorded in the first scenario, with a value of 48,491 TWh in 2060. While in the „Unfinished Symphony" scenario, water consumption is expected at 79.58 billion m^3, even if this scenario is characterized by a strong development of solar and wind technologies, therefore is considered sustainable from an environmental point of view.

4. Conclusion

Understanding relationship between water and energy is essential in order to anticipate future stress points, and to identify policies, technologies and practices useful for solving the possible risks associated with this phenomenon. In evaluation of impacts on water in the electricity generation sector, it became clear that it is necessary to reduce the use of fossil fuels for electricity production. In particular, thermal power plants consume large quantities of water and use non-renewable sources, destined to run out. It is therefore essential to develop technologies for the production of clean energy, which consume very low quantities of water.

Finally, this study proposed three possible future energy scenarios, each of which foresees the evolution of energy demand and the consequent impact on the water sector in 2060.

The scenario with the least global impact for both water and energy is the "Hard Rock" scenario. According to this scenario, in 2060 the energy requirement will be covered by 40% from renewable sources, the total estimated water consumption will be around 70 billion m^3 for an electricity production of 44.47 TWh.

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Aalto University, Finland

is a multidisciplinary science and art community in the fields of science, business, and art and design. Research problems in Department of Built Environment involve the great challenges facing today's society, including population growth, urbanisation, climate change, globalisation, digitalisation and the increasing use of natural resources.

Authors: Juho Kaljunen, doctoral student; Anna Mikola, Professor; Raed Al-Juboori, post-doctoral researcher.

Ecological Fertilizer from Wastewater Nutrients

Integrating the innovative NPHarvest-process into wastewater treatment scheme provides an efficient pretreatment while producing ecological fertilizers with high quality. Wastewater contains a large amount of phosphorus and nitrogen, which are valuable nutrients. Aalto University's NPHarvest system (shown in Figure 1) has the capacity to the recover these nutrients as clean ammonium sulfate and phosphorus and calcium rich sludge. The process produces ecological fertilizers as an end-product and, at the same time, saves energy and natural resources by recycling nutrients from wastewater.

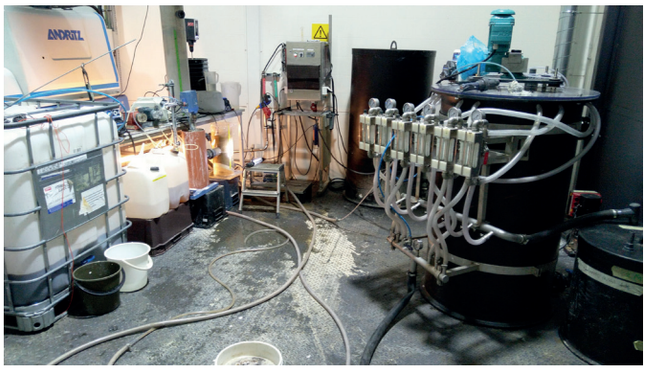

Figure 1. NPHarvest system in action at Gasum's biogas plant in Riihimäki.

Membrane Contactor as a Technique for Nutrient Recovery

Utilizing sludge in agriculture is a challenging task due to the presence of harmful materials to human and environment. However, the EU has listed phosphorus as a valuable critical resource indicating that all phosphorus should be recycled in an environmentally friendly and cost-effective way. Solids and phosphorus in wastewater are separated in NPHarvest process using a combination of coagulation/flocculation and ballasted sedimentation. The latter process is performed using a side-product of lime production. The use of lime increases the product's soil-amending properties, solubilization of phosphorus and the hygienic quality by increasing pH.

The nitrogen recovery process is based on transforming ammonium nitrogen to ammonia gas at alkaline environment. Ammonia is separated by stripping through a gas permeable hydrophobic membrane. This enhances the efficiency of the process significantly. Our solution was to design a novel membrane contactor, which tolerates high level solids to make the process economically viable. There are commercial membrane contactors, but they require microfiltration as pretreatment which consumes a high level of energy and consequently, increases the process cost and depreciates its positive environmental impact.

From a technological perspective, recycling nutrients is proven to be feasible. However, the economic viability of such practice is still debatable. The motivation behind NPHarvest research and products development is to create solutions with a strong economic viability in the recycled nutrient market, which is a new and growing area.

Nutrient recovery with NPHarvest can conveniently be integrated into the standard wastewater treatments. The process is beneficial especially to those wastewater streams with more nutrients than the usual municipal waters. Suitable streams for the process are, for example, reject water from digestion, urine, landfill leachate and septic waste. NPHarvest technique has been proven to be efficient during pilot testing in real environments.

Ammonia Recovery Produces Ammonium Sulphate or Phosphate

Figure 2 below presents an example of a recovery test conducted with digester reject water in Viikinmäki wastewater treatment plant during summer 2019. The recovery efficiency increased to 90 % during the process start up where the flow rate is relatively slow (and hydraulic retention time relatively high, around 10 hours). After the startup phase, different conditions were tested, but the overall recovery efficiency was approximately 80 %. The membrane material has retained its qualities during the test period. Membrane acid wash was performed between the testing locations to maintain its performance.

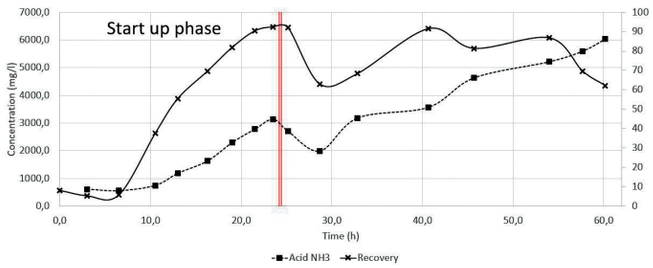

Figure 2. NPHarvest performance with Viikinmäki wastewater

The recovered ammonia is captured in acid after membrane stripping. Sulphuric acid was used for testing purposes to produce ammonium sulphate but in a commercial application phosphoric acid would be more attractive as it forms ammonium phosphate. Its value is higher as a fertilizer or a raw material for fertilizers.

The Process Potential Commercial Value to Agriculture and Wastewater Industry

The process can be commercialized in the agriculture business as all the demand for fertilizers in Finland could be fulfilled by recovering nutrients from different biomasses and wastewater. In addition, farms that have their own digestion tanks can economically benefit from the process as the digestion reject water can be used for nutrient recovery and produce a recycled fertilizer product.

Reject water produced at wastewater treatment and biogas plants is a good candidate for this process. Composting plants also produce nitrogen rich liquid wastes. Besides these reject streams, water originating from landfill sites has a high nitrogen content. Hence, there is a demand for a technology that enables nutrient recovery from liquid wastes. A business model for NPHarvest process and its end-products has therefore been developed.

The project progress-to-date and future forecast are detailed as follows. During the recent year, the pilot process pre-treatment will be partially scaled up to match the appropriate treatment and recovery capacity. The new challenge will be to test the process with landfill leachate rich with nitrogen. The process will further be optimized by developing process efficiency, material quality and the operational paradigm for each respective feed water source.

The project has been funded by the Ministry of Environment and it has been executed in partnership with many industries. Aalto University has collaborated in the project with Helsinki Region Environmental Services Authority HSY, Nordkalk, Gasum, Biolan, Teollisuuden Vesi, Kemira and Outotec.

Prof. Patrick Willems

is a Professor of Urban and River Hydrology and Hydraulics at the University of Leuven (KU Leuven). He is also a lecturer in Water Management at the Vrije Universiteit Brussel (VUB). In 2015, he undertook Belgian chair at the Imperial College London. His research interests are in the vast field of hydrological extremes, river and urban drainage modelling, climate change impact analysis, adaptation planning and other water and forecast related research. He is a member of the EWA Technical and Scientific Committee and his institute KU Leuven is an EWA Research member.

EWA's new research member KU Leuven: research and education on sustainable water solutions

The University of Leuven (KU Leuven) recently became an EWA Research Member. KU Leuven is one of Europe's eldest, highest-ranked and most renowned universities. According to Thomson Reuters, it is the most innovative university in Europe, followed by Imperial College London and the University of Cambridge, and the 7th most innovative university worldwide[1].

Figure 1: KU Leuven, ranked as most innovative university in Europe, became EWA research member

KU Leuven has different research groups performing fundamental and applied research in different aspects of water-related process knowledge, management and technology. They are wide ranging from river, urban, coastal and estuarine hydrology and hydraulics, to hydrogeology and groundwater management, atmospheric processes, agricultural water management, soil water, aquatic ecology and ecohydrology, sediment transport and erosion, economic and sustainable management of water resources, as well as water quality technology.

The research group on urban and river hydrology and hydraulics – civil engineering department holds expertise on surface water hydrology, hydraulics, statistical analyses focusing on hydrological extremes, and impact analyses of climate change. The group developed a plethora of data-driven modelling techniques, including the integration of artificial intelligence techniques in conventional model structures, and is currently expanding its knowledge on Big Data water systems through several EU and privately funded projects. Next to research, consulting services are provided to private companies, governments, and other research institutes throughout the world. Smart water implementation projects are supported by the tech-start of the group, called Sumaqua. The group is moreover active in educational programs around the world, including India, Bolivia, Suriname, Kenya and Vietnam.

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1 https://nieuws.kuleuven.be/en/content/2019/most-innovative-universities-worldwide-ku-leuven-stands-firm-at-seventh-place

Weblink KU Leuven – Hydraulics Section: https://bwk.kuleuven.be/hydr/

Weblink Sumaqua: https://www.sumaqua.be/

Some recent or ongoing research innovation projects by the KU Leuven group are outlined hereafter.

Study of climate change impacts on hydrological extremes

For the study of climate change on hydrological extremes, a climate perturbation tool has been developed that can be applied by end users for adapting historical time series of meteorological data and inputs to hydrological and hydraulic models. The tool is based on a large ensemble of climate model results, so that uncertainties in the future climate projections are taken into account. It is based on statistical downscaling and allows changes in both the frequency and intensity of rain storms and droughts to be taken into account. The tool is being applied in a large number of projects worldwide ranging from urban and river flood risk analysis to drought and water availability studies.

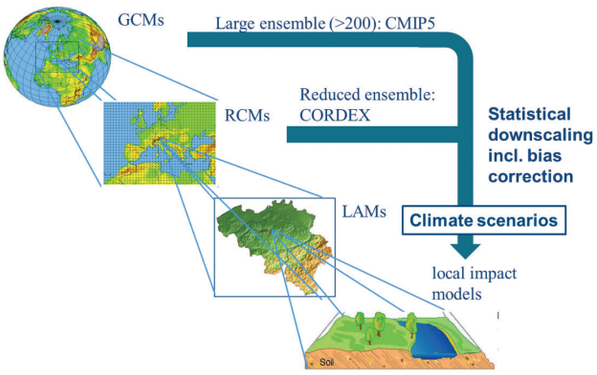

Figure 2: Climate perturbation tool based on statistical downscaling of large ensemble of climate model results, for local impact analysis of climate change

Smart and resilient climate adaptation planning

The increase in the frequency and severity of hydrological extremes and the need for sustainable and resilient adaptation strategies will receive more and more attention in the future worldwide. This demands for climate adaptation planning making combined use of advanced technology, robust infrastructure, and well-thought multi-functional and creative use of open spaces.

To support the implementation of storm water source control measures such as blue – green solutions, a tool called Sirio has been developed and became the standard in Flanders for design of local rainwater solutions. Upscaling of the effects to the city or catchment level and design of climate adaptation plans at the integrated urban water system scale is based on another tool Scan. Both Sirio and Scan have computationally efficient model engines that allow fast simulations of long-term time series of meteorological data and statistical post-processing. For applications in Flanders, 100-year time series of 10-min historical and future rainfall intensities are being simulated.

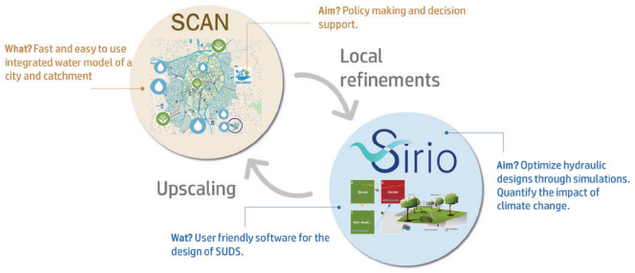

Figure 3: Integrated water planning tools Sirio and Scan

Another application is the smart real-time regulation of water systems. The basic idea is to anticipate weather forecasts. This allows the same storage capacity for water (such as along watercourses, in the subsurface, retention basins, rainwater tanks, even on green roofs, etc.) to be used both for drought management and against flooding. When a long dry period is predicted, the water is retained to the maximum. If, on the other hand, intense precipitation is predicted - with the risk of flooding along rivers or sewers - the water system is anticipated so that sufficient storage capacity becomes available to store or absorb the large amount of rainwater running off and thus prevent flooding.

The concept was first developed to optimize river flood control, by making more efficient use of the storage capacity in flood control reservoirs. It is now being implemented along the Demer river in Belgium. Our research indicated that if a flood like that of September 1998 would occur again in that region, 1 million euros of flood damage would be avoided through that smart water system regulation.

The concept is now being expanded to also smartly control rivers, reservoirs, even rainwater tanks, with the aim of minimizing both the risk of flooding and the risk of water shortages. Along rivers, we also take into account other - sometimes conflicting - needs such as energy generation (hydro power) and water quality / ecology. It is an innovation that fits in with the plan of several water authorities to innovate through artificial intelligence (cf. smart cities, internet of things). The key to effective application lies in combining physical process knowledge, self-learning models, big data techniques and simple sensors that are controlled via a central system. In this way,

smart control can also be integrated into the existing urban drainage management.

Smart control can even be applied to green roofs. In Antwerp, tests were conducted with controlled "blue-green roofs": green roofs with a water buffer to temporarily retain the water. More water can be stored on the blue-green roof than on a traditional green roof, so that it has a significant effect on the drainage of the sewer system, and at the same time the vegetation on the roof can survive long dry periods. The extreme droughts of last years was the ultimate stress test for that. The experiments and extrapolations based on models indicated that the implementation of such „smart green roofs" on all roofs of the city of Antwerp where this is possible would reduce the water nuisance caused by overflowing the sewage system by no less than 30%! It is also a good example of an innovation where a nature based solution and technology are brought together in order to arrive at a climate-robust and flexible strategy that, in addition to reducing flooding and drought effects, also offers other advantages such as reducing heat stress, increasing biodiversity and perception in the densely built-up city centers.

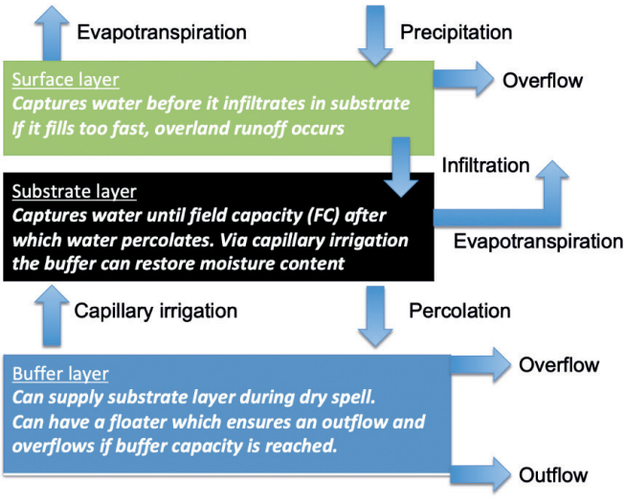

Figure 4: Schematic overview of the (blue-)green roof model with its three layers and hydrological mechanisms

We see the same concept applicable in the future for smart control of drainage systems, for smart water level management along rivers, and even for weir and pump control in polder regions to prevent salinisation.

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Albania

Water Supply and Sewerage Association of Albania (SHUKALB)

The Association is a professional, non-profit organization of water supply and sewerage professionals with the objectives to advocate the collective interests of professionals in the water sector in Albania.

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Austria

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Belgium

VLARIO

VLARIO is an independent non-governmental and non-profit organization in Flanders (Belgium).

VLARIO sees themselves as the consulting platform and information and knowledge centre for the Flemish sewer sector and offers an independent platform for experts of rainwater, wastewater and sustainable water management.

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EWA Council Representative
Wendy Francken

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Bulgaria

Bulgarian Water Association (BWA)
Bulgarska Asociacia po Vodite

BWA is a non-governmental, non-profit organization whose main fields of interest are water supply and wastewater disposal and treatment, as well as management, preservation and utilization of water resources.

EWA Council Representative
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Croatia

Croatian Water Pollution Control Society (CWPCS)

CWPCS is a voluntary, non-profit association of citizens and legal entities joined together to promote water protection and other water related issues. Established in 1979 as the first environmental organization in this part of Europe, today the CWPCS has an important role in the education of new generations of water professionals in different fields of water management.

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Czech Republic

Asociace pro vodu ČR
The Czech Water Association (CzWA)

The CzWA is the association representing Czech specialists and companies working in the fields of wastewater, waste and water management and quality control of surface waters. The main activities of the association cover both technical-scientific subjects and the economic and legal aspects of water environment protection.

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Denmark

Danish Water Forum (DWF)

Danish Water Forum (DWF) is a network of Danish water organisations aimed at highlighting expertise and knowledge and facilitating concerted actions. The competences and high standards of its members make DWF an excellent entry point to the Danish water sector and its services and expertise within virtually all aspects of water industry, technology, science and management.

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Finland

Suomen Vesiyhdistys ry
Water Association Finland

The Water Association Finland is a non-governmental body with the aim to improve and distribute knowledge and promote professional networking in Finland and abroad. The purpose of the association is to improve and disseminate knowledge and promote professional networking in Finland and abroad on hydrology, limnology, water ecology, fisheries, water supply, hydraulic engineering, water pollution control and water legislation.

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France

Association Scientifique et Technique pour l`Eau et l`Environnement association (ASTEE)
("Scientific and Technical Association for Water and Environment")

The 'Association scientifique et technique pour l'eau et l'environnement' is a French association recognized to be of public interest. It connects close to 4000 members from water and waste professional sectors. Its purpose is to seed knowledge, and share technical practices and expertise for the benefit of all. ASTEE is involved in the design, production and operation of urban and rural equipment and infrastructures, with a strong emphasis on environment and hygiene related utilities.

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Germany

Deutsche Vereinigung für Wasserwirtschaft, Abwasser und Abfall e. V.
German Association for Water, Wastewater and Waste (DWA)

The DWA – German Association for Water, Wastewater and Waste – is intensively committed to the development and distribution of a secure and sustainable water management. It acts as a politically and economically independent organisation in the field of water management, sewage, waste and soil protection. DWA provides professional competence regarding standardisation, professional training and information towards the public.

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Hungary

Magyar Szennyvíztechnikai Szövetség (MaSzeSz)
Hungarian Wastewater Association

The Association has around 300 individual, institutional and company members. The members are mostly designers, operators, experts, students and professors from different institutions, universities and business entities dealing with municipal water and river basin management.

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Luxembourg

Association Luxembourgeoise des Services d'Eau (ALUSEAU)
Luxembourg Association of Water Services

ALUSEAU is the national association of water services in the Grand-Duchy of Luxembourg, regrouping members of the drinking-water sector, the wastewater sector and other public actors active in water management. ALUSEAU is a politically independent and non-profit making association.

EWA Council Representative
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Norway

Norsk Vannforening
Norwegian Water Association (NWA)

The Norwegian Water Association (NWA) is an independent non-governmental and non-profit organisation dealing with the management and improvement of the water environment. The NWA provides a forum for discussion of key technical, scientific and policy issues on water covering both water resources and water quality.

Chair
Lars Hem

EWA Council Representative
Harsha Ratnaweera

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Portugal

Associação Portuguesa de Engenharia Sanitária e Ambiental (APESB)

The Portuguese Association for Sanitary and Environmental Engineering (APESB) is a non-profit, scientific and technical association. APESB is a national body with the objective, among others, to the study, analysis and discussion of aspects related with water supply, drainage, treatment and final disposal of wastewater and the collection, treatment and final disposal of solid waste, in order to contribute to the implementation of better, feasible and sustainable solutions.

President
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Romania

Romanian Water Association (RWA)

Romanian Water Association is a professional, non-profit and an employers' association. Its main objectives are as following: To represent and to promote the interest of its members; To support the capacity development at the level of the Romanian water sector; To improve the quality of the water services in Romania in order to meet the EU requirements; To improve the quality of life and environment by providing water supply and sewerage services of better quality.

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Serbia

Serbian Water Pollution Control Society (SWPCS)
SRPSKO DRUŠTVO ZA ZAŠTITU VODA

Serbian Water Pollution Control Society (SWPCS) is a non-profit independent organisation of experts in water sector which was established in 1966. The main objective of the Society is to create and foster the network of leading water professionals through the provision of services and products to the members, including conferences, publications and support for member groups. In addition, to represent the views of members in the national and international forums aimed at advancing best practice in the sustainable water management.

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Slovak Republic

Asociácia čistiarenských expertov SR (AČE SR)
Association of the Wastewater Treatment Experts of the Slovak Republic

AČE SR is the Slovak membership association, which groups professionals acting in the fields of wastewater management and water protection. AČE SR covers all aspects of wastewater pollution control, collection, treatment and disposal; promote exchange of the latest skills, techniques and knowledge on all aspects of wastewater, water and sludge management. The mission is to enable the improvement of groundwater and surface water quality in an environmentally sustainable way. AČE SR disseminates the knowledge by means of conferences, workshops, specialised meetings, publications, electronic media and expert services.

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Slovenia

SLOVENSKO DRUŠTVO ZA ZAŠČITO VODA (SDZV)
Slovenian Association for Water Protection

The purpose of the Association is to associate societies and individuals working in water and wastewater management, especially regarding quality issues. The main activities in this sector are to act in water pollution control, drinking and wastewater treatment.

President
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Spain

Asociación para la defensa de la calidad de las aguas (ADECAGUA)

ADECAGUA is a non-profit educational and technical association of water quality experts, which are economically and politically independent. ADECAGUA develops and disseminates information concerning the different areas of water treatments and nature, via technical seminars and meetings, collaborating on a regular base with two specialized journals in Spain.

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Switzerland

Verband Schweizer Abwasser- und Gewässerschutzfachleute (VSA)
Association Suisse des professionnels de la protection des eaux
Associazione svizzera dei professionisti della protezione delle acque
Swiss Water Association

The VSA is the association representing Swiss specialists working in the fields of wastewater and water pollution control management. The main activities of the association cover technical, scientific, economic and legal aspects of water pollution control. Central tasks of the association are the preparation and updating of technical standards and guidelines and professional training of members and staffs of sewage treatment plants.

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IFAT

IFAT is the world's largest environmental technology trade fair: here, more than 3,300 exhibitors from all over the globe present their solutions for water, sewage, waste and raw materials management to around 150,000 international trade visitors. And with 48 percent of exhibitors and 49 percent of visitors coming from abroad, IFAT is also the most international trade event in the field of environmental technologies.

Spanning 270,000 square meters and thus occupying all 18 halls plus an extensive outdoor area of the Messe München trade fair center, half of the event is dedicated to the water and sewage sector and covers the whole spectrum from supply and recycling to disposal.

IFAT hence not only offers the ideal setting for top market players to find out about latest trends and challenges in the various markets, but also to discuss strategies for making the best possible and sustainable use of the 'blue gold'. Strengthening the circular economy plays an essential role here. It is about keeping resources circulating as well as using them sustainably and repeatedly. Circular economy ultimately means a raw material shift. And in view of the increasing water shortage worldwide—partly caused by climate change—it is more important than ever to make maximum use of this resource.

The next IFAT will take place from May 30 to June 3, 2022 in Munich, Germany.

Further information is available at www.ifat.de.

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VTA – the No. 1 for innovative environmental Engineering

Since more than 25 years, the VTA group is known as a pioneer in wastewater technology. The company is active in more than 60 countries around the world. The scope of the VTA group is centered at wastewater treatment plants - maximum efficiency combined with minimum ecological burden. This is our aspiration, this is our driving force. With two decades of gained experience, research work and partnerships, our company holds more than 70 patents on high-tech products for wastewater treatment!

250 employees in Austria and on the international level are currently taking care of our partnerships, technological maintenance and the success of our company.

VTA products are used in a wide variety of sectors, ranging from municipal wastewater plants up to paper, food, textile, drilling, disposal and automotive industry.

Our unique characteristic is based on our long-standing experience, which allows us to offer customer- oriented solutions with sustainability and integrity.

The VTA Nanofloc® - one of our flagship products, is based on nanotechnology and opened the door to a new dimension of wastewater technology. The use of nanoparticles ensures rapid flocculation, sedimentation and stable operation of sewage plants.

Another business area of VTA is developing innovative water engineering technology. For example sludge disintegration, microturbines or dosing systems. Our technology division provides solutions for all kind of waste water treatment.

Profound expertise, sustainability, innovation and flexibility combined with full-service support for our customers – this is VTA!

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Xylem is is a leading global water technology company committed to creating both economic and social value across all of our stakeholders – our employees, customers, communities, shareholders. We, at Xylem, pledge to help create a world where water issues are no longer a barrier to human health, prosperity and sustainable development. Xylem's products, solutions and services span the entire cycle of water, from watershed to public utilities to end-user –serving the public utility, industrial, residential and commercial building services sectors.

We transport water to where it needs to be, efficiently and safely. We treat water to meet the highest quality standard requirements. We track, analyze and optimize the entire water and wastewater network. Our portfolio of sensor technologies, smart metering, communications technology, measurement technologies and advanced data analytics improve operational integrity and efficiency, by connecting you to all of your assets. We transform how you run your assets for better outcomes. We partner with customers to help them envision and drive enterprise-wide performance improvements by leveraging Xylem's broad portfolio of solutions and experts around the world. We help water managers solve their toughest water challenges.

Together with our partners, we're driving progress across the water sector.

We're collaborating with governments, industries and communities all over the world to create the next generation of transformative water management solutions. We're partnering with our customers to help create a more sustainable and water secure world.

About Xylem

Xylem (XYL) is a leading global water technology company committed to solving critical water and infrastructure challenges with technological innovation. Our more than 16,000 diverse employees delivered revenue of $5.25 billion in 2019. We are creating a more sustainable world by enabling our customers to optimize water and resource management, and helping communities in more than 150 countries become water-secure. Join us at www.xylem.com.

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ASEM

Water Resources Research and Development Center

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EWA Membership Application

☐ National Membership ☐ Sponsor Membership

☐ Corporate Membership ☐ Research Membership

Contact Person (Please type or print clearly in CAPITAL LETTERS)

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EWA | EUROPEAN WATER ASSOCIATION

Your interests are important for us

In order to inform you purposefully, we request the following information:

Interested in

- ☐ Integrated Water Research Management
- ☐ Restoration of Water Bodies
- ☐ Flood Protection
- ☐ Drinking Water
- ☐ Wastewater
- ☐ Storm Water
- ☐ Rehabiliation of Water and Wastewater Systems
- ☐ Climate Change
- ☐ Hydropower
- ☐ Research
- ☐ Economics
- ☐ European Legislation
- ☐ Other: .....

I became aware of EWA through

- ☐ Colleagues
- ☐ Journal *KA/KW*
- ☐ Educational events
- ☐ Internet
- ☐ Other: .....