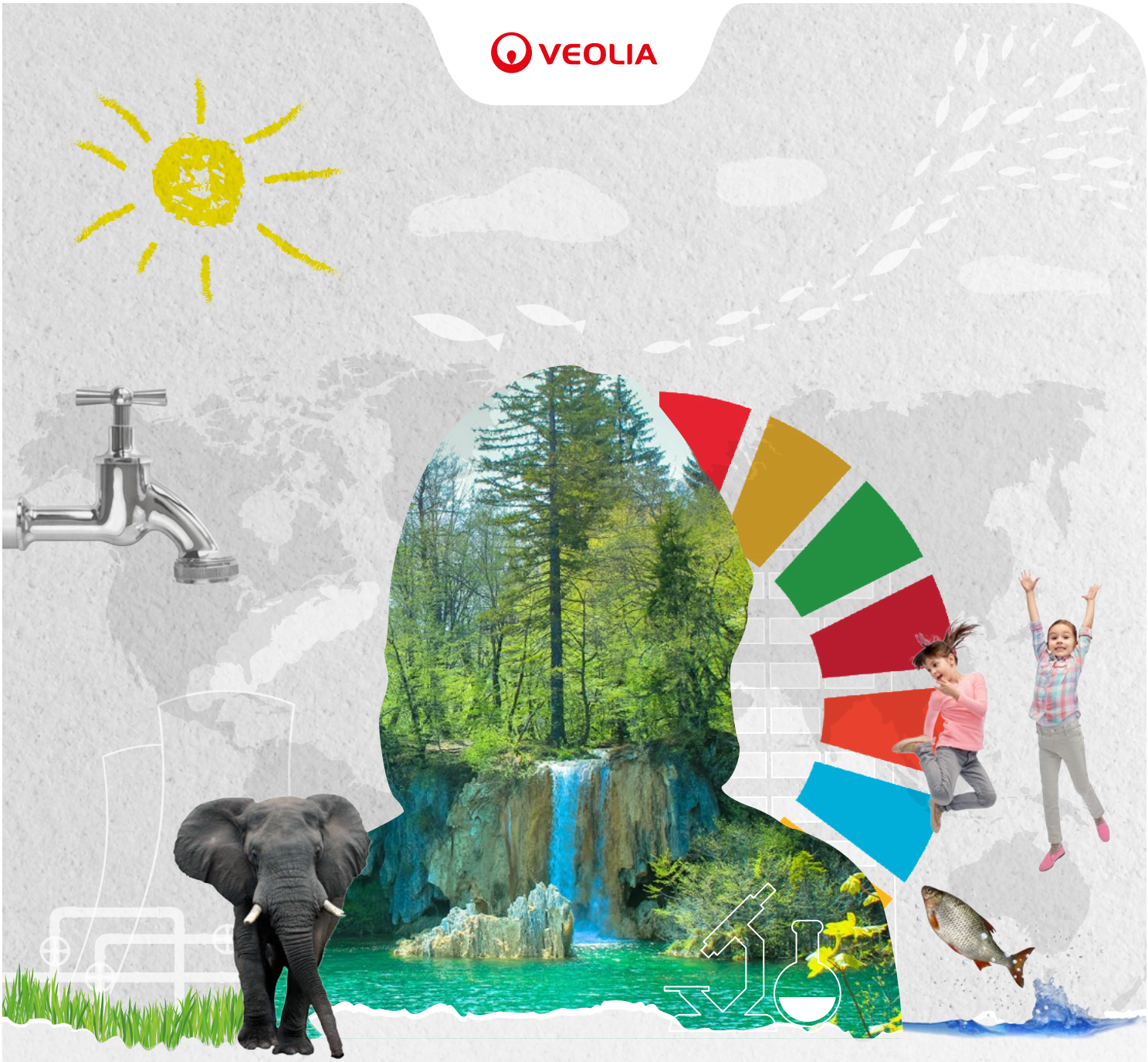
VEOLIA



OUR COMMITMENT SUSTAINABLE DEVELOPMENT GOALS

WATER TECHNOLOGIES

Contents

By working together we can — and will — make a difference

"There's nothing more essential to life on this planet, that has a limited supply, than water. From drinking and cooking, being used to manufacture almost everything from paper to medicine, to underpinning agriculture and generating electricity. Water is our most valuable resource.

However, many of the water sources that help our ecosystem thrive and sustain our way of life are under severe stress. The United Nations estimates that two billion people will be living in countries or regions with absolute water scarcity come 2025. A further two-thirds of the world's population will be facing water shortages.

In addition to losing access to these water resources, water demand is rapidly rising. It is projected to increase 55% by 2050 — this includes a 400% rise in demand to maintain manufacturing processes.

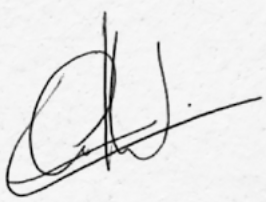
This unsettling situation is compounded further by climate change. As our worldwide weather and water patterns continue to be altered, we will face more frequent water shortages, droughts in some areas and flooding in others.

Without intervention, the future of our water resources is bleak. Urgent and decisive action is needed today, not tomorrow.

At Veolia Water Technologies, we have always believed that innovation advances water sustainability and improves resilience. And so, we have naturally aligned our business to help our customers support the United Nations' Sustainable Development Goals (SDGs). We are committed and will continue to contribute to all SDGs wherever water is involved.

Ahead of COP26, this report presents how innovation can help end poverty, by providing basic access to water and sanitation, and how innovation can help protect the planet, by safeguarding water resources.

As you will see, many of our customers already have ambitious environmental targets. And so, we invite you all to join us on our mission to resource the world. Together we can — and will — make a difference."



Vincent Caillaud,
Chief Executive Officer
Veolia Water Technologies

United Nations' Sustainable Development Goals

A BRIEF HISTORY

The 17 Sustainable Development Goals (SDGs) replace the Millennium Development Goals (MDGs) which mobilized the entire world between 2000 and 2015 behind a common program for developing countries.

The 17 SDGs were established in 2015 to build on this momentum to promote prosperity while protecting the environment.

Together, the SDGs create a blueprint to achieve a better and more sustainable future for all. However, six years after this historic agreement was signed by all 193 Member States, we are off-track to achieve our global targets. Furthermore, COVID-19 threatens to reverse much of the progress that has been made.

To ensure the world remains focused on the long-term benefits that will be brought about by the SDGs, the United Nations is calling for a Decade of Action — to accelerate sustainable solutions to all the world's biggest challenges by 2030.

"Sustainable development is more than a goal. It is our responsibility to our planet and future generations."

António Guterres, Secretary General of the United Nations.

The Sustainable Development Goals are the result of a three-year process involving 83 national surveys engaging over seven million people, making it the biggest consultation in UN history.

OUR COMMITMENT: TO THE PLANET AND OUR CUSTOMERS

As part of Veolia Group, we have established our contribution to the international community's sustainable development agenda, in line with the Sustainable Development Goals.

At Veolia Water Technologies, as part of our ongoing mission to resource the world, we create specialized water treatment technologies and services for sustainable development.

Our team designs and delivers drinking and wastewater treatment plants as well as developing water treatment equipment for industrial and municipal customers. Owing to this, we are providing access to water for more and more people, while helping to preserve this precious resource for future generations.

In this report, we share concrete examples of how we help our customers make a difference. By working together we believe we can achieve the United Nations' Sustainable Development Goals by 2030.

"The Earth is a fine place and worth fighting for."

Ernest Hemingway, American novelist.

GOAL 1
NO POVERTY

The fight against poverty has never been more important. Sanitary issues and natural disasters pushed the extreme poverty index to the first increase in decades. Goal one aims to ensure equal rights to access economic and natural resources as well as to basic services to all men and women.

"As long as poverty, injustice and gross inequality exist in our world, none of us can truly rest, moreover, the global campaign for action against poverty represents such a noble cause that we could not decline the invitation."

Nelson Mandela, Former president of South Africa.

Thanks to sustainable sanitation and drinking water solutions, Veolia Water Technologies plays a vital role in the economic growth contribution that reduces poverty.

70%
of people living in extreme poverty (those who earn less than $1.90 a day) live in South Asia and Sub-Saharan Africa.

In 2020,
it is estimated an additional
71 million people
were pushed into extreme poverty

SOLVING SEVERE WATER SHORTAGES IN LEBANON

Despite many natural advantages, many residents of Beirut lack critical water and sanitation

The facility produces 250,000 m³ of treated drinking water, every day — equivalent to 100 Olympic-sized swimming pools.

Geologically Lebanon has an abundance of natural resources such as limestone, iron ore and salt; however, the country lacks one vital resource: Water.

For decades the country has suffered from severe water shortage which, according to the World Bank, affects approximately 1.6 million people in Beirut and the Mount Lebanon area. The shortages are at their worst in the low-income neighborhoods of Southern Beirut where it was reported residents only have access to drinking water a few hours each day.

A project to increase the provision of potable water for these residents started in November 2017. Over three years later, the team utilized a coagulation treatment process to make surface water drinkable.

From 2022, the plant will supply water for 16 supply reservoirs through a distribution network of 187 km of pipelines across southern Beirut and parts of the Metn, Baabda and Aley to provide all 1.6 million people with access to safe, clean drinking water.

SUPPLYING SAFE DRINKING WATER TO 350,000 PEOPLE IN SRI LANKA

Good quality water for better living conditions

The island of Sri Lanka, located in the south of India, is known for its beautiful tropical landscapes. It has also been marked by conflict for over 30 years and now faces an increasing number of challenges due to climate change.

With new strategies and an inclusive economy, the country has overcome several poverty challenges. In 2017, our subsidiary, OTV, was awarded with an important contract for the construction of five water treatment plants in the agricultural area of Greater Matale.

The population previously consumed untreated water from unsafe sources, risking exposure to chronic kidney disease.

By improving the living conditions of this population, our team contributes to fighting against poverty, by giving locals better access to basic services.

75,000 m³/d of drinking water will be treated and supplied throughout the 430 km network.

"Access to water is a key factor in the growth of cities, their citizens and their economy. Veolia is deeply rooted and involved in Asia-Pacific. Today, we see that in Sri Lanka our solutions are helping an entire region's development by making it more competitive."

Claude Laruelle, Chief Financial Officer of Veolia Group.

65 VILLAGES IN SAUDI BENEFIT FROM CLEAN AND FREE WATER

Working with the Princess Al-Anood Philanthropic Foundation on a rural water desalination plant

Saudi Arabia is highly urbanized with close to 85% of citizens living in cities. However, the Borgen project estimates four million Saudis reside in slums on the outskirts of these cities — the country does not release regular statistics resulting in varied estimates by outside agencies.

Haqal is a mountainous village 90 km Northeast of Al-Laith district and 200 km away from the city of Makkah. Due to lack of proper water treatment, people of Haqal have sometimes consumed polluted water obtained from wells and ponds in the area.

Established in 2000, Princess Al-Anood Philanthropic Foundation handles all types of charitable work like housing and water treatment projects, construction of mosques, or offering support to those with special needs.

In collaboration with the Princess Al-Anood Philanthropic Foundation, our team established a water desalination plant in Haqal, in Makkah province. The facility in Haqal first became operational in May 2014 and has since benefited 65 villages and 10,000 citizens with clean and free water.

The contract was signed by His Royal Highness Prince Saud Bin Fahd Bin AbdulAziz Al Saud, the CEO of Princess Al-Anoud Foundation, and Badr Ghawji, Managing Director of Veolia Water Technologies in Saudi Arabia, for the supply and installation of the Haqal plant.

"We are extremely proud to be part of such an important project that reflects Veolia's commitment to supporting Saudi communities. Through our joint efforts with Princess Al-Anood Philanthropic Foundation, we aim to play a key role in educating the Kingdom's local communities about the environmental challenges ahead."

Dr. Badr Ghawji, Managing Director of Veolia Water Technologies Saudi Arabia.

GOAL 2
ZERO HUNGER

Goal two's primary aim is to ensure sustainable food production and implement resilient agricultural practices that increase productivity and production by 2030. The second phase is to increase investment in rural infrastructure and technology development to enhance agricultural productive capacity in developing countries.

If recent trends continue, the number of people affected by hunger will surpass 840 million by 2030, or 9.8% of the global population.

Whether it's water recycling and reuse, aquaculture or nutrient recovery, our technologies supported more than 700 food and beverage clients in 2020. Together we reduce their water consumption, limiting their water intake and reducing their carbon footprint.

"We need to start thinking about the future of food if we are going to feed nine billion people in a way that does not destroy our environment."

Bill Gates, American business magnate, responding to UN's 2050 population projections.

SUSTAINABLE SALMON AT FREDRIKSTAD SEAFOODS

Norway's first land-based plant feeds thousands

Aquaculture, also known as fish farming, has expanded almost 14-fold since 1980. Today, the world produces more farmed fish than beef and demand is expected to increase upwards of 35% in the next 20 years.

This is concerning since overfishing is one of the greatest threats facing the oceans today — and the damage caused by overfishing goes well beyond the marine ecosystem.

Norway's first land-based salmon farm is underpinned by a unique grow-out solution. This technology means fish are farmed in a controlled environment with state-of-the-art recirculation technology, ensuring stable water parameters to optimize growth and safeguard survival.

This creates a sustainable, resource-efficient and eco-friendly way of feeding our growing population while easing pressure on wild fish stocks and thus protecting the oceans.

Under the Convention on Biological Diversity, EU member states pledged 10.8% of their marine areas would become protected waters — in 2020 the EU achieved this target.

DAIRY FACTORY HELPS QUENCH THIRST IN MEXICO

A world-first technology created in the water-stressed state of Jalisco

When Nestlé inaugurated a new dairy plant in Lagos de Moreno, Mexico, the celebration focused on more than just the opening of a brand new facility. It was also about achieving zero-water dairy production to help protect the water-stressed city of Jalisco.

This is just one action Nestlé is taking to achieve its 2030 ambition to have zero environmental impact from its operations and, as part of this, we were tasked to conserve scarce groundwater resources and limit water extraction.

Working alongside dairy technology firm GEA Filtration, our Mexican team added new Cero Agua (zero water) technologies to the already constructed plant. They used a membrane reactor to remove solids and then reverse osmosis to allow all water from the plant's production processes to be reused.

This was a world-first for the dairy products industry that is being rolled out in Nestlé plants worldwide.

By 2020 Nestlé aimed to reduce its global water consumption by 35% which — with the help of this project and others — was surpassed on this site which achieved a 40% reduction.

Nestlé has reduced its water consumption globally by one third during the past 10 years, even while global production has increased.

"Nestlé is focused on creating a positive environmental impact. We have set a target to reduce water usage per ton of finished product by 25% as part of our commitment to conserve water resources. We asked Veolia to provide a solution that would enable us to recover water from our process in order to avoid using deep well water in a high hydrological stress region of Mexico."

Nuria Navarrete, Nestlé engineer.

GOAL 3
GOOD HEALTH AND WELL-BEING

Before the pandemic, major progress was made in improving the health of millions of people. Yet, today, the number of deaths and illnesses has rarely been so high. COVID-19 has and will continue to impact us but we must also continue to fight against pollution, hazardous chemicals, and contamination that can also have a detrimental impact. In doing so, goal three aims to reduce the global maternal mortality rate and manage sanitary risks to eradicate a wide range of diseases.

785 million people lack even a basic drinking-water service, including 144 million people who are dependent on surface water.

Veolia Water Technologies helps to facilitate good health and well-being by providing drinking water solutions and wastewater treatment services, improving sanitation conditions, and also with our laboratory water systems used by worldwide health professionals.

"It is health that is the real wealth and not pieces of gold and silver."

Mahatma Gandhi, Indian lawyer.

WATERING CUTTING-EDGE GENE RESEARCH

Next-generation sequencing technologies investigate chronic human diseases

Research at Yamaguchi University is focused on cardiovascular disease, which is the number one cause of death globally; dementia, which affects around 50 million people — of which nearly 60% live in low to middle-income countries — and cancer, which causes approximately 9.5 million deaths worldwide each year.

It used to take over a decade to complete a human genome project but today it can be done in just one day. This revolution in biological research is thanks to next-generation sequencing technologies that are capable of ultra-high throughput, scale and speed that provide an unprecedented level of detail.

This comprehensive genetic analysis is exactly what scientists at the Institute of Gene Research at Yamaguchi University in Japan are using to investigate chronic illnesses such as cancer, dementia and cardiovascular disease.

To ensure their success, the team relies on high-quality ultrapure water provided by our technologies, which is processed to remove all contaminants and impurities — even harmless minerals such as calcium, magnesium, sodium, potassium and phosphorus.

This ultrapure water is the foundation of various techniques, from preparing growth media for cell culture to diluting DNA and RNA after extraction from cells or tissues, as they can apply their analyses without data inaccuracy.

Yamaguchi University carries out research aimed to create new values, to solve problems, and to promote comprehensive understanding of humanity, society and nature.

RECORD BREAKING EFFORT IN THE CANARY ISLANDS

Emergency technical assistance to help quarantined holiday-makers without water

Positive case detection of COVID-19 demands an immediate lockdown to avoid any further risk of the disease spreading. An iconic hotel in Tenerife, Canary Islands, was no exception.

On February 24th, 2020, after identifying one case amongst its guests, one thousand people, including guests and workers, were quarantined as the hotel took necessary action.

The hotel services kept working normally until the desalination plant providing drinking water to the hotel shut down working due to technical problems.

Our Spanish team mobilized and following strict health and safety recommendations, a technician, Carlos Martín Rojas, volunteered to provide assistance and resolved the critical situation. In a record-breaking effort, he found a solution 48 hours after the call, restoring the hotel's drinking water supply.

Approximately 50% of the population in the Canary Islands depend on desalinated water supplies.

"It was one of the first cases of COVID-19 in Spain and there was little information regarding the virus, so it caused a lot of concern. Despite this complex situation, the entire team of the Canary Islands technical service understood that we had a commitment with the client, since the supply of drinking water depended on us."

Julio Castro, Canarias, Support Center Manager Veolia Water Technologies Ibérica.

PUTTING AN END TO HARMFUL FOREVER CHEMICALS

Successfully removing synthetic chemicals to safeguard human health

First created in a lab in 1947, C-8 has managed to spread extraordinarily far and wide. Today, there are thousands of these man-made chemicals known as PFOA and PFOS.

Research shows the widespread use of these chemicals and their incorrect disposal into landfills and waterways has impacted the environment and various ecosystems. Since these chemicals are highly persistent without intervention they will remain — and build up — in humans, animals and the environment indefinitely.

The United States Environmental Protection Agency is focused on removing 32 chemicals in particular as there is evidence excessive exposure leads to adverse human health effects.

Our team in North America is utilizing powdered activated carbon to try to adsorb these dangerous micropollutants. And, following successful trials, the perfluorooctanoic acid chemical compound (PFOA) has been successfully removed from contaminated well water.

This process removed approximately 80% of these harmful molecules and in the coming years the team hopes to be able to reduce concentrations from drinking water.

PFOA was detected in blood serum in 99% of the U.S. general population between 1999 and 2012; however, the levels of PFOA in blood have been decreasing since U.S. companies began to phase out production.

GOAL 6
CLEAN WATER AND SANITATION

***"Ensure availability and sustainable management of water and sanitation for all,"* is the aim of goal six. One of eight targets is to substantially increase water-use efficiency across all industries by ensuring sustainable withdrawals and fresh water supplies, to address water scarcity and reduce the number of people suffering from it.**

"Wastewater can no longer be regarded as waste. Today, only 2% of the wastewater produced in the world is reused. There is a lot of room for improvement!"

Antoine Frérot, Veolia Chairman and CEO.

Industry is one of the main water users in Europe, accounting for about 40% of total water abstractions. Furthermore, only 60% of industrial wastewater receives treatment before being disposed of into the environment.

We are the water treatment and technology experts of Veolia Group, the global leader in optimized resource management. This means, providing safe, clean, drinking water and environmentally conscious wastewater treatment solutions are at the core of everything we do.

"At AWS, we're on track to power our operations with 100% renewable energy by 2025 and achieve carbon neutrality by 2040. Beyond our own commitment, we also look for ways to innovate alongside customers in their efforts to accelerate research and innovation for their sustainable projects. We are delighted to put our technological expertise at the service of Veolia Water Technologies on providing access to clean water and sanitation."

Julien Grouès, Country Manager, AWS France.

ARTIFICIAL INTELLIGENCE: THE BRAIN BEHIND WATER-OPERATIONAL EXCELLENCE

Smart membrane technology helps plant operators better plan short-term preventative and long-term curative maintenance

The Oman Sur desalination plant treats over 150,000 cubic metres of seawater daily. This produces 130,000 cubic metres — equivalent to 52 Olympic-size swimming pools — of drinking water every day making the plant vital to the 600,000 residents of the Sharqiyah region.

The reverse osmosis membranes guarantee the most stringent international drinking water standards are met. Yet, a complex challenge the site team faces is anticipating when to clean or change the water filtering membranes. Working with Amazon Web Services, our team has developed a prototype that optimizes maintenance timings to ensure performance and prevent downtime.

The prototype was developed during the first wave of the COVID-19 pandemic but is already in beta testing. The team has plans to productize in the Middle East in 2021 with one goal: to provide an uninterrupted clean and safe water supply.

DISASTER RELIEF FOR COMMUNITIES HIT BY HURRICANE IRMA

Reinstating clean, safe, drinking water following category five storm

In September 2017, the caribbean islands of Saint-Martin and Saint-Barthelemy were crushed by Hurricane Irma. It caused widespread destruction, with houses flattened and boats flung on land, and it wiped out power and water supplies.

Without groundwater on either islands, the two desalination plants operated by SIDEM — a subsidiary of Veolia Water Technologies — represented the only means of producing drinking water.

The Saint-Barthelemy facility was largely preserved and thanks to the team's around the clock efforts, it re-started producing fresh water for the 9,500 inhabitants in under a week.

The situation in Saint-Martin was much worse and with a larger population of

© Photo credit: CAPA

40,000, emergency mobile water units were flown in from Spain. SIDEM employees worked with the Veoliaforce emergency teams that were sent by the Veolia Foundation to get safe water flowing.

© Photo credit: CAPA

"As an actor on the humanitarian scene, our mission was clear: to restore access to drinking water as quickly as possible in order to guarantee this vital service and avoid epidemics. The existing operational partnership between the Veolia Foundation and the French Red Cross proved once again to be very effective in the field."

Thierry Vandevelde, Executive Officer of Veolia Foundation.

At its peak, Hurricane Irma was a Category 5 with wind speeds of 284 km/h (177 mph).

"In partnership with Amazon Web Services, we have created a substantial edge in the value we can deliver to our customers, particularly improving the operational resilience of water plants."

Aude Giard, Chief Digital Officer.

THE WORLD'S LARGEST DISC FILTER INSTALLATION REDUCES DEPENDENCY ON THE NILE

Treating municipal, industrial and agriculture wastewater, Bahr El-Baqar prevents water scarcity in Egypt

Approximately 700 million people in 43 countries suffer today from water scarcity. By 2025, 1.8 billion people will be living in countries or regions with absolute water scarcity, and two-thirds of the world's population could be living under water stressed conditions.

Not only is the River Nile seen traditionally as the passageway between life and death, it is also the backbone of Egypt's industrial and agricultural sector as well as the primary source of drinking water.

However, in recent years, Egypt has suffered severe water scarcity owing to a rapidly growing population and inefficient irrigation.

To help reduce dependency on the Nile, and ensure water resources are sustainably managed, the Bahr El-Baqar plant treats 5,000,000 cubic meters of wastewater per day — equivalent to the water of one hundred and forty million showers.

Our team supplies the plant with 120 disc filters to recover and recycle the wastewater by removing organic compounds, bacteria and other harmful elements so it can be used for irrigation in Sinai governorate.

This is by far the biggest disc filter installation in the world, both in number of filters supplied and total filtration area. This helps reduce the environmental impact of the plant and reduce water intake from the Nile overall.

"Any alteration to Nile flows could make a huge difference. Every 2% drop of water affects one million people."
Randa Aboul Hosn of the UN development agency UNDP.

"Scarce availability to clean water is a global problem. Disc filter make wastewater reuse for irrigation possible. This is important in ensuring that all people can have access to clean drinking water in the future while at the same time fighting global hunger."
Peter Wiktorsson, Project Manager at Veolia Water Technologies.

GOAL 7
AFFORDABLE AND CLEAN ENERGY

All over the world efforts have been made to find new solutions to create and produce clean energy. In order to accelerate this transition, social and economic efforts must be made. Goal seven aims to double the global rate of improvement in energy efficiency to guarantee more reliable, affordable, sustainable and modern energy systems.

1.2 billion people
(20% of the world's population) do not have access to electricity.

By using anaerobic digestion to capture biomethane from wastewater sludge, which is then turned into energy, or implementing green infrastructures to control energy consumption, our technologies provide sustainable sources of energy and energy management.

THE NEVER-ENDING POWER OF SLUDGE

One city's mission to save money and the planet

Wastewater treatment produces sludge as a by-product which is primarily human waste. Instead of simply disposing of this sludge, which can be expensive and time-consuming, why not transform it into energy?

That is what Fréjus, a city located in the French Riviera, did in 2019 by equipping its Reyran station with a methanisation unit, allowing the conversion of biogas into biomethane.

The valorization of the biogas is ensured by our membrane technology via a separation technique that purifies the biogas (approximately 60% methane) into biomethane (over 97% methane) to meet the qualities required for its end use.

The technology uses very low energy to operate and does not require reagents or water. And, as well as producing natural gas and high-quality sludge for the agricultural sector, the reduction of its volume decreases constraints and costs of disposal and limits greenhouse gas emissions.

The biomethane is reinjected into the gas network, benefiting five municipalities by producing 6,000 megawatts of electricity and heating 750 local homes, annually.

"Reliable and affordable energy is essential for meeting basic human needs and fueling economic growth, but many of the most difficult and dangerous environmental problems at every level of economic development arise from the harvesting, transport, processing and conversion of energy."

John Holdren, senior advisor to President Barack Obama.

"This injection of green gas into our territory's natural gas distribution network is first and foremost the result of a political will to reduce our agglomeration's energy dependency. In addition, it limits GHG emissions, generates revenue and allows us to benefit from avoided costs. These savings can be reinvested in projects aimed at developing new energies or reducing energy consumption."

Maurice Chabert, former CAVEM elected representative of five municipalities including Reyran.

"With numerous innovations, such as the biofiltration of water, treatment by air micro-bubbles injected into the water, mesophilic digestion of sludge, secure biomethane production, and the perfect control of acoustic and olfactory nuisances, everything has been done to ensure that this plant is useful, productive and perfectly integrated into our urban environment."

Louis Nègre - Mayor of Cagnes-sur-Mer, Delegate President of the Nice Côte d'Azur Metropolis.

FRANCE'S FIRST ENERGY-POSITIVE WASTEWATER TREATMENT PLANT

Effective and controlled energy savings

France has committed to reduce its greenhouse gas emissions by 40% between 1990 and 2030 and fourfold between 1990 and 2050.

For the past few years, energy transition has been in the center of French priorities. Ambitious programs were launched under the Energy and Climate Change Law 2019 by designing a national low-carbon strategy.

Even before the law, Veolia Water Technologies' subsidiary, OTV, began working on the Cagnes-sur-Mer wastewater station in 2017. Located in the south of France, it is France's first energy-positive wastewater treatment plant.

Beyond the architectural concerns regarding the design and harmony of the building in the sector and the green aspects integrated in the plant, OTV accomplished this with high-performance equipment in compliance with European standards.

Today the plant treats the wastewater of 160,000 inhabitants and produces more energy than it consumes. Thanks to a low temperature sludge treatment, limited energy consumption, the recovery of all potential sources (solar, heat pumps, etc.), and production of biomethane for resale by reinjection into the network, the site produces enough power to supply 1,000 homes.

GLOBAL PRAISE FOR THE BILLUND BIOREFINERY

With three innovation and sustainability awards on its mantel, this facility produces more than energy

Denmark ranked top in the global sustainability index for 2020. One of the country's biggest accomplishments is reducing its CO_2 emissions over 50% since peaking in 1996.

It has achieved this by rethinking its resources and one example is the Billund BioRefinery, which is much more than a wastewater treatment plant.

Denmark has decided that Danish wastewater utility companies will be 100% energy and Climate Neutral Certified by 2030.

Yes, it treats the wastewater of approximately 70,000 residents, but it's an innovative and complete sludge reduction solution that makes it special. This is the first full-scale plant of its sort in the world boasting continuous thermal hydrolysis.

This means it can anaerobically co-digest 5,000 tonnes of primarily domestic organic waste, together with the surplus activated sludge from the biological wastewater treatment process, per year — the same weight as 33 blue whales.

It runs continuously, rather than in batches so the reactor volume is used 100%. As a result, it treats over three times the amount of sludge compared to a similar sized batch reactor, substantially lowering its energy footprint.

Billund's biogas production generates about three times the energy requirements of the plant itself, with the surplus being exported to the grid.

"Billund Water and Energy has chosen SDG 7 as one very important goal for the future. Supporting production of more green energy from biogas production, than the entire utility company can use in making electricity, heat for district heating. An important step in making Billund municipality a CO_2 neutral community."

Ole Johnsen, CEO, Billund Water and Energy.

"The greatest threat to our planet is the belief that someone else will save it."

Robert Swan, polar explorer

GOAL 9
INDUSTRY, INNOVATION AND INFRASTRUCTURE

Innovation and industrialization are at the heart of social and economic development. Goal nine aims to bring sustainable and inclusive solutions together, to develop quality, reliable, sustainable and resilient infrastructure by updating, increasing resource-use efficiency and adopting clean and environmental technologies.

"Science and technology, powered by the fuel of entrepreneurial energy, are the largest multipliers of resources we have to solve our many social problems."

Vinod Khosla, entrepreneur, investor and technologist.

Around 800 million people in the world lack access to water.

When it comes to sanitation, Veolia Water Technologies innovates and helps customers get the most of their water infrastructure. Our team designs and maintains water networks of all kinds to ensure long-term sustainability and profitability with enhanced optimization, improved resiliency and continued compliance.

REUSED WATER COUNTERS WATER SCARCITY

A small municipality is pioneering water resiliency in Spain

Water is scarce in El Port de la Selva. This small city in Costa Brava in northeastern Spain has just 1,000 full-time inhabitants, yet welcomes 12 times more visitors during the summer months. As a result, it suffers from water stress when rainfall is limited.

Recognizing the importance of tourism and that holiday-makers need access to water, the municipality enrolled in an European Union funded project called DEMOWARE (DEMOnstration of WAter REuse). As the DEMOWARE technology experts, our mission was to investigate the feasibility of indirect potable water reuse*.

The mission was to guarantee technical, economical and sanitary viability of the project for drinking water supplies in peak seasons and an initiative from the Port de la Selva City council was to secure the reuse treated wastewater for the aquifer recharge.

In partnership, and with minimal additional infrastructure, this wastewater reuse was implemented in 2016. The installation helps ensure tourism, supporting the local economy, and promotes the circular economy too.

**The indirect potable water reuse project is on standby until further notice from Consorci d'Aigües Costa Brava Girona.*

Tourism in Spain is the third largest contributor to national economic life accounting for 12.4% of the country's GDP.

"This aquifer is sufficient for the supply in normal situations, but during the drought period of 2007 - 2008 we realized that we were pumping and supplying extra water. At that time, we considered the possibility of reusing the water we already had, not only for non-drinking purposes, which we were already doing, but also to return it to the system, so that it would become a natural resource to feed the aquifer."

Josep María Cervera, Mayor of El Port de la Selva.

The global augmented reality (AR) market is expected to grow at a compound annual rate of 75% from 2016 to 2024 to reach USD 100.2 billion by 2024.

AR facilitates remote collaboration with subject matter experts in real-time via smartphones, mobile devices, web browsers and smart eyeglasses, to conduct virtual inspections and verifications.

INNOVATION BEAMS EXPERTS INTO THE FIELD... FROM THEIR DESK

Based in Jordan but virtually in Germany, augmented reality enhances the world of field services

Global travel was extremely limited during 2020, owing to the COVID-19 pandemic. This meant when a giant in the food and beverage industry required a factory acceptance test (FAT) an alternative solution needed to be found.

Our digital team used a real-time augmented reality (AR) tool, Fieldbit. AR can let the user see the real-life environment with a digital augmentation overlay.

In this case, the German team was able to virtually present all the pre assembled equipment to the customer in Jordan, the United Arab Emirates and France.

This means, without actually being there, the customer could still speak to our experts, thoroughly check the equipment and get answers to a wide range of situations.

The full inspection was carried out live and the FAT approved in under two hours, instead of a three day business trip. The equipment was then shipped avoiding any possible delay in commissioning and production of the process water treatment plant.

GOAL 11
SUSTAINABLE CITIES AND COMMUNITIES

For several decades, climate change has presented a real challenge to urban management. Severe storms, floods, droughts, wildfires and earthquakes are becoming more frequent. Inclusive and sustainable urban development at all levels provides a safeguard to develop urban adaptation. Goal eleven targets better adaptation to climate change in cities and communities, by becoming more resilient to disasters and implementing sustainable infrastructure.

Half of humanity – 3.5 billion people – lives in cities today and 5 billion people are projected to live in cities by 2030.

Whether it is a residential district, a university campus, or a shopping, hospital or business complex, water is vital. Veolia Water Technologies brings comprehensive and integrated solutions in terms of water resource management to help meet sustainable city challenges.

"The proper use of science is not to conquer nature but to live in it."

Barry Commoner, American cellular biologist, college professor, and politician.

SLOVENIAN CAPITAL WELCOMES A SEMI SELF-SUFFICIENT ENERGY WASTEWATER TREATMENT PLANT

Energy-efficiency with better environmental footprint

In 2017, Slovenia was named the most sustainable country on Earth by National Geographic and their dedication to sustainability continues.

Their capital, Ljubljana, is undertaking a rehabilitation and extension project for their existing wastewater treatment plant. This is currently the most important environmental project in the country which aims to increase capacity by 52% once completed in 2022.

This reference project will ensure the removal of pollution in accordance with European Union directives and will be more energy efficient. It will feature state-of-the-art equipment for the biological treatment of sludge and concentrated nitrogen.

Optimization and reuse of the energy potential contained in the wastewater treated will contribute towards an energetic self-sufficient wastewater treatment plant with reduced energy consumption.

Slovenia continues to promote self-sustainability and the circular use of resources to achieve a minimal environmental footprint supporting the European Green deal.

This will increase the treatment capacity of the existing plant from 360,000 to 550,000 local residents.

"Apart from the [equipment] installation, new clarifiers will also be installed so the general capacity will be extended. In this way, the wastewater treatment plant will be able to comply with the strict national and EU standards on effluent discharge into the Ljubljanica River that runs through the old part of the town."

Lars Henrik Andersen, Project Manager with Krüger A/S, a subsidiary of Veolia Water Technologies.

BLUEKOLDING USES DATA TO INCREASE SEWAGE SYSTEM RESILIENCE

An innovative approach helps maintain wastewater infrastructure whatever the weather

The current level of investments in many EU member states is too low. To reach and maintain compliance with the Directive in the long term, several EU towns or cities still need to build or modernize their infrastructure for collecting wastewater, as well as to put modern treatment plants in place.

In the face of increasing extreme weather events, cities are future-proofing their essential infrastructure to adapt to climate change.

Safeguarding resiliency by being in a position to anticipate, prepare for, and react quickly to disturbances is now a priority for wastewater treatment plant (WWTP) managers.

For more than 14 years, BlueKolding A/S — the company responsible for the municipality of Kolding in Jutland, Denmark — has prioritized and applied technology to ensure they can maintain steady plant loads and avoid combined sewer overflows across their entire sewer network owing to frequent heavy rainfalls.

Since the first installation, in 2007, of our digital solution at the Agtrup WWTP, BlueKolding has implemented it throughout the sewage network and at three satellite wastewater sites.

In 2017, they then launched BlueGrid — a project to combine the data already being captured with weather forecasts and rain radar data to ensure their resiliency, whatever the weather.

Analysis from ASCE predicts the U.S. water and wastewater system infrastructure investment gap is at $82 billion per year.

"BlueGrid serves as a good example of BlueKolding's commitment to due diligence in relation to the challenges posed by heavier and increasing amounts of rain. It also constitutes an important part of our strategic ambition to be a front runner in the digitalization of our company and an inspiration to our industry by making the most of the data we have available. In order to do so we have grown accustomed to moving further and faster than rules and regulations require us to."

Per Holm, CEO of BlueKolding.

WORLD-CLASS CENTRAL DISTRICT FOCUSES ON WORLD-CLASS SUSTAINABLE INNOVATION

TRX aims to grow its economy with sustainable solutions

Following the Government's Economic Transformation Program, the state-owned Malaysian company, Kuala Lumpur - TRX City Sdn Bhd, launched the project Tun Razak Exchange (TRX), a new international trading hub, located in the heart of the capital.

Hosting commercial, leisure and cultural spaces as well as residences, the 70-acre metropolis aims to reduce its carbon emissions by 40%, divert 70% of its waste from landfill and reduce its total fresh water intake by 50%, when compared to conventional development. It is rated platinum on Malaysia's Green Building Index.

Wastewater treatment and reuse is fundamental to the sustainable mission of the project. To achieve this, we combined five technologies which resulted in lower chemical consumption and achieved the lowest possible energy consumption to minimize the site's carbon footprint.

The treated water delivered in an intelligent network eliminates leaks and aims at a network efficiency of over 98%. With a reuse capacity of 100%.

TRX is the first fully integrated commercial water recovery project in Southeast Asia and a global reference project for sustainable development.

"This will be the first plant in Malaysia that processes the wastewater and produces the recycled water to supply the entire development."

Muhammad Baharuddin Mohd Nordin, Construction Manager TRX.

GOAL 12
RESPONSIBLE CONSUMPTION AND PRODUCTION

"If we could build an economy that would use things rather than use them up, we could build a future."

Dame Ellen MacArthur, The Ellen MacArthur Foundation.

Currently, worldwide consumption and production — a driving force of the global economy — relies heavily on the natural world and its resources. If this continues it will have destructive impacts on the planet. Goal 12 encourages large companies to adopt sustainable practices and to integrate sustainability performance into their reporting cycle to better manage natural resources.

At Veolia Water Technologies, we create technologies for sustainable development. We focus on keeping water resources in use for as long as possible by improving energy efficiency and providing efficient water treatment solutions. This reduces the overall ecological impact of our customers' production processes and ensures the responsible consumption of water.

1.3 billion tons of food is wasted every year, while almost 2 billion people go hungry or undernourished. — Worldvision

DEIONIZATION EXPERTIZE KEEP ON TRUCKIN'

A secure source of treated water is now only one truck away thanks to brand new regeneration facility

The facility is capable of regenerating up to 90,000 liters a day of industrial resins, annually — equivalent to 298 full bathtubs.

"Our mobile water business provides solutions for our clients to secure their activity and their assets, sometimes in adverse conditions, always in a safe and reliable way. It is also an innovative option to address water scarcity."

Vincent Caillaud, Chief Executive Officer of Veolia Water Technologies.

Due to its proximity to Benelux — Belgium, Luxembourg and the Netherlands — and France, Heinsberg in Germany has always played a central role in the region's industry. Now, thanks to a new state-of-the-art facility, it is set to be at the circular heart of European industrial manufacturing.

Mobile water services has set up camp in Heinsberg to provide energy, chemical and petrochemical industries, amongst others, with 24/7, 365 days, access to ion exchange technology. This means the resins used to deionize and purify water across all of these industries — used to produce everything from high pressure steam to process water used in manufacturing — can be recycled or regenerated to be reused time and time again.

Not only does this €20 million Veolia Water Technologies' investment provide an economic solution for local industries. It also provides an environmental solution on the doorstep of many industries that optimizes resources, ensures reliability and business continuity by securing supplies.

PLANT-BASED CHEMICALS GET THE GREEN LIGHT

Proud to be organic and Halal, AAK Foods adds “green” to the menu

From coconuts found in the subtropical regions of Sri Lanka to shea oil from the Sahel of western Africa, AAK Foods based in Runcorn, UK, upholds the responsible and sustainable sourcing of all its ingredients.

As part of their ongoing efforts to implement the circular economy throughout their business — and in direct alignment with the Sustainable Development Goals — they sought to improve their effluent water treatment performance at their Runcorn facility. They wanted to reduce their overall chemical usage and make sure their operation was as environmentally friendly as possible.

AAK Foods selected our vegetable-based organic coagulant made from the renewable source of black acacia tree bark. This non-toxic coagulant proved to be a greener and more efficient alternative to traditional metal-based coagulants like ferric chloride or polyaluminium chloride which are toxic.

Food processing accounts for up to 30% of food-related greenhouse gas emissions and 25% of worldwide water consumption. Food, therefore, lies at the heart of trying to tackle climate change, reducing water stress, pollution, restoring lands back to forests or grasslands, and protecting the world’s wildlife.

CANNED SARDINES CHAMPION ENVIRONMENTAL CONSERVATION

How recovering solids and fats for manufacturing helps save the planet

From car manufacturing, to medicine making and canned sardines, all of these processes have an impact on the environment. Public awareness of this has intensified over the last thirty years and, as a result, more and more companies search for solutions to lower their environmental footprint.

Today, groups like GUAYMEX — a leader in the processing of canned sardines in Mexico — are making their contribution by better managing their resources.

In 2019, while expanding its process plant in Matancitas, GUAYMEX sought to upgrade their wastewater treatment plant. For the treatment of their residual discharges they used a dissolved air flotation system to lower chemical consumption, and a self-cleaning screen filter, was used for wastewater pre-treatment and solids separation.

The reduced solids and fats are then recovered, reducing the environmental impact and increasing the profitability of the plant.

"Another source of water pollution as a result of food production is when untreated wastewater is discharged from domestic, industrial, agricultural or mining sources. In 2010, more than 70% of Mexico's water bodies were contaminated, especially those in the Valley of Mexico, according to the UNAM (National Autonomous University of Mexico)."

Greenpeace.

GOAL 13
CLIMATE CHANGE

Climate change is affecting every country on every continent and so there has never been a greater need to strengthen resilience and adaptive capacity to climate-related hazards and natural disasters. Goal 13 strives to do this by keeping a global temperature rise this century well below two degrees Celsius above pre-industrial levels.

The World Bank determined that "there's no certainty" humans could adapt to a world that is four degrees Celsius warmer.

At Veolia Water Technologies we continue to develop a wide range of innovative solutions to improve the environmental impact of water consumption. By optimizing their water management processes and focusing on water reuse and wastewater recycling, our customers directly reduce their greenhouse gas emissions.

More than one million species are at risk of extinction by climate change.

"Climate change is the single greatest threat to a sustainable future but, at the same time, addressing the climate challenge presents a golden opportunity to promote prosperity, security and a brighter future for all."

Ban Ki-Moon, Former Secretary-General of the UN.

DESIGNING THE FUTURE OF WASTEWATER TODAY

Borås aspires to create a city free from fossil fuels

Since the Swinging Sixties, Borås, the second largest city in Western Sweden, has been committed to sustainable development.

This dedication paved the way for a SEK 400 million (€42.5 million) contract to design and build an ambitious wastewater treatment plant for the 210,000 residents. The plant came online in late 2018, featuring the latest advancements in sustainable wastewater treatment to produce sludge with the highest possible potential to generate energy in the nearby biogas plant. In addition, phosphorus is recovered, mainly through biological treatment to be reused as fertilizer.

We've worked with Borås Energi och Miljös for over a decade. Together we provide the City of Borås with district heating and cooling, biogas, waste management, water and sewage treatment and energy services.

The joint aim is to convert the energy of the city's waste streams into renewable valuables, and create a city free from fossil fuels.

"We are really proud of the fact that Borås has a wastewater treatment plant of the highest environmental standards."

Jonas Holmberg, Marketing Director of Borås Energi och Miljö.

Swedish Parliament aims to be the world's first fossil-free welfare state to showcase a prosperous, inclusive and equal society without greenhouse gas emissions. A large political majority introduced a climate policy framework in 2017 to reach net-zero emissions by 2045 at the latest, and thereafter negative emissions.

SAFE, CLEAN AND CLEAR-CONSCIENCE WATER

The waterworks in Moos sets standards in economy and drinking water quality

According to NASA over the past 170 years, human activities have raised atmospheric concentrations of CO_2 by 47% above pre-industrial levels found in 1850. This is more than what has happened naturally over 20,000 years.

"Because the future of our children is particularly important to us."

Hermann Gruber, Federal Construction Manager of Bavaria.

After only three and a half years of planning and construction, the waterworks from Waldwasser in Moos, Bavaria — a drinking water site near Deggendorf, Germany — began operation in 2018 and simultaneously became one of the most modern plants in Europe.

Not only does the facility provide more than 80,000 private households with soft, clean drinking water, it does so with a crystal clear conscience.

The central element is an ion exchange system which softens the drinking water, reduces sulphate, nitrate and chloride, and also uses carbon dioxide (CO_2) as a regeneration agent. The CO_2 is recovered from an exhaust gas from the chemical industry instead of being emitted directly into the atmosphere.

This reduces energy consumption by 50% compared to other technologies and relieves the atmosphere of 630 tons of CO_2 per year — equivalent to the CO_2 emissions of 6.6 million kilometers traveled in a car every year.

Due to the large energy savings, the German Ministry of Environment has sponsored the technology used at the waterworks in Moos.

KEEPING THE LIGHTS ON AND WATER FLOWING IN EGYPT

Supporting Egypt's 2030 vision to drive sustainable urban development and economic growth

As demand for energy rises, the power sector's water usage is expected to increase even further, straining scarce water resources. Thirty-six countries around the world already suffer from high or extremely high water stress.

Cairo Electricity Production Company, an affiliate of the Egyptian Electricity Holding, awarded a consortium — led by our team in Egypt and France — the contract to design, build and set up water and wastewater treatment plants for the Assiut Supercritical and Cairo West power plants.

The mission: to address the ongoing water scarcity and power outages in the country.

A team of approximately 180 engineers from across the consortium enabled both power plants to operate at maximum capacity while meeting each boilers' feed and high demand for extra-pure demineralized water.

This helps lessen chemical consumption and eliminates chemically-contaminated wastewater, improving the quality of the water being discharged while contributing to ensuring continuous power supply in the region.

To stabilize (or even reduce) concentrations of CO_2 in the atmosphere, the world needs to reach net-zero emissions. This requires large and fast reductions in emissions. — Our World in Data.

"With a globally unique combination of processes, it is certainly one of the most exciting projects in recent years."

Uwe Sauer, Head of Sales Municipal Applications, Veolia Water Technologies Germany.

"Assiut PowerStation is fully designed and implemented to be operated using natural gas and/or mazout. The power station is designed with an ash handling system to treat the exhausted flue gases to ensure our commitment in keeping our environment safe and clean."

Eng. Emad Gamal Ragheb, Project Manager of Upper-Egypt Electricity Production Company (UEEPC).

GOAL 14
LIFE UNDER WATER

The world's oceans are the undeniable force behind our global ecosystem. Their temperature, chemistry, currents and the life they inhabit makes the Earth habitable for humankind. However, life underwater is facing serious threats with up to 40% of our oceans heavily affected by pollution causing depleted fisheries and loss of coastal habitats. Goal 14 seeks to significantly reduce marine pollution of all kinds and minimize the impact of ocean acidification.

"Industrial pollution and the discarding of plastic waste must be tackled for the sake of all life in the ocean. Surely we have a responsibility to care for our planet. The future of humanity and indeed all life on earth, now depends on us."

Sir David Attenborough, English broadcaster and natural historian.

The market value of marine and coastal resources and industries is estimated at $3 trillion per year or about 5% of global GDP — World Bank.

Water pollution occurs when harmful substances such as chemicals or microorganisms are released into the environment, contaminating rivers, lakes, oceans, etc. The innovative solutions developed by Veolia Water Technologies meet the needs of large industries as well as local authorities and public entities to ensure any water released back into the environment is thoroughly tested and safely discharged.

CATCH 22 OF COOLING TOWER TREATMENT

Salty alternative provides onsite oxidizing solution for cooling tower water

"Using salt electrolysis to produce an oxidizer against bacteriological development is a simple solution already used for swimming pool water treatment. It reduces toxic discharges into the natural environment after treatment while ensuring the durability of the installations."

Philippe Guérinel, Water Treatment Chemical Activity Director, Veolia Water Technologies.

French legislation requires industrial companies to reduce the environmental impact of their cooling towers. Their strict controls focus on bacterial growth and aim to eliminate the risk of Legionnaires' disease, which requires the use of biocide.

However, simultaneously, legislation restricts the use of synthetic biocide to reduce pollutant levels in both steam and water discharges from cooling towers.

This is vital as roughly 80% of marine and coastal pollution originates on land including agricultural run-off, pesticides, plastics and untreated sewage.

A leading player in the oil and gas market found themselves in this catch 22. They required a clean and secure operation of their cooling tower facilities while also meeting the strict environmental regulations for their water discharges.

Our team designed an on-site generator using only salt water and electricity to produce a suitable oxidizer. This provided an ecological alternative to synthetic biocides and has both positive environmental and economic impacts.

UNLOCKING THE SECRETS OF ANTARCTICA

Supporting the Italian National Antarctic Research Programme

The Antarctic region is a sensitive indicator of global change since buried inside polar ice caps is a record of past atmosphere and environmental factors that go back hundreds of thousands of years.

Scientists from the Italian National Antarctic Research Program have been uncovering these secrets by analyzing ice, snow, sediment, atmospheric and oceanic samples for over 30 years.

In November 2011, a team from the CNR Institute for the Dynamics of Environmental Processes and the Department of Environmental Sciences, Informatics and Statistics, Università Ca' Foscari in Venice documented the significance of pollutants of particular concern in water samples and rare earth elements.

Their ship was equipped with a laboratory and to conduct their work in the field successfully a reliable source of ultrapure water was needed to ensure the cleanliness of all the sampling equipment.

The team also returned to Italy with ice cores and over 300 frozen samples for analysis. Their research measurements were often made at ultra-trace levels also requiring the most sensitive analytical techniques and our purest water supplies for sample preparation and analysis.

Covering more than 70% percent of our planet, [the oceans] govern the weather, clean the air, help feed the world, and provide a living for millions — Natural Resources Defense Council, Inc.

The average annual loss of ice from Greenland and Antarctica in the 2010s was 475 billion tonnes – six times greater than the 81 billion tonnes a year lost in the 1990s.

"When monitoring baseline levels in a pure environment such as Antarctica, it is vital to avoid introducing any contaminants during the sampling procedure [...]. We need to be certain that whatever we are analyzing is coming from our samples and nowhere else."

Dr. Warren Cairns, Analytical Chemist at CNR-IDPA.

CLEANING UP RANDLE REEF

Reducing harbour contamination to significantly improve water quality

Marine pollution occurs when human-created products such as industrial waste and sewage enter our waterways. A prime example is Hamilton Harbour and an area known as Randle Reef.

The size of the Randle Reef site is approximately 60 hectares — equivalent to 120 U.S. football fields.

Owing to its heavy-industrial past, it became the largest contaminated sediment site on the Canadian side of the Great Lakes. Many improvements had been made to reduce pollution but the legacy problem of contaminated sediment remained.

The site contained approximately 695,000 cubic metres of sediment contaminated with polycyclic aromatic hydrocarbons (PAHs) and other toxic chemicals.

The three-stage remediation project involves: building a 6.2 hectare Engineered Containment Facility (ECF) over the most contaminated harbour sediments; dredging and depositing adjacent contaminated sediments into the ECF, and placing a thin layer cap on residual sediments outside the ECF; and finally, sealing the contaminants and creating a pier over the top of the ECF to be operated by the Hamilton Oshawa Port Authority.

During Stage 2 the contaminated water produced by hydraulic dredging is treated. On average, the process reduces the concentration of suspended solids by 90%. It also reduces selenium by 55%, lead by 99.5% and PAHs by over 85%. Stage 2 will be completed in late 2021.

This project will reduce the slow spread of contaminants through Hamilton Harbour, significantly improving water quality and fish and wildlife habitats. It is to be completed in 2023.

GOAL 15
LIFE ON LAND

Industrialization, urbanization and unsustainable agriculture practices, among others, contribute to massive desertification and soil contamination. Today, two billion hectares of land are degraded, driving species to extinction, impacting 3.2 billion people's lives and having a direct impact on climate change. To achieve a land degradation-neutral world, goal 15 aims to combat desertification and restore degraded land and soil.

Degraded land impacts almost half of the world's population (7.8 billion)

At Veolia Water Technologies, our experience within soil and groundwater remediation started in the early 1980s when we started designing and operating remediation systems. Today we have provided remediation solutions to more than 100 customers in 10 countries to save their soils.

"A nation that destroys its soils destroys itself. Forests are the lungs of our land, purifying the air and giving fresh strength to our people."

Franklin D. Roosevelt, Former President of the United States of America.

DISCOVERING A MINE OF CHALLENGES

Helping to protect the environment as part of the biggest mine clean up in the world

Faro is a town in the center of Yukon, Canada, known for its vast wilderness. It was also home to the largest open pit lead-zinc mine in the world — 25 square kilometers, an area roughly the size of the city of Victoria, British Columbia.

In 1998, the mine was abandoned by the owners leaving the Canadian government with what was to become one of the most complex remediation projects, ever.

During the mine's operations (1969 to 1998), its processes left behind waste rock and finely crushed particles, known as tailings, which proved to be highly acidic.

This caused a significant purification challenge as the tailings were contaminating water.

To minimize the risk of discharging untreated water into the Pelly River, the team used water clarification processes to remove acidity, dissolved metals (mostly zinc, iron and manganese) and suspended solids. This ensured the water met Federal regulations before it was released into the environment.

Acid leaching posed a large environmental risk to the surrounding land and water and so a $1 billion CAD clean up spanning 40 to 50 years started.

CLEANING UP AGENT ORANGE RESIDUE IN DA NANG, VIETNAM

Treating soil contamination from the Vietnam War

Since the dioxins persisted in the environment they infected millions of people in Vietnamese, Cambodian and Laotian border areas causing health problems. Today, the fourth generation still suffers from the effects of this pollution.

"Our thermal remediation project approach was evaluated by USAID to give the lowest potential impact on human health and the environment."

Maiken Faurbye, Manager for soil remediation, Krüger A/S, a Veolia Water Technologies' subsidiary.

A pile of excavated soil 100 meters long, 70 meters wide and 8 meters high was treated, and the whole procedure was carried out twice.

For more than ten years, the American armed forces sprayed 80 million liters of a powerful defoliant, known as Agent Orange, on Vietnamese soil.

This herbicidal warfare destroyed forests and plantations and the consequences of this long-outlasted the war, as the defoliant entered the water cycle and food chain, and ultimately peoples' bodies.

To counteract this, in 2012, the Vietnam Ministry of Defense and the United States Agency for International Development (USAID) launched a project to treat 87,000 cubic meters of soil and sediment at Da Nang airport. This is an ex-military airbase and hot-spot for dioxin pollution because the U.S. used it for storage and handling of the chemical.

The American company, TerraTherm (later part of Cascade), teamed up with us to use the best technology capable of meeting the cleanup standards. The process called remediation heats the soil to 335°C (635°F) for several months so the dioxins vaporize or degrade and become available for extraction and treatment.

Choosing in-pile thermal desorption, achieved the best performance with the lowest environmental impact in only 20 months. And, once remediated, this regenerated and safe soil was placed back in the environment.

© Photo credit: USAID

SOLUBLE FERTILIZER REVOLUTION OF AUSTRALIA'S SULFATE OF POTASH

More performance, less risk

Global awareness of food quality grows, leading farmers to seek more sustainable solutions. Potassium sulfate (SOP) is a certified fertilizer for organic agriculture that is increasingly in demand for its distinct advantages: it has a substantially lower chloride content and provides plant-available sulfur, essential for some crops.

In the Asia-Pacific region, the demand for such fertilizers thrives thanks to the expansion of micro-irrigated, green-house grown horticulture. Australian company Salt Lake Potash Ltd. enlisted our team to develop the Lake Way potash mining project to produce SOP from dry salt lake deposits using solar evaporation to concentrate the hypersaline, potassium-rich brines for salt harvesting.

To process these solids, our team designed and supplied two evaporation and crystallization technologies: one to grow 32 tons of high-purity potassium sulfate crystals every hour, the other to recycle 54 tons per hour of solids to yield the maximum potassium recovery.

Focusing on enhancing environmental sustainability as well as energy and resource efficiencies, our tailored technologies growing fully-soluble crystals, help global fertilizer producers to optimize their recovery operations.

245,000 tons of SOP will be produced per year — which is heavier than the weight of Sydney Opera House.

"Based on test work, which confirmed the process viability, our crystallizer technology will help the flagship Lake Way project set the industry benchmark in producing high-grade SOP."

Jim Brown, CEO of Veolia Water Technologies Americas.

Our conclusion

Since September 2015, when all United Nations member states adopted the 17 Sustainable Development Goals, our collective global progress has been slow.

The Secretary-General of the United Nations, Antonio Guterres, has called for a decade of action to ensure we meet the global targets we set ourselves.

We all need to take responsibility and act today — not tomorrow — to end poverty, protect the planet and ensure all people enjoy peace and prosperity by 2030.

At Veolia Water Technologies, we are committed to supporting the Sustainable Development Goals.

Are you?

Publication Director: Élise Le Vaillant

Chief editor: Séverine Le Bideau

Creators: Maria Dinard, Kathryn Moore

Contributors: Anne Abraham, Aditya Akella, Emily Brennan, Julio Castro, Rune Christensen, Maxime Claudot, Jérôme Colin, Annabel Dorr, Mark Dyson, Mark Elliot, Marie Esteve, Olivier Estienne, María Jesús Fernández, Antonio Fonseca, Alain Gadbois, Rebecca Gan, Lisset Garcia, Marie Gaveriaux, Badr Ghawji, Aude Giard, Julien Grouès, Stephen Heal, Abdelrahman Helal, Graham Holt, Elie Hreiz, Tobias Jungke, Claude Laruelle, Sylvaine Leriquier, Oscar Mcclure, Alexandre Merian, Lydie Mimiette, Nadine Mourad, Matias Navarro, Louis Nègre, David Oliphant, Enrique Ortega, Manon Painchaud, Inti Perez, Maan Rafeh, Emad Gamal Ragheb, Rania Sadek, Uwe Sauer, Gisela Schilling, Anne-Liza Shepherd, Per Håkon Stenhaug, Evelyne Vermeulen, Lainee Wong, Natasha Zarach

Design: Veolia Water Technologies Graphic Design Team

Photo credits: © Veolia photo library François Berthemet / Benoit de La Rochefordière / Christophe Majani D'Inguimbert / Christophe Daguet / Christel Sasso/CAPA Pictures - Getty images - Shutterstock.

This report features third party quotes that do not relate to Veolia Water Technologies: Randa Aboul-Hosn, UNDP Resident Representative; Sir David Attenborough, English broadcaster and natural historian; Barry Commoner, American cellular biologist, college professor, and politician; Mahatma Gandhi, Indian lawyer; Bill Gates, American business magnate; Greenpeace; Ernest Hemingway, American novelist; John Holdren, senior advisor to President Barack Obama; Vinod Khosla, entrepreneur, investor and technologist; Ban Ki-moon, former Secretary-General of the United Nations; Nelson Mandela, former president of the South Africa; Dame Ellen Patricia MacArthur DBE, Ellen MacArthur Foundation; Franklin D. Roosevelt, 32nd U.S. President; and Robert Swan, polar explorer.

This report features third party facts and figures that do not relate to Veolia Water Technologies: American Society of Civil Engineers, Economic Development Research Group; Borgen Project, 7 Facts About Poverty in MENA; Danish Ministry of Climate, Energy and Utilities, Denmark's Integrated National Energy and Climate Plan; Desalination and Water Treatment report: Volume 55, 2015 - Issue 9; European Environment Information and Observation Network, State of Europe's seas - European Environment Agency, 2017; European Commission, Urban waste water: improvement in collection and treatment across the EU helps reducing pollution in the environment; European Union (EU), Eurostat: Water use in Industry; Global Sustainability Index 2020; Gouvernement.fr website, Adoption of the national low-carbon strategy for climate; Instituto Nacional de Estadística, Travel and Tourism report; Intergovernmental Panel on Climate Change (IPCC); Statista, Augmented reality (AR), virtual reality (VR), and mixed reality (MR) market size 2021-2024, published by Thomas Alsop, Mar 1, 2021; National Aeronautics and Space Administration (NASA), Global Climate Change: CO_2 observations; Natural Resources Defense Council, Inc., Helena Eitel, Pawan Patil, and Ocean Art Hub (www.oceanarthub.org); Our World in Data, CO_2 and Greenhouse Gas Emissions by Hannah Ritchie and Max Roser; Swedish Environmental Protect Agency, Sweden's Climate Act and Climate Policy Framework; United Kingdom Committee for United Nations Children's Fund (UNICEF UK); United States, Environmental Protection Agency, Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA); United States National Hurricane Center. May 25, 2020; United Nations, Food and Agriculture Organization (FAO); United Nations, Sustainable Development Goals; United Nations; United Nations Information Centres; World Bank, Fish to 2030: Prospects for Fisheries and Aquaculture; World Electric Power Plants Database; and WorldoMeters, Current World Population.

Veolia Water Technologies Communications - 04/2021 (210080)

Resourcing the world

Veolia Water Technologies
L'Aquarène • 1 place Montgolfier • 94417 Saint-Maurice Cedex • France
tel. +(33) 0 1 45 11 55 55
www.veoliawatertechnologies.com