Winter 2023

IDA GLOBAL CONNECTIONS

The water sector is considered one of the most critical pillars of **Egypt's national security**

Interview with **H.E. Prof. Hani Sewilam**, Minister for Water Resources and Irrigation, Arab Republic of Egypt

TABLE OF CONTENTS

Editorial Director
Shannon McCarthy

Editorial Inquiries
+1-978-774-0959
info@idadesal.org

Sponsorship Inquiries
+1-978-774-0959
sponsorships@idadesal.org

This publication is produced on recycled paper in support of sustainability

MESSAGE FROM THE SECRETARY GENERAL

Dear Members and Colleagues:

This year marks the 50th anniversary celebration of the International Desalination Association, and while we are certainly chartered and obligated to continue looking forward, every now in then it's worth peeking over our shoulders, so that we can recall how far we've come.

The technological advances we have made since 1973 can only be described as remarkable, and that is a testament to the passion and efforts that you have invested to resolve growing water scarcity. But the scientific and technical developments made pale mightily in comparison to the lives that we have changed for the better because of your desire to innovate and help to provide water for all. And, for that you should feel both proud and accomplished.

The 50th year of a marriage is known as the Golden Anniversary and, as the color of gold symbolizes, the 50th year is meant to fondly recollect the wealth of experiences that we have shared, but even more so it represents the optimistic hope that we will carry into our 51st year and beyond. So, as we humbly consider our past achievements together, we must also move forward with a distinct measure of persistence and diligence.

This year we enthusiastically anticipate the IDA Seville Summit on Water and Climate Change that will take place on 15-18 October 2023 in the beautiful city of Seville, Spain. This summit will focus on adaptation to climate change and address the synergies between the adoption and integration of unconventional water resources as part of the solutions to food security, industry, and municipal water needs. We will also feature talks and case studies from the industry on being water-positive, making more fresh water available than is used.

To whet your appetite for the upcoming summit, in this month's magazine, we hear from H.E. Prof.

Hani Sewilam, the Minister for Water Resources and Irrigation of the Arab Republic of Egypt, who reveals how his country is addressing water challenges in the face of mounting environmental and climate change, population growth and decreased government spending.

We have also captured the high-level communiqués presented at the IDA 2022 World Congress in Sydney by dignitaries such as Secretary John F. Kerry, the United States Special Presidential Envoy on Climate Change, Hon. Sebastian Piñera, former Chilean President and Hon. Tanya Plibersek, Minister for the Environment and Water in Australia.

H.E. Dr. Abdulaziz Al-Shaibani, the Deputy Minister for Water from the Saudi Ministry of Environment, Water and Agriculture provides an Executive Viewpoint on the Kingdom of Saudi Arabia's measures to reduce carbon emissions and an update on the Saudi Green Initiatives. And Mr. Marco Arcieri, Vice President of the International Commission on Irrigation and Drainage (ICID), provides a detailed analysis of the use of non-conventional water as a means for irrigation.

We hope you enjoy the contribution from Eng. Nizar Kammourie, the CEO of SAWACO Water Group, about the launch of a new technology that is designed to increase the capacity of Reverse Osmosis desalination
Plants, as well as the piece from Eng. José Manuel Pano, the CEO of Interconsultores S.A., summarizes how water flows through the seventeen objectives of the 2030 United Nations agenda.

We also have a commentary from Dr. Claudio Sáez Avaria, a Senior Researcher at the Department of Marine Sciences and Applied Biology Faculty of Science, Universidad de Alicante, Spain, who substantiates the use of desalination as an environmentally trustworthy activity. Finally, we offer you the commentary from Ms. Lauren Nicole Core, a Climate and Water Writer and Filmmaker, who provides an update on the mobile direct potable reuse (DPR) system that purifies municipal wastewater for potable use.

As the IDA is an accredited UN Environmental and Social Council (ECOSOC) NGO, we are co-convening two side events at the upcoming UNGA Water Conference in New York on March 22. It's our sincere pleasure to work with the Government of Spain to moderate the discussion on incorporating unconventional water resources into integrated water resource management plans. We are equally thrilled to collaborate with the US Chamber of Commerce for our second side event focused on why desalination and water reuse are critical to addressing water scarcity and utilizing unconventional water resources as an emerging opportunity to narrow the water supply-demand gap.

The national motto of Spain is *"Plus Ultra,"* which translates from Latin as *"Further Beyond."* As we prepare to gather this October in Spain, let us all consider the boundaries we can push and the lives we can change by taking desalination and water reuse technologies *further beyond.*

Sincerely,
Shannon McCarthy

MESSAGE FROM THE PRESIDENT

Dear Colleagues,

I would like to start this note with a thank you message for the trust the board and members have placed in me with being elected as the president of the International Desalination Association (IDA) for the term 2022-2024. I am humbled by the opportunity and excited to continue the path of impact which is being paved through the continuous hard work and genuine dedication of all stakeholders within the IDA's ecosystem.

As we mark IDA's 50th anniversary this year it's evident that the role of the Association has never been more relevant as highlighted at the IDA World Congress in Sydney last October. Industry leaders, decision makers and government representatives unanimously agreed that we are chartering unprecedented times, and facing dire water shortages due to multiple factors including; increasing population, urbanization, industrialization, and climate change. We have reached the point where humanity depletes the available freshwater supply at a rate of 4.3 trillion cubic meters yearly – the majority of which goes to agricultural and industrial uses, and the U.N. estimates that one in four people may live in a country affected by chronic freshwater shortages by 2050. According to the World Bank, this climate-induced reduction in freshwater availability, coupled with increased demand, could also reduce water availability in cities by more than 66% by 2050. Needless to stress, securing alternative water sources through wastewater treatment, recycling and reuse, and desalination is therefore no longer considered as complementary but rather essential to achieve water security.

At large, at the UN COP27 this year, the importance of integrating greener technologies, further collaboration between the private and public sector and the need for mega sustainable water projects were all centric to high level discussions. This all asserts the important role the IDA must continue playing in creating abundant opportunities for industry leaders and decision makers to engage, explore new opportunities, be introduced to latest technologies, and to share top quality strategic insights. We must continue advocating, brainstorming, and engaging with all stakeholders to be able to close the increasing gap between water supply and demand and to give back to our communities, all over the world.

Today the IDA has members from over 60 countries, so as we march ahead to help shape the future of water recycling and reuse, and

desalination worldwide, we must set priorities that are both feasible and achievable. I'm proud of IDA's successes over the last term, under the leadership of Shannon McCarthy and Carlos Cosin, particularly in securing more opportunities for meaningful engagement of our members, sponsors, and industry thought leaders, all while achieving a financial turnaround. In the year ahead, we will continue these initiatives, as we continue building on the tremendous worldwide awareness and recognition of the IDA, thereby securing more share of voice across markets.

Protecting fundamental human rights for safe and clean water access and achieving inclusive economic opportunity through supporting circular economy is another priority for us this year. The IDA will continue working with its global stakeholders' community to reinstate the real value of water and bring solutions to meet the UN SDG, especially No. 6 – Clean Water and Sanitation and No. 11 – Sustainable Cities and Communities. With my extensive experience at Metito for almost four decades, I have first-hand knowledge of fruitful collaborations between the public and private sectors and affirm that working together to integrate best practices combined with governments' ability to scale impact, is the shortest path to a more water positive world.

The changes around us—whether climate change, environmental, social, political, technological, economic or otherwise—require that we help each other navigate through new and increasingly complex landscapes, which profoundly impact the companies for which we work, our communities, and the water industry at large. To achieve water security, we must work together and leverage our strengths within our immediate and larger ecosystems to innovate collectively and find solutions to positively impact water accessibility and availability. As an industry we have achieved a lot, but the coming years are crucial and the IDA's role, its connections, accumulated experience and ability to influence the industry and decision makers, must be amplified. This is what we promise to achieve.

One of our many responsibilities as the IDA leadership team is to facilitate the transformation of great viable proposals into reality, and so I ask you all to further engage with us, share your ideas, your best practice and your experience and we promise to do our best to make you proud of your association with the IDA and the impact we are creating. We have so many great people and so many opportunities ahead of us and together we will work collaboratively to grow the association and grow the awareness of the value of our work.

Sincerely,

Fady Juez

The water sector is considered one of the most critical pillars of Egypt's national security

IDA Interview with **H.E. Prof. Hani Sewilam**, Minister for Water Resources and Irrigation, Arab Republic of Egypt

How is Egypt addressing water challenges, in the face of mounting environmental and climate change, non-replenishable aquifers, and increasing clean water demands to meet agricultural, industrial, municipal, and residential needs?

It's well known that Egypt is a water-scarce country as we are approaching 500 m3 /capita/year. This per capita share continues declining with the increase in population. In addition, 97% of our renewable water resource comes from outside the country. Furthermore, Egypt is extremely vulnerable to climate change impacts in different aspects, the uncertainty of the amount of flow coming from upstream countries, global warming and associated increasing demand on the water as well as the challenges due to sea level rise and saltwater intrusion which affects the groundwater quality in the coastal areas as well as the risks associated to inundation of the most fertile land of the Nile delta.

Accordingly, the water sector is considered one of the most critical pillars of Egypt's national security, and it's well addressed in the Egypt Vision 2030. Moreover, all-comprehensive sustainable development plans depend on the state's ability to provide the necessary water resources required to implement these plans.

How can public utilities proactively address these challenges, and how can they secure sustainable supplies of safe water in the face of population growth, urbanization, decreased government spending, industrialization, and climate change?

Accounting of the increasing demand, we started to reveal the problems and risks; it was essential to act firmly in a preventive manner; we recognized that the future bears more severe conditions, especially with a changing climate.

The Egyptian government has spent billions of US dollars on projects to make the best use of the limited available water resources and increase water use efficiency by minimizing all types of losses, maximizing water productivity, intensifying water reuse, and improving water quality.

For this purpose, the Ministry of Water Resources and Irrigation is working on various programs; in terms of water

resources management, the Ministry adopted the national project for the rehabilitation of canals and the use of modern irrigation methods, in addition to the establishment of two mega treatment plants for agricultural drainage water, all to provide additional quantities of water for increasing agricultural areas to meet the increasing demand for food and adapt to climate change. It also carried out

> Egypt adopted a strategy to cover drinking water uses in coastal cities with desalination plants; the aim is to reach 2.5 BCM/ year in the year 2050 (according to MOHUUC).

comprehensive studies and enhanced governance of the deep non-renewable groundwater to achieve sustainable management.

We have implemented a program to protect against floods and water harvesting through the construction of small dams and storage lakes; we also implemented many projects to protect coastal areas from sea level rise and seawater intrusion in the Northern delta.

Also, several ministries concerned with the water and food files, in partnership with the Ministry of Water Resources and Irrigation, have undertaken their plans to ration the use of water resources.

How is Egypt leveraging unconventional water resources as new sources of sustainable water supply that can complement its natural resources in the face of growing water demand?

The country's total water need is 114 BCM/year to meet a steadily increasing population, where the total water needs are almost double the available; thus, we had no choice but to reuse drainage water and shallow groundwater and expand in desalination to fill the gap; while the rest, around 34 BCM/year of virtual water is bridged through imported crops.

Mega treatment plants were undertaken (Bahr el Baqar - Hammam - Mahsama) to enable us to recycle nearly 14 MCM/day to make use of each drop of water; after the accomplishment of the Hammam plant, Egypt will be recycling about 40 percent of its renewable water resources.

In addition, Egypt adopted a strategy to cover drinking water uses in coastal cities with desalination plants; the aim is to reach 2.5 BCM/year in the year 2050 (according to MOHUUC).

How has the Egyptian initiative AWARE included the role of unconventional water resources through water reuse and desalination in its strategy? What investments are being made for exchanging information, capacity building, and investment in water adaptation and projects?

The Egyptian government has launched the AWARE program on the sidelines of COP 27, and extensive consultations are being conducted with partners to ensure it addresses all the gaps in the water sector globally; desalination and water recycling are part of the six work streams, and it is well addressed in its main objectives. Egypt will announce the action plans of the initiative at the UN 2023 Water Conference.

Establishing regional hubs is the key delivery mechanism of the AWARE program; they will oversee the implementation of the work streams for adaptation to climate change in the water sector at the regional level. These hubs are the gateways for supporting and providing knowledge transfer and data exchange in all work streams and projects. Egypt will host the first Hub in Africa (the Pan-African Centre for Water and Climate Adaptation). The Regional Training Center affiliated with MWRI, with its facilities and labor (Laboratories, meeting rooms, hotel, and staff and employees), is devoted to this purpose.

> In 2006, the government of Egypt adopted a new long-term policy to increase the involvement of private firms in the country's economic development as a source of capital financing and know-how.

This Center is to be scaled up to other regions of the world according to future COP presidencies and champions that catalyze replication. The Hubs will have different (sub-regional) nodes in supporting countries (or regional organizations) that focus on primary activities and actions.

How about the more comprehensive Public Private Partnership project structures (PPPs) for water reuse and desalination projects - following global trends - is this something Egypt is re-considering now?

The government of Egypt is always keen to include PPPs in its development plans, and water reuse and desalination projects are among the investments that Egypt is encouraging in cooperation with the private sector.

In 2006, the government of Egypt adopted a new long-term policy to increase the involvement of private firms in the country's economic development as a source of capital financing and know-how. The aim of the new policy was to expand the much-needed investment in infrastructure within the country.

To promote the involvement of private companies, the Egyptian Ministry of Finance decided to establish the Public-Private Partnership Central Unit; in August 2010, the government brought in a specific PPP law, Law No. 67, regulating Partnerships with the Private Sector in Infrastructure Projects, Services, and Public Utilities.

As for desalination for drinking purposes, the government was keen

to engage the private sector as part of its development plans. In recent years, several corporations succeeded in Sharm el Sheikh, Hurghada, and North Coast cities. In wastewater treatment and reuse, New Cairo Wastewater Treatment Plant is the first public-private partnership (PPP) project in Egypt, among others.

Also, there are tremendous efforts by the government to overcome the distinctive national characteristics that may challenge the implementation of (PPPs).

How are international development agencies assisting Egypt to secure water sustainability through the construction of desalination and water reuse facilities?

International development agencies are assisting Egypt to secure water sustainability in the construction of desalination and water reuse facilities through innovative financial mechanisms and the provision of appropriate technologies. Also, bringing together inclusive partnerships and diverse knowledge are keys to solving water and development

challenges. Therefore, creative and transdisciplinary projects that combine research, education, and capacity-strengthening activities.

In the meantime, and in recognizing the urgency of climate action and the pivotal role of Egypt as host of COP27, the Government of the Arab Republic of Egypt (GoE) has sought to establish a flagship program/package of national projects "NWFE" launched and showcased at COP27, with the goal of enhancing Egypt's national capacity for climate adaptation and mitigation as well as enhancing its water, food, and energy security.

We welcome the support of the private sector and donor institutions to maximize the mobilization of donor support to enhance Egypt's water and food security for Egyptian citizens through the NWFE to Egypt's Country Platform, in meeting its sustainable development goals, and implementing its NDCs, in line with Egypt's Vision 2030 and the 2050 National Climate Change Strategy.

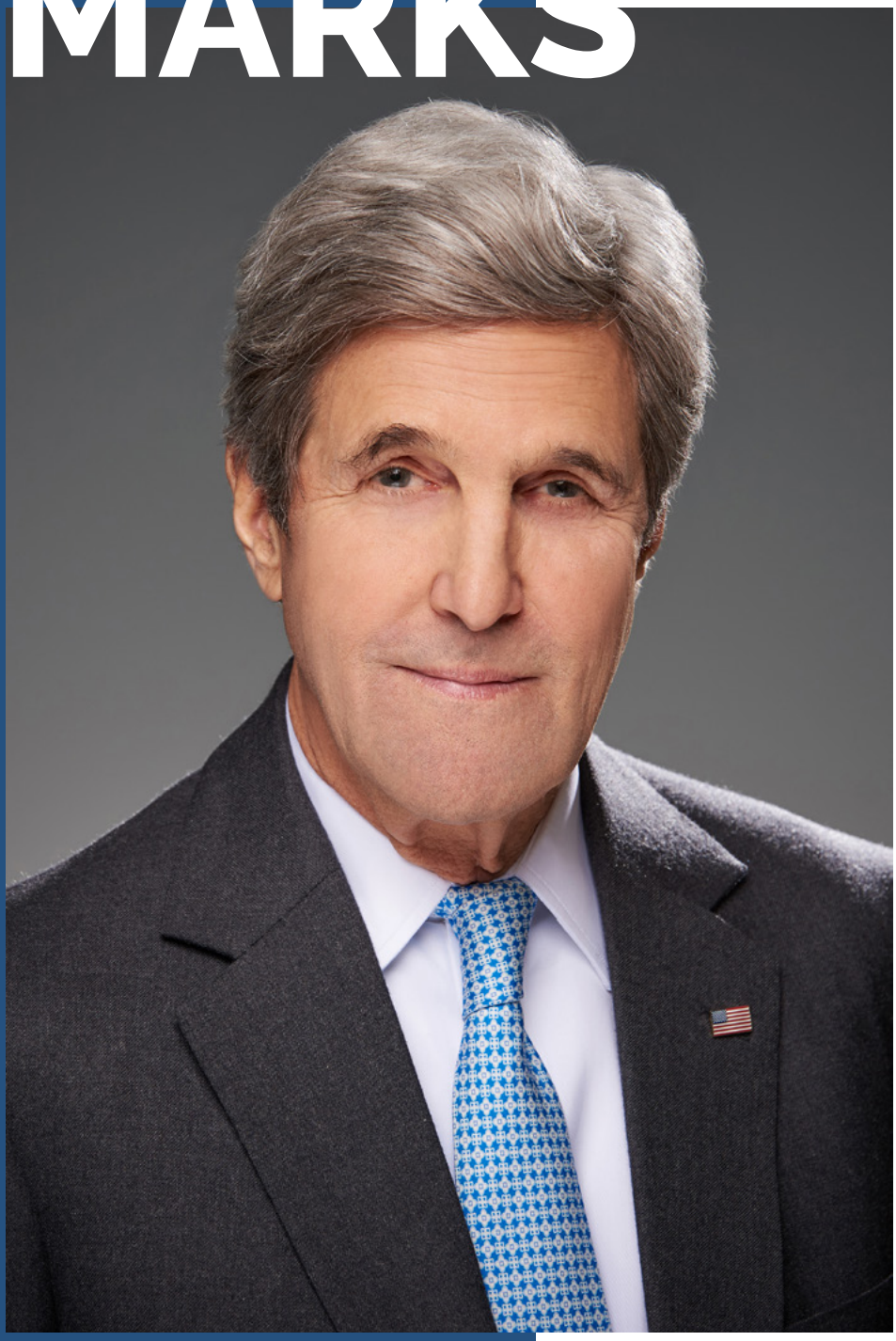
What is Egypt's general desalination and water reuse program in the coming years? Will we see more small-scale localized projects or continue to see more significant projects with mega capacities to serve wider communities and purposes?

Egypt is exploring all available technologies worldwide in the desalination and treatment of agricultural drainage water with high salinity levels, starting from traditional ones for drinking water to innovative Water-Energy-Food Nexus approaches. We explore investing in desalination projects, not only for drinking purposes but also for food production.

With the continuous increase in population and limited water resources, food security is challenging all national entities to collaborate; to find solutions for non-conventional water resources for food production.

In the meantime, and parallel to the works in implementing mega-scale projects, small, localized projects remain on top of our priorities list, to be explored according to the needs assessment for different geographic locations for small communities.

SPECIAL REMARKS



HON. SECRETARY JOHN F. KERRY

United States Special Presidential Envoy on Climate Change

Remarks presented at IDA 2022 World Congress in Sydney

Good afternoon, I really wish I could be with you in person at this year's International Desalinization Association World Conference, but unfortunately, with COP 27 just a few days away, it's not possible. Most people will first experience the impacts of climate change through water, either too much or too little. Two billion people already lack access to safely managed drinking water, and this problem is only getting worse due to climate crises. We see it all around the world; rivers that are low, glaciers that have melted, the world is changing, and if the water continues to disappear and climate change significantly alters both the access to and the availability of fresh water, it is really easy to imagine the geopolitical consequences. We have already seen tensions rise around the basins of the Nile River in Africa, the Indus River in South Asia, and the Mekong River in South East Asia. These growing tensions between the direct human consumption of water and agricultural and industrial needs require the development of novel sources of fresh water. In some places, water security will only become a reality through greater investment, advances in technology and innovation, and improved water management at every level of government.

Through the White House action plan on global water security and the President's emergency plan for adaptation and resilience known as 'Prepare,' the United States is fully committed to partner in efforts to tackle the water crises. Desalinization is a critical tool in this effort, and it can be a really good way to produce drinking water as part of a broader water management scheme when powered by renewable energy and when waste byproducts are well managed. Technological advances in desalinization and water reuse, and recycling are coming quickly, and they offer solutions to the challenges in providing clean water to an increasing human population on a changing planet. To solve the climate crisis and to avoid the worst consequences of it, we need everyone to be on board. We all have a role to play, we can't, no one country can solve this problem by itself, and I have no doubt that the attendees at this important conference can make an important contribution to finding climate-smart solutions to meet water demands and advance water security. Let's get as far as we can quickly and together. I am confident that we can do it. Thank you.

SPECIAL REMARKS

HON. SEBASTIAN PIÑERA

Former Chilean President

Remarks presented at IDA 2022 World Congress in Sydney

Ladies and Gentlemen, it's a great honor to participate in the International Desalination Association World Congress 2022 in Sydney, Australia. I would like to thank and congratulate all the scientists and researchers around the world that contribute so much to ensure water flow. Each generation has its own challenges and missions, but no generation has faced such an urgent and formidable challenge as climate change and global warming and such a vital and great mission as surviving. This is the battle for our lifetime. The human being is the smartest and most ingenious creature living on planet earth, and yet, it is the only one capable of destroying its own planet, our only planet. Some people are skeptical about global warming, but the scientific evidence is overwhelming. We know too much to remain skeptical. This is not anymore a matter of opinion, it is a matter of facts and science. We need to take now bold action and tackle the root of the problem to reduce our emissions and increase our capture of greenhouse gases. This is why Chile pledges to become carbon neutral before 2050. We also must adapt to the new climate reality.

Adaptation is not an option, it is an urgent task for the benefit of this generation and those to come. In this context, the desalination is a good solution, and Chile is fully committed to desalination. In the last thirteen years, Chile has experienced its worst drought in its history. That is why we have taken tough measures to combat this dramatic drought, to ensure water for human consumption, and to advance in efficiency and agriculture and other economic sectors. Because of our geography, the Pacific Ocean can quench thirst, can alleviate this serious drought, and can promote great progress for our lives. We already have 35 desalination plants working, producing water for human consumption and natural use, and we have many more plans under construction. My dear friends, I'm convinced, fully convinced, that the alliance between technology, nature, and entrepreneurial spirit can transform millions of liters of salty water into drinkable water and useful water, which means 'Life' for millions of people. Water is Life, lets protect our water. Have a useful journey, and thank you very much.

SPECIAL REMARKS

Australian Government
Department of Climate Change, Energy the Environment and Water

HON. TANYA PLIBERSEK

Minister for the Environment and Water, Australia

Remarks presented at IDA 2022 World Congress in Sydney

So, hello, everyone gathering at the International Desalination Association World Congress. My name is Tanya Plibersek, and I'm Australia's Minister for the Environment and Water. Welcome to Sydney, which is my beautiful hometown. I'm so sorry that I can't be with you in person today because of an earlier commitment, but I did really want to send you a message because what you are discussing here at this conference is so very important. Australians live on the driest inhabited continent on earth. We know that water security is literally a matter of life and death. In the last 20 years, we have lived through two brutal droughts, with the worst, what Australians call the millennium drought, lasting eight terrible years.

The reality and the difficult truth is water management is only going to get more difficult for all of us going forward. Rainfall patterns are changing, temperatures are changing, climate change means that in Australia's biggest river system, the Murray-Darling Basin, river flows could decline by as much as 30 percent by the year 2050. So, we need to manage our precious water recourses as carefully as we can, but we also need tools at hand for when management is not enough. So, desalination is one option for providing safe and reliable drinking water that's independent of rainfall. All of Australia's major cities are located along the coast, and they all have large desalination plants as part of their mix of urban water supply. Outside our major cities, smaller desalination plants are helping local communities by providing safe drinking water while supporting industry and agriculture. We've relied on your facilities in some of our most difficult times. I know that you will all share ideas and experiences, learn from each other and make your operations even more effective. I know that the Australian Desalination Industry has been working very hard to improve its efficiency and to embrace renewable energy.

All major plants in Australia are either sourced from renewables or offset their emissions. So, I encourage everyone in this sector to consider how they can contribute to our transition to net zero emissions and how they can leave as light an environmental footprint as possible. As a sector, you have consistently embraced science, technology, and innovation to address your environmental challenges, to strengthen water security, and to overcome barriers to successful implementation. So, the successful uptake of desalination plants in Australia has relied on a collaboration between the government, water infrastructure providers, and water users, and I really hope that that will continue into the future. So, thanks again to all of you for coming here to Australia to attend this important conference. I hope you enjoy our hospitality; I hope you have a fruitful week together, and I hope you get to have look around Sydney, which is a beautiful, welcoming City. Thanks

ENVIRONMENTAL STEWARDSHIP

TOWARDS DECARBONIZATION OF THE WATER SECTOR IN SAUDI ARABIA

By H.E. Dr. Abdulaziz Al-Shaibani, Deputy Minister for Water, Saudi Ministry of Environment, Water and Agriculture

The Paris Agreement of 2015 sets global commitments to reduce carbon emissions from all economic sectors. The Signatory Parties agreed to prepare, communicate and maintain a nationally determined contribution and pursue domestic measures to achieve their commitments. Accordingly, the water sector in the Kingdom of Saudi Arabia has strategized and taken robust actions toward achieving the country's contribution. This is further propelled by the water sector's commitment to the country's effort to plant 10 billion trees during the coming decades as part of the Saudi Green Initiative and the national objective to achieve net zero carbon emissions by the year 2060.

Water production, transmission and distribution and wastewater treatment are naturally energy demanding processes. This energy demand is exacerbated in Saudi Arabia by intensive production of desalinated water, pumping of deep groundwater and operating an extensive water transmission network. Decarbonization of the water sector in the country then must take a systematic approach, embedded within an overarching enabling environment, to be able to reduce, replace and remove carbon emissions.

Saudi Arabia's current strategic standpoint is expressed by its National Water Strategy 2030 with its vision of a "sustainable water sector, safeguarding the natural resources and environment of the Kingdom and providing cost-effective supply and high-quality services, contributing to economic and social development." The Strategy guides the water sector to attain environmental sustainability, minimize environmental footprints, enhance operations and boost economic efficiency.

To date, the Saline Water Conversion Corporation, the major public producer of desalinated water and a global leader in the desalination industry, is going beyond energy efficiency requirements, reducing costs and increasing the sustainability of its operations. Starting from a baseline of 60 metric tonnes of CO2 annually in 2019, the Corporation targets a 56 percent emission reduction by 2024, with the remaining 44 percent to be removed by 2030. This will

be achieved by adopting renewable energy sources, reducing gas fuel consumption by 43 percent through use of efficient technologies and phasing out of all liquid fuel use in desalinated water production. The Corporation's carbon-neutral proposal includes expansion of solar power to cover 50 to 62.5 percent of energy requirements in three reverse osmosis plants. This shift is not only an environmental win but is expected to result in savings of 8.8 billion Saudi Arabian Riyals annually. The Corporation's CO2 emissions reduction represents 26 percent of the total 130 tonnes set for Saudi Arabia in the Paris Agreement.

Given the fact that desalinated water production is the most energy demanding and carbon emitting process in water production, Saudi Arabia has utilized other water supply sources to optimize the energy supply mix and minimize their carbon footprint. Supply sources include groundwater wellfields, surface water dams and treated sewage effluent for non-potable purposes. Water transmission is another energy demanding process and thus identifying the optimal water supply mix in regional contexts has efficiently further reduced the energy requirements and carbon footprints of the water sector in the country.

For food production, the governance of groundwater resources has witnessed a peak in implementation of policies that reduce carbon footprints by maintaining economic depth to water and eliminating excessive pumping. Furthermore, smart agriculture is gradually being implemented. On the other hand, treated sewage effluent is used in increasing quantities for agriculture and other purposes. Due to treatment being an energy consuming process, efforts are underway to optimize the energy efficiency of sewage treatment plants by implementing more process control and cogenerating for the recovery of thermal and electrical power. Further alteration to the digestion processes and disposal of sludge with less methane production are also being applied. An example of a sewage treatment plant in commercial operation is the TAIF Independent Water Treatment Plant in western Saudi Arabia which has a 100,000 m3/day treatment capacity with less than 0.35 kWh/m3 electrical consumption and 30 percent biogas cogeneration. Other examples include Tabuk, Buraydah and Madinah sewage treatment plants with 9, 15, and 0.2 thousand m3/d, respectively. These plants consume more than 30 percent of their power from biogas and solar, reaching 68 percent in the case of the Tabuk plant.

In the distribution sector, the coverage percentage of water supply networks and sanitation services in urban areas has grown significantly. These are lower carbon

emission alternatives than hauling by trucks. Smart systems are augmenting the monitoring and control of the networks for more efficient management and operation. Physical non-revenue water due to leaks is being improved which in turn reduces energy required to maintain the network under pressure.

In conclusion, the Kingdom of Saudi Arabia's water sector has implemented effective measures to reduce carbon emissions throughout the supply chain based on well-defined over-arching national plans to reach net zero carbon by the year 2060. Furthermore, the water sector is contributing to combatting climate change and enhancing decarbonization by efficiently allocating the needed treated sewage effluent, renewable groundwater and surface water to meet the Saudi Green Initiative's water demand.

About the Author

وزارة البيئة والمياه والزراعة
Ministry of Environment Water & Agriculture

H.E. Dr. Al Shaibani has over 32 years of experience in academia, consulting, and professional leadership in water resources management and related fields.

Currently, he is the Deputy Minister for Water at the Ministry of Environment, Water and Agriculture, and a member of the Board of Directors of the Saudi Geological Survey, 2019 – 2022.

Dr. Abdulaziz AlShaibani holds a B.Sc degree in Geophysics with honors from King Fahd University of Petroleum and Minerals (KFUPM), M.Sc.in in Geophysics and PhD in Geology from Texas A&M University, USA.

Dr. Alshaibani worked briefly as a geophysicist at Saudi Aramco Exploration Department, before joining King Fahd University of Petroleum and Minerals (KFUPM) as a teaching assistant. He continued his academic career as a faculty member until he became Associate Professor at the College of Petroleum Engineering and Geosciences.

Worked as a full-time and part-time consultant in several government and private organizations.

At KFUPM, he taught graduate and undergraduate courses, supervised several Masters and PhD theses, and supervised research projects in the fields of water resources management, geology and environmental sciences.

Dr. Alshaibani is an active member of several scientific and professional societies.

Dr. AlShaibani has published many scientific papers and articles in international scientific journals and conferences.

EXECUTIVE VIEWPOINT

IRRIGATION MANAGEMENT WITH POOR QUALITY WATER RESOURCES

By Mr. Marco Arcieri, Vice President, International Commission on Irrigation and Drainage (ICID)

By 2050, there will be almost 10 billion people living on our planet and 20% less arable land per person to grow enough food. And as population will grow by another 1.6 billion people over the next 20 years, food production will still need to double, but without further reduction of forests (greenhouse effect), avoiding environmental damages, reducing pollution due to fertilizers and pesticides and, most of all, without any upsurge in the use of good quality water (arctic ice melting).

The key drivers to this irreversible drift are:

•Increasing fresh water scarcity.

•Growing trends of population and urbanization (with rapidly changing diets);

•Rising water demand for industrial, energy and domestic sectors;

•Climate change impacts on environment and agriculture.

As of today, the distribution of fresh water on our planet is only 2,5% of the global amount of the available resources; of these, more than two thirds (69%) are provided by snow glaciers and permanent snow cover; less than one third is represented by fresh ground water (30%), whilst only 0,3% is made up of fresh water lake and river flows. The remaining 0,7% is represented by soil moisture, ground ice and/or permafrost, and swamp waters.

Especially water scarcity and uncertainties linked to climate change scenarios make it clear that we need to increase agricultural productivity by improving water use efficiency. But water demand often exceeds reliable and exploitable water resources; hence, we need to reach an appropriate balance between the limited supply and the increasing demand for water which, at the moment, is heavily unbalanced. That's exactly where innovative irrigation fits in, changing the economics of global agriculture and allowing farmers to produce more per

hectare of land and per cubic meter of water used. And this is why new, alternative forms of irrigation will become increasingly indispensable to increase yields of crops and ensure agricultural food production. Which are the options available and what are the alternatives that could provide a sustainable solution to avoid water conflicts and to meet the increasingly water demand in agriculture? In the agricultural sector, the use of poor quality or non-conventional water resources as an additional source for irrigation is one of the exploitable solutions. Today, new advanced technologies are available thanks to results provided by research in recent years, and saline and brackish water can be effectively desalinated and used to produce food and fodder. And, what is most important, with a great reduction in the operating costs, as compared to the past. Thus, non-conventional water is by all means a potential source for irrigated agriculture, and in order to maximize freshwater saving its sustainable and safe use should be exploited more and more in the future. But in order to fully deploy its great potential a new integrated, holistic approach to the sector is needed, to prevent environmental consequences such as soil salinization and water logging, for instance.

The integrated management of different quality water at the farm level, both in irrigation systems and drainage basins, such as the conjunctive use of saline groundwater and surface water to lower down the eventual up surging of the water table, is to promote when technically feasible and economically viable. But the new technologies available today, such as advanced desalinization especially, coupled with appropriate water management strategies and the adoption of innovative irrigation systems and techniques, must be furtherly developed and implemented. These must be fostered by means of adequate dissemination, education and training. Improving the Institutional Capacity Building in this field is also another essential process.

This is why a comprehensive, multi-disciplinary approach in applied research programmes regarding saline irrigation is essential on this matter. In the past a lot of useful research on potentials and hazards of saline water use in irrigation has been left in relative isolation, with poor or little mechanisms created to coordinate the research work and effectively utilize the findings. Hence, the conceivement and conception of new cooperative research

Sprinkler irrigation

networks on these aspects needs to be implemented.

More specifically, the implementation of mathematical and computer simulation models to relate crop yield and irrigation management under saline conditions is desired, so that the empirical models obtained can be reliably applied under a wide variety of field conditions. These can be trialled establishing specific pilot projects in saline groundwater areas with rising water table and/or sea water intrusion dynamics, in order to evaluate effectiveness of localized water application methods or models of management. Of course, the role of Decision Makers, of policies and of the academic or scientific institutions involved in R&D programs in creating demand for new technology is crucial, from this point of view. On the other hand, a new participatory approach needs to be introduced, especially at the farmer's level: the use and proper management of saline water are part of a complex process which needs adequate skill and thorough knowledge. Farmers' participation and involvement in planning are also some of the key points leading to success and/or failure in irrigation projects regarding the use of desalinated water.

Drip irrigation

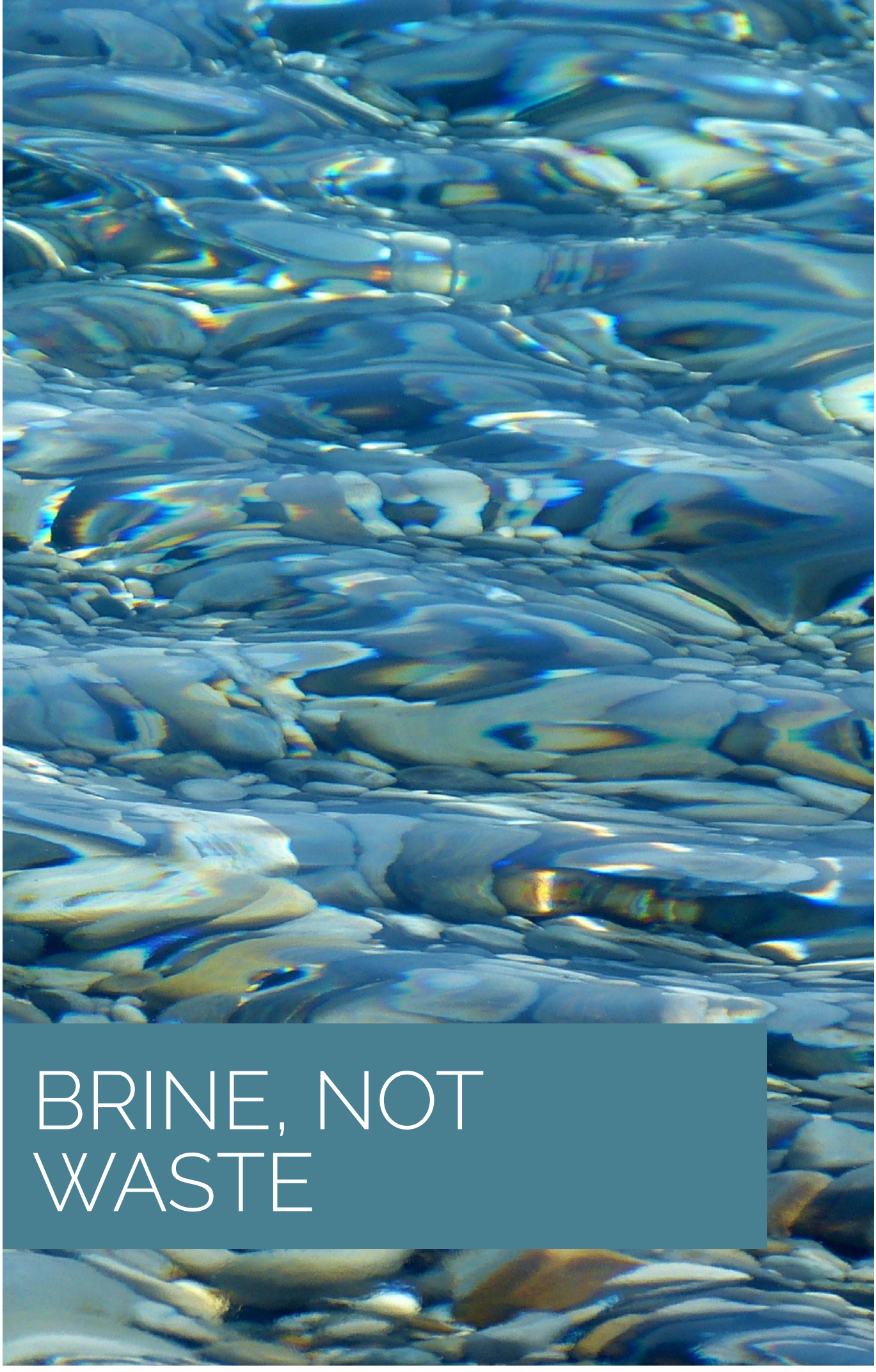
Sub surface drip irrigation

About the Author

Mr. Marco Arcieri is expert in governance, water use planning and management of water resource for irrigation use. Drought monitoring, prevention and mitigation. Combating desertification.

Agricultural water resource management. Irrigation planning and design. Management of dryland systems. Drought risk prediction, assessment, prevention and mitigation.

ICID•CIID



BRINE, NOT WASTE

BRINE, NOT WASTE: UNLOCKING BRINE'S POTENTIAL WITH SAWACO'S CFRO SOLUTION

By Eng. Nizar Kammourie, CEO, SAWACO Water Group

As the world faces the impending crisis of water scarcity, the demand for pioneering and efficient methods of producing fresh water is on the rise. The World Health Organization predicts that by 2025, half of the world's population will be experiencing water shortages due to the changing climate. This dire prediction has put the spotlight on the RO desalination process, which has the potential to meet the freshwater needs of entire countries.

SAWACO, a leading provider of potable water in Saudi Arabia, has collaborated with Gradiant to bring the new CFRO technology solution to seawater desalination. This innovative Cascade Flow Reverse Osmosis technology (CFRO) provides a sustainable approach to freshwater production.

What Is CFRO Technology?

Traditional Reverse Osmosis (RO) systems have been discharging a significant amount of valuable feed water as wastewater brine. The CFRO, as a Brine Reduction System, changes the game by reducing brine discharge and increasing the quantity of usable fresh water from RO systems.

CFRO is a highly advanced process that utilizes the same general concept of conventional RO, using hydraulic pressure to drive water across a semi-permeable membrane. However, CFRO system overcomes the salinity barrier of traditional RO methods, resulting in high recovery rates. It utilizes specific membranes that allows for a relatively higher diluted solution at the permeate side, reducing the osmotic pressure difference across the membranes. This reduction allows for a pumping pressure of less than 83 bars to drive the brine saline water through the membranes and concentrate the brine to more than 145,000ppm in TDS (Total Dissolved Solids).

What Are the Benefits of CFRO?

By using commercially available and cost-effective components, the CFRO technology increases the RO plant fresh product water quantity and at the same time reduces the environmental impact by reducing brine discharge. It can be retrofitted to existing SWRO plants to increase their

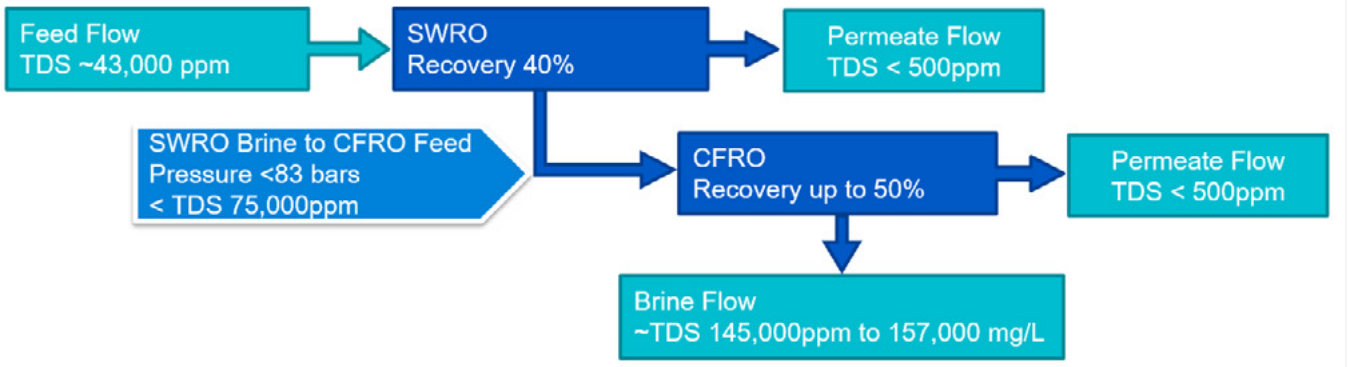


Figure 1: Detailed Process Example of CFRO System.
Overall recovery of 70 % of the combined SWRO & CFRO system are achieved.

recovery rates for up to 70% without the need for new intakes and outfalls.

Not only does the CFRO technology provide a solution to these problems, but it is also commercially feasible, with reasonable energy consumption compared to other existing brine reduction technologies. The technology also allows for high salinity brine concentrations that would be feasible for brine mining.

In a world where water is becoming an increasingly precious resource, CFRO technology provides a ray of hope for a sustainable and cost-effective future for RO water treatment systems.

The Key Differences Between, Conventional RO and CFRO Equipped Desalination Plants.

Get a glimpse into the CFRO system with this process example.

Exploring the distinction between conventional RO desalination plants and those equipped with the cutting-edge CFRO technology.

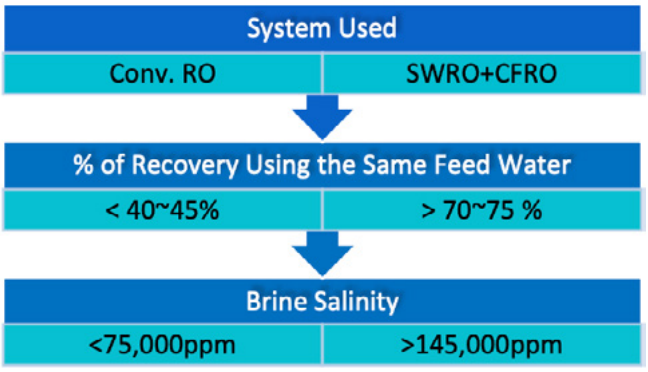


Figure 2: (Conventional RO vs. CFRO Systems)

SAWACO's CFRO Technology Proven Successful at South Jeddah Pilot Plant.

In the face of the increasing demand for freshwater in 2023 and limited avenues to increase supply, SAWACO decided to turn to a cutting-edge solution: CFRO technology. This approach was put to the test at the SAWACO South Jeddah, SOJECO Plant and after three years of intensive demonstrations, it was proven to be both efficient and

effective. The results of the pilot tests were astonishing, displaying a brine recovery rate of 50% with an energy consumption of less than 7 kWh/m3 permeate even after sustained usage.

train, utilizing the brine from the original SWRO train as feed water. The retrofitting project is expected to yield an impressive overall recovery rate of 69% and double the plant's production output without the need

Figure 3: The above selected photos shows the existing CFRO system, within the pilot plant operated by SAWACO.

SAWACO's Store City Retrofit: Paving the Way with CFRO Technology.

SAWACO is taking steps to boost production at its existing Store City RO Desalination Plant in Al Khumrah, Jeddah. The company is retrofitting the second SWRO train to a CFRO

for additional feed water or pretreatment. The retrofitting process is ongoing, SAWACO is confident to complete the project on schedule. The company has set its sights on having the plant fully operational by the second quarter of 2023.

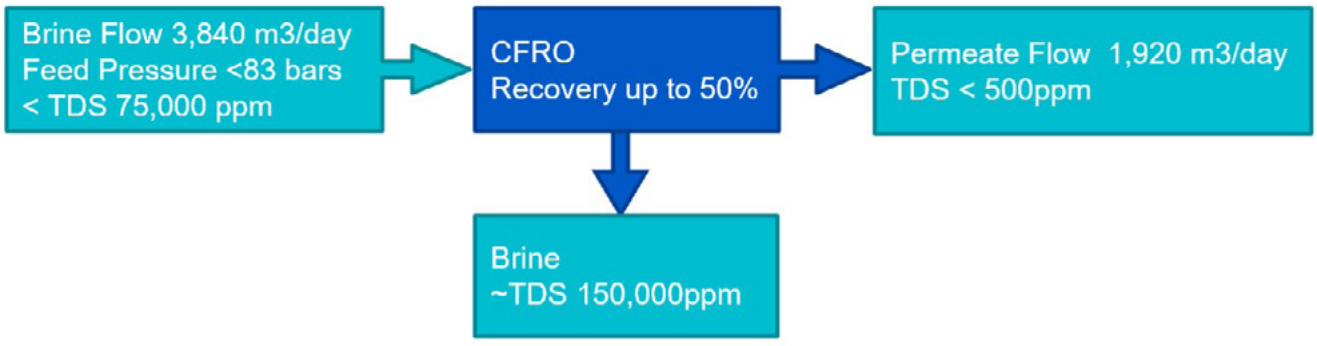


Figure 4: Above figure shows "Store City Plant" CFRO system recovery at 50% form brine. Overall plant recovery is 69%.

Figure 4: Above figure shows "Store City Plant" CFRO system current retrofit works.

SAWACO Plans to Expand CFRO Technology to SOJECO Plant as Well.

The successful implementation of the CFRO technology at the Store City plant will demonstrate its effectiveness and provide a roadmap for others looking to adopt this solution.

SAWACO also intends to use CFRO system to increase the permeate production of its SOJECO SWRO plant in Jeddah, KSA, before the end of 2023, without additional feed water intake from existing wells.

By reusing the waste brine from its existing SWRO trains as feedstock for new permeate production, the proposed CFRO process will produce 208 m3/h (or 5,000 m3/d) of new permeate with a recovery rate of 53% from the brine alone.

By the End of 2023, SAWACO and Gradiant Will Have Launched Their CFRO Technology in KSA

In conclusion, SAWACO and Gradiant are revolutionizing the water industry by pushing the boundaries of RO desalination. With their combined effort, they are launching CFRO technology in KSA, a cost-effective and sustainable solution that successfully increases the capacity of RO desalination plants.

About the Author

Nizar Kammourie currently heads SAWACO Water Group of the privately-owned Saudi Brothers Commercial Group in the capacity of CEO.

The SAWACO Water Group consists of three companies: SAWACO-Water Desalination - a private water utility, Suido Kiko Middle East (SKME) - a Japanese-Saudi EPC venture in the water treatment field and Chemsbro - specialist chemical services provider for the water treatment industry.

Mr. Kammourie sits on the Board of three companies: Rabigh-3, the largest desalination plant in the world, The Canadian Water Technology Company (Current Water Technology Inc.), and the Japanese EPC Company, Suido Kiko Middle East.

Mr. Kammourie has developed SAWACO-Water desalination, Saudi Arabia's first private water utility, for Saudi Brothers Commercial Group in 2000. SAWACO has expanded its output capacity and extended its operating model to include BOT concessions.

Mr. Kammourie has a keen interest in environmental matters and circular economy with special emphasis on sustainability. He currently sits on the Board of AmCham (American Chamber of Commerce) Jeddah and leads the AmCham ESG committee.

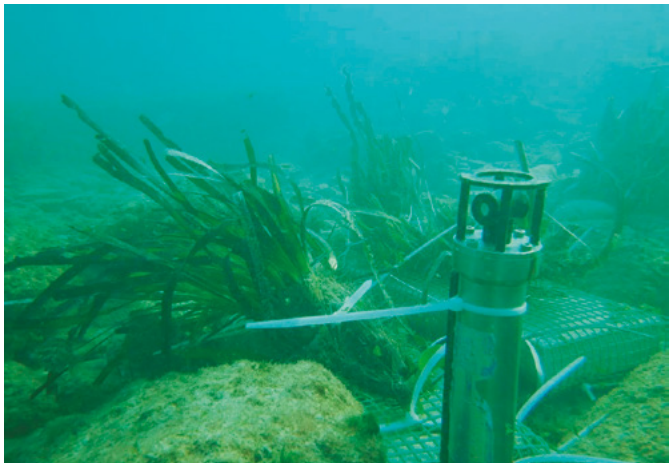
ENVIRONMENTAL STEWARDSHIP

DESALINATION, AN ENVIRONMENTALLY TRUSTWORTHY ACTIVITY FOR CURRENT AND FUTURE CHALLENGES OF CLIMATE CHANGE

By Dr. Claudio Sáez Avaria, Senior Researcher, Department of Marine Sciences and Applied Biology Faculty of Science, Universidad de Alicante, Spain

Desalination consists of the process extracting excess solutes from different sources (e.g., seawater, brackish water, sewage), although the most common is the direct input from the ocean using reverse osmosis mechanism. Currently, there are over 20 thousand desalination plants operating across the world, producing around 100 million m3/day used for drinking water, the industry and agriculture; and indeed, this es expected to significantly increase due to the global water crisis mediated by climate change. However, the process also implies the production of over 140 million m3/day of an increased salinity discharge, also called brine, which is usually returned to the sea. This discharge consists mainly of the same amount of salts that entered the system with half of the raw seawater, a process equivalent to evaporation in the natural water cycle. The global production of wastewater at 1,000 million m3/d, of which 63% is collected and 52% is treated, if we talk about environmental impact, this should be the focus of discussion.

Our studies on environmental aspects of desalination are conducted at different levels of biological organization, from classic ecological and eco-physiological observations to cutting-edge metabolic and genetic approaches; these, using frontier combined laboratory and field transplantation experiments. The latter



allows identification specific stress responses associated with brines and to test the best environmental biotechnology tools (i.e., bioindicator species, functional indicators, biomarkers) to understand the extent impacts of desalination discharges. Complementarily, we develop complete

oceanographic and physicochemical characterization of the discharges to understand the 3-dimensional dilution of the brine at sea.

We have identified that the biological effects of desalination discharges on marine organisms are principally attributed to the osmotic pressure caused by excess salinities.

However, it is important to mention that the degree of stress and effects on coastal communities are directly proportional to the spatial dilution rate of the discharge plume towards reaching the natural salinity of the sea. In this context, the industry has important challenges that are specific to where the desalination plant operates. For instance, the Mediterranean coasts are characterized by low currents and shallow littoral geomorphology, which makes it defiance for a rapid dilution of the brine. Instead, in the southeastern Pacific, the strong currents mediated by processes as the Humboldt Current and El Niño, added to the deep subtidal environment, facilitates a complete dilution usually within 10 meters of the discharge; therefore, the environmental impact is minimal, just like the human breathing process, which by exhaling CO2, produces a minimal environmental impact on its surroundings.

In this regard, the industry has significantly advanced in collaboration with the academia, adopting logistic and technological measures to ease the dilution regardless of the characteristics of the destination of the discharge. Despite the brine behavior in the density water body, our ecotoxicological data demonstrate that salinities around a prudent distance from the discharge itself do not significantly affect macroalgae, seagrasses and their sustaining communities; certainly, for example, different studies even evidence an increase in the diversity and richness of fish in desalination discharges, even having a positive impact on local fisheries.

Desalination has shown to be sustainable, competitive, and reliable source of water, since it does not depend on the vicissitudes of climate, and tackles not only water availability but also quality. For instance, addresses the lack of sanitation in developing countries, the presence of emerging contaminants, and a significant affection of continental water cycles; together, essential for the water 2030 agenda. In this regard, objectiveless columns, and media releases, even supported by non-expert “scientists”, have contributed to spread myths related to the real environmental effects of the desalination industry. Therefore, it is indispensable to set in the spotlight the

empiric data of the specialized scientific community. In a world threatened by water scarcity, desalination is undoubtedly an imminent solution, and thus demands a strong scientific base and academia/public/private sectors collaboration to put it at service of humanity on the foundation of a sustainable and environmentally friendly scheme. The world population continues to grow, and it is estimated that 10 billion people will inhabit the planet in 2050, we will need more resources to feed them, and without water this will be impossible. History, science, and technological development demonstrate close to certainty that desalination will be one of the main pillars for humanity to thrive under the consequences of global changes; we must then ensure to do it together, and to do it right.

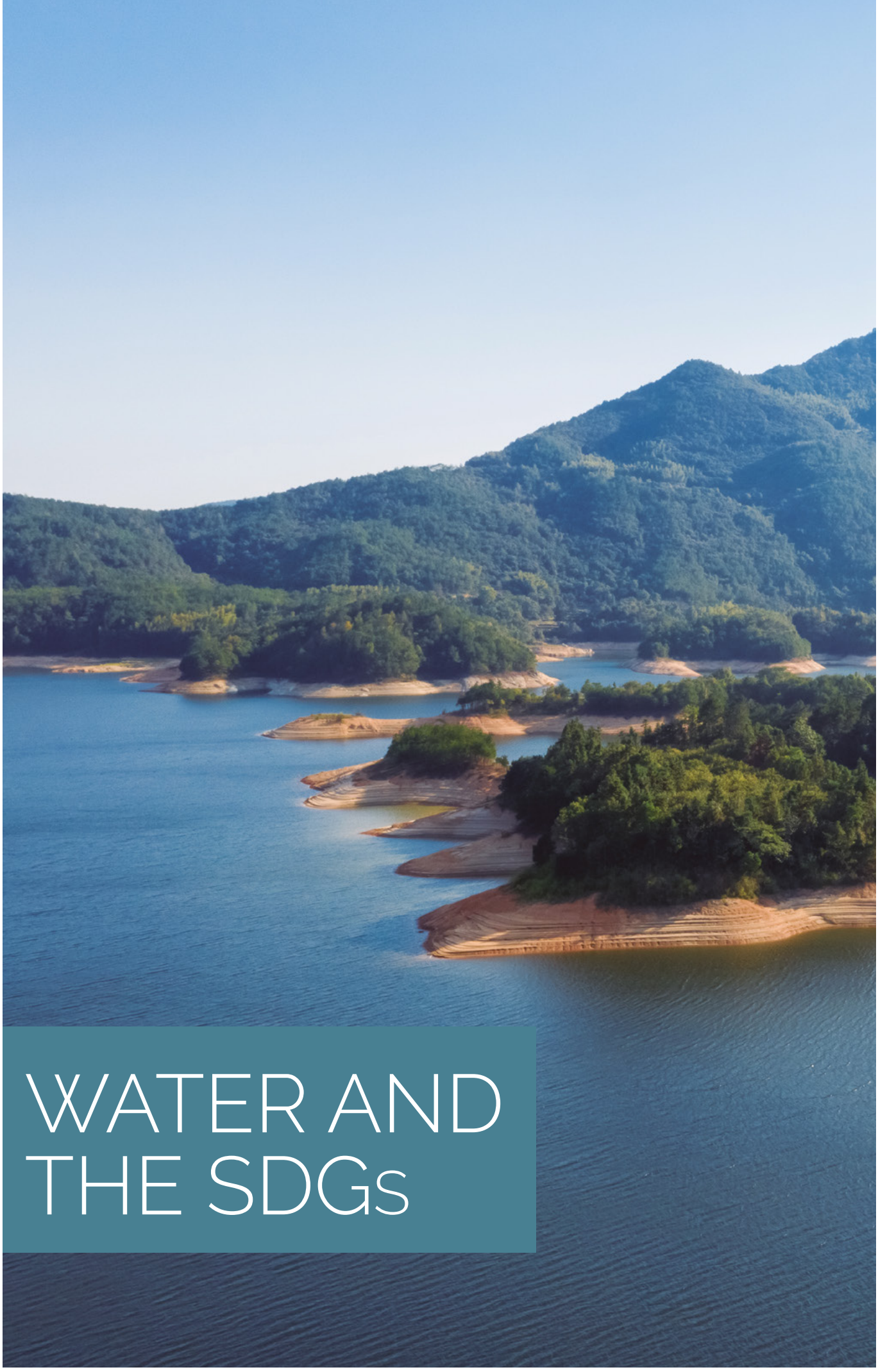
We desalinate water at $0.001 and 0.005 kg CO2 per liter when we need 60 kg CO2 to produce 1 kg of meat, and finally with an energy 10 times less than bottled water, proof enough that desalination is a sustainable way of supplying us with water.

About the Author

Universitat d'Alacant

Claudio A. Sáez is Environmental Engineer by the University of Valparaíso, Chile, and Victoria University of Wellington, New Zealand, and Doctor of Philosophy in Marine Sciences at University of Plymouth, United Kingdom. Dr. Sáez es currently Senior Researcher and Professor at University of Playa Ancha, Chile, and University of Alicante, Spain, and leads an internationally renowned research group on marine environmental management and risk assessment. Dr. Saez's group have specialized in desalination effects, although their investigation also covers other human-related activities causing hydrocarbons, metal, and nutrient pollution, among others, and climate change. Their investigations have been conducted at a global scale, but can be highlighted those developed in Europe, South America and Antarctica.

Our group has years of experience and constitutes the greatest internationally spread academic pole focusing on desalination impacts, publishing our work in the most relevant scientific journals in environmental studies (e.g. Environmental Pollution, Desalination, Aquatic Toxicology, Frontiers in Marine Sciences). Our research uses mainly marine macrophytes (i.e. macroalgae and seagrasses) as biological models for stress biology assessments and developing biomonitoring tools to ascertain for potential environmental impacts of desalination con coastal ecosystems. Currently, we focus on desalination effects in distinctive marine ecosystems, as those from the southeast Pacific Ocean and the Mediterranean Sea.



WATER AND THE SDGs

BANISH HUNGER AND POVERTY FROM THE WORLD, FIGHT INEQUALITY AND INJUSTICE, AND PROTECT THE PLANET

By Eng. José Manuel Pano, CEO, Interconsultores S.A.

Throughout the history of humanity, water has been key to our development and evolution. Water is at the heart of sustainable development and is fundamental for socio-economic development, healthy ecosystems, and quality of life. The seventeen objectives of the 2030 United Nations agenda, signed by 193 countries, on September 15, 2015, shows that water flows through each of them, and to achieve these objectives, our approach to water is critical.

About 10 % of the world's population lives in extreme poverty, with almost nil access to water and sanitation. Access to clean water is crucial to this goal, as access to safe water and sanitation is essential for reducing poverty and improving health outcomes. Investing in clean water infrastructure and improving access to water can lead to economic and social benefits. Technology in water purification has advanced incredibly, producing ultrapure water from any water source, such as the sea or our wastewater, just like nature does, in a competitive, reliable, and sustainable way.

One in every nine people worldwide does not have enough food to eat. Access to water plays a crucial role in achieving this goal, as it is essential for agricultural production, food security, and nutrition.

Climate change significantly impacts water resources, affecting water availability, quality, and distribution. Decentralized water management as desalination and water reuse, are among the strategies that can help to address the challenges posed by climate change and support sustainable agriculture. Both desalination and water reuse can help achieve SDG 2 by providing alternative water sources in areas facing water scarcity and reducing the pressure on existing water resources.

Lack of access to clean water and sanitation is a significant contributor to many health problems, such as waterborne diseases, which can significantly impact the health and well-being of populations, particularly in developing countries. In addition, water scarcity can also increase the risk of water-related conflicts, which can further impact health and well-being.

New illnesses will likely emerge due to increased globalization, population growth, and climate change. Some of these illnesses may be related to water, as contaminated water sources can harbor dangerous pathogens that can cause disease. We must insist that public health officials and governments monitor for contaminants of emerging concern in water sources and take steps to mitigate exposure where necessary since we still do not know the consequences that these may cause us.

Water and education are closely interconnected, and the lack of access to clean water and adequate sanitation facilities can seriously impact educational opportunities and outcomes. Some of the significant problems associated with water and education are negatively impacting students' health, absenteeism, and reduced educational outcomes, infrastructure, and resources for providing clean water and adequate sanitation facilities in schools, resulting in inadequate access for students.

On the other hand, we must work on educating future generations about water knowledge. Much of the problems humanity faces about water are due to a lack of understanding of decision-makers. We need to teach the next leaders to differentiate water by its quality and not by its source, that the waste from the desalination process is no more than the same number of original salts diluted in half the water, a process similar to evaporation in the water cycle, or that water purified with a tertiary system can be purer than the most expensive brand bottled water in the supermarket.

In water, gender equality is essential for ensuring equitable access to and control over water resources. Women and girls are disproportionately affected by water scarcity and lack of safe drinking water and often have limited decision-making power over water management in their communities. Ensuring gender equality in water governance, allocation, and management can help to improve water security and promote sustainable development. Additionally, involving women and girls in water management can increase their empowerment and strengthen their voices in decision-making.

Water and sanitation are at the core of sustainable development, and their services underpin poverty reduction, economic growth, and environmental sustainability. However, in recent decades overexploitation, pollution, and climate change have led to severe water stress in locales worldwide. Today, 2.2 billion people lack access to safely managed drinking water, and more than 4.2 billion lack safely managed sanitation. Climate change exacerbates the situation with increasing disasters such as floods and droughts. Eighty percent of wastewater in the world flows back into the ecosystem without being treated or reused, and 70 percent of the world's natural wetlands have been lost, including a significant loss of freshwater species.

Estimates that 15-20% of the world's population lives in water-stressed regions and could benefit from desalination, and many countries are still questioning the technology or its efficiency. Water reuse is not without challenges, including public perception and concerns about water safety, and as with desalination, science says it's a safe water source but still needs media support.

Energy and water are closely interlinked, and their sustainable use and management are crucial for a sustainable future. Energy is required to extract, transport, treat, purify, and distribute water, while water is needed to produce energy. Adopting more sustainable and efficient practices is essential to meet the growing demand for energy and water. It includes using renewable energy sources such as solar, wind, hydrogen, and hydropower to produce energy and reduce greenhouse gas emissions. It also includes adopting water-saving technologies, such as water reuse and desalination, to conserve water resources.

Water is a critical component of SDG 8 and vital in promoting sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work. By ensuring access to clean water and improved sanitation facilities, promoting sustainable water use and management in agriculture and industry, and supporting the growth of the water sector, it is possible to progress towards SDG8.

The effective management of water resources, including desalination and water reuse in a sustainable manner, can help conserve water resources and support economic growth in water-scarce regions, supporting agriculture and industrial activities by providing a reliable source of water, helping to create jobs, and promoting economic development.

This goal aims to ensure access to safe and sustainable water for both people and industry, promoting economic growth and development while protecting water-related ecosystems and preserving this precious resource for future generations, and calls for building resilient and sustainable infrastructure and promoting inclusive and sustainable industrialization. It also recognizes the importance of research and innovation for finding lasting solutions to social, economic, and environmental challenges, where the new sources of water as Desalination and Reuse, are critical components for ensuring access to clean water and sanitation for all.

Within this goal, reducing the industry's water footprint and promoting "water-positive" practices are essential to ensuring sustainable and equitable water use. In this way, the sector can offset its water and carbon footprint and continue to produce sustainably.

Lack of access to clean water and sanitation significantly contributes to poverty, poor health, and reduced economic productivity. Disparities in access to water and sanitation often fall along socio-economic, gender, and geographic lines, exacerbating existing inequalities. SDG 10 aims to reduce inequality within and among countries. Within this goal, desalination and water reuse solutions can reduce water access disparities and promote sustainable development.

A sustainable city meets the needs of its current residents without compromising the ability of future generations to meet their own needs. A sustainable city considers the economic, social, and environmental impacts of its development and strives to balance these three aspects in a sustainable long-term way.

One of the critical aspects of this goal is access to safe and adequate water, aiming for inclusive, safe, resilient, and sustainable cities and human settlements. Safe and sufficient water is essential for human health, food security, and economic development. Using desalination and water reuse can reduce water access inequalities and promote sustainable development. Desalination is particularly important in areas where freshwater resources are limited or where there is a high demand for water due to population growth, economic development, and other factors. Water Reuse can help conserve water resources, reducing the need for potable water supplies, saving energy from water transportation, and avoiding pollution of freshwater sources.

Clean water is a finite resource, threatened by overuse, pollution, and the impacts of climate change. SDG 12 aims to ensure sustainable water use and management by promoting efficient water use, reducing water pollution, protecting water-related ecosystems, and improving governance and management of water resources.

One crucial aspect of this goal is reducing the production processes' water footprint. Water-positive companies are companies that aim to reduce their water footprint and have a positive impact on water resources. These companies can achieve this by using desalination and water reuse. Both sources of water can purify non-potable water and transform it into fresh water, just like the natural water cycle, compensating for or replacing freshwater consumption in industrial production, called the Water Footprint.

Water plays a critical role in achieving SDG 13, which focuses on climate action and reducing the impact of climate change. Climate change leads to water scarcity, water pollution, and the degradation of aquatic ecosystems. It is crucial to address these water-related challenges, such as reducing greenhouse gas emissions in water production facilities, improving water management practices, and investing in clean water and sanitation infrastructure.

Green areas can absorb carbon dioxide and other pollutants, reduce the urban "heat island effect," improve air quality, and provide habitat for wildlife. Decentralized water production using desalination and water reuse are two approaches that can play a role in achieving this goal by reducing the carbon footprint of water transportation, which is particularly important for remote areas where freshwater resources are scarce, and there is a high-water demand. Additionally, reusing wastewater for irrigation can help reduce water pollution, reducing the carbon footprint associated with additional water treatment for discharge and transportation processes to generate green areas, such as parks, gardens, and urban forests, which can provide numerous environmental and social benefits.

This goal aims to conserve and sustainably use the oceans, seas, and marine resources for sustainable development. One aspect of SDG14 addresses the issue of water pollution, which is a significant threat to the health and well-being of marine ecosystems and human health. If we do not stop polluting our oceans, severe problems will affect every person and living creature on the planet. Addressing pollution includes:

- The reduction of marine pollution and the impacts of ocean acidification (Carbon pollution).
- Ending overfishing.
- Conserving marine and coastal areas and ecosystems.

Desalination and water reuse are two approaches that can play a role in achieving this goal by reducing the carbon footprint of water transportation in remote areas. By reusing wastewater, water reuse can reduce the amount of freshwater used and conserve water resources. Additionally, it can also play a role in reducing water pollution, including the pollution of contaminants of emerging concern, considerably reducing the volume of wastewater, and thus making its final disposal environmentally friendly. In the case of river water, technologies such as ultrafiltration, compared to conventional water treatment, could avoid the indiscriminate use of different chemicals, such as aluminum chloride (PAC), and thus prevent its toxicity to marine life.

The link between water and SDG 15 is critical as water is essential for life on land, including plants and animals. Maintaining the health of terrestrial ecosystems, such as forests, wetlands, and deserts, is vital to preserving water resources and ensuring their sustainable use.

Water reuse and wastewater management play a crucial role in achieving this goal; by treating and reusing wastewater, communities can reduce their reliance on freshwater resources, thereby reducing pressure on these ecosystems and protecting them from degradation. Effective wastewater management can also prevent land and water resource contamination, which can negatively impact biodiversity and ecosystem health.

"Peace, Justice, and Strong Institutions" are closely linked to water. Access to water is often a source of conflict, particularly in regions with limited resources or rapidly growing populations. Addressing these conflicts through peaceful means and establishing solid institutions can help ensure equitable and sustainable access to water. Achieving peace and stability is critical for providing access to water and other essential resources for all people.

In areas with limited freshwater resources, desalination can provide a reliable water source, reducing the need for inter-community conflicts over water resources. The development of desalination technologies can also provide economic opportunities and support sustainable development, reducing poverty and inequality.

"Partnerships for the Goals" is closely linked to water, as sustainable water management requires collaboration and partnerships between different stakeholders.

The International Desalination Association (IDA), affiliates, and partners are key players in promoting partnerships and collaboration to achieve this goal. IDA brings together a diverse range of stakeholders, including governments, private sector companies, research institutions, and civil society organizations, to promote the sustainable development and implementation of water treatment technologies, promoting the sustainable use of water resources, such as desalination and reuse.

About the Author

José Manuel Pano is Industrial Engineer from UCA Universidad Católica Argentina (1980), Postgraduate in Corporate Strategy MIT Massachusetts Institute of Technology, Sloan School of Management, USA (1993), Management Development Program PDD IAE Universidad Austral (1988). Since 2001, he has directed his own consulting firm Interconsultores SA www.interconsultoresjmp.com, a national registered business accelerator, assisting companies in business strategy and management perspective. Develops economic development programs and papers for public sector. José is a Sustainable Development Goals United Nations Agenda 2030´s UN Certified Trainer. Between 1980 and 2000 he worked as Commercial Director of the petrochemical companies at Bridas Group (nowadays Pan American Energy) (14 years) and Grupo Atlántida Comunicaciones (Communications Corp) (7 years): Distribution and Sales Director for Editorial Atlántida (Magazine Publishing) (4 years) and Televisoras del Interior TELEFE CEO (TV) (4 years). He directs Palermo University National Accelerator. ALADYR, Latin American Association of Desalination and Water Reuse Argentina representative. Consultant for several organizations, institutions, and companies. Pallium Latin-American PR, NGO focused on Palliative Care and elderly life quality.

RESOURCE RECOVERY

BAHAMAS LOOKS TO BRINE FOR A SOLUTION

Author: Ms. Rebekkah Swisher, Vice President, Sustainability, Partanna

The Bahamas, like many other developing nations, is acutely aware of the devastating impacts of climate change. Even though the nation has contributed very little to the problem, it suffers acutely from the effects, including more frequent and severe hurricanes, rising sea levels, and other environmental challenges. That paradox has been the subject of ongoing debate, leaving developing countries at the mercy of industrialized nations to both provide needed funding for adaptations and reduce the greenhouse gas emissions that are responsible for the problem in the first place.

Since Philip Davis was elected Prime Minister in 2021 and emerged in the climate scene at COP26 soon after, he has made pleas to other world leaders to take urgent, necessary action and honor their commitments. That in no way implies he is standing by idly, though. He is determined to help his country become more active in its destiny. In partnership with innovative technology providers, his initiatives promise to generate significant carbon credits, bolster fresh water supplies, improve ocean health, provide affordable climate-resistant housing, and create a local manufacturing industry — all while demonstrating a positive and cost-effective use of desalination brine.

Rick Fox, Founder, Sam Marshall, Co-Founder with the Prime Minister of The Bahamas, Philip Davis launching contract with Government of the Bahamas at COP27 in Egypt.

This past November, at COP27, Davis announced a partnership with Partanna, a company that Bahamian Rick Fox co-founded for a project to design, develop, finance, and construct affordable, hurricane-resistant homes. "We heeded our own call and resolved to act to do whatever we could, to help avert a climate-based disaster. One of our initiatives was to invite entrepreneurs from around the world to bring their technologies,

bring their climate solutions to The Bahamas," he explains. "It is extremely gratifying that one of our own responded so quickly and passionately to that call."

Brine contains valuable chemical compounds, but in our opinion, the cost-benefit relationship has not been compelling enough to warrant valorization at scale. Our technology lowers the cost equation by finding outlets for concentrated brine that do not require useful compounds to be calcined into dry powders. Partanna's IP, which relies partly on chemicals derived from brine, allows us to produce cementitious products such as concrete, pavers, tiles, and other solid surfaces. The technology completely avoids the need for any Portland cement, which is responsible for 9% of global CO2 emissions. Meanwhile, our formula removes CO2 from the atmosphere through direct air capture and permanently mineralizes it into the concrete through a carbonation reaction. As a result, this material provides net-positive CO2 removal from the atmosphere, pioneering a new era of carbon removal technologies in practical applications.

This year, Partanna will embark on a pilot project of 50 affordable homes on the Bahamian island of Abaco, and Davis has pledged backing for 1,000 per year after that. "This arrangement satisfies two key priorities of the Government of The Bahamas: firstly, to provide affordable, sustainable housing in The Bahamas, and secondly, to meet the carbon priorities of the country," he says. As part of the agreement, the company will invest $50 million into the Bahamian economy to establish a manufacturing plant in Nassau.

Partanna's IP focuses on locally available materials, such as desalination brine.

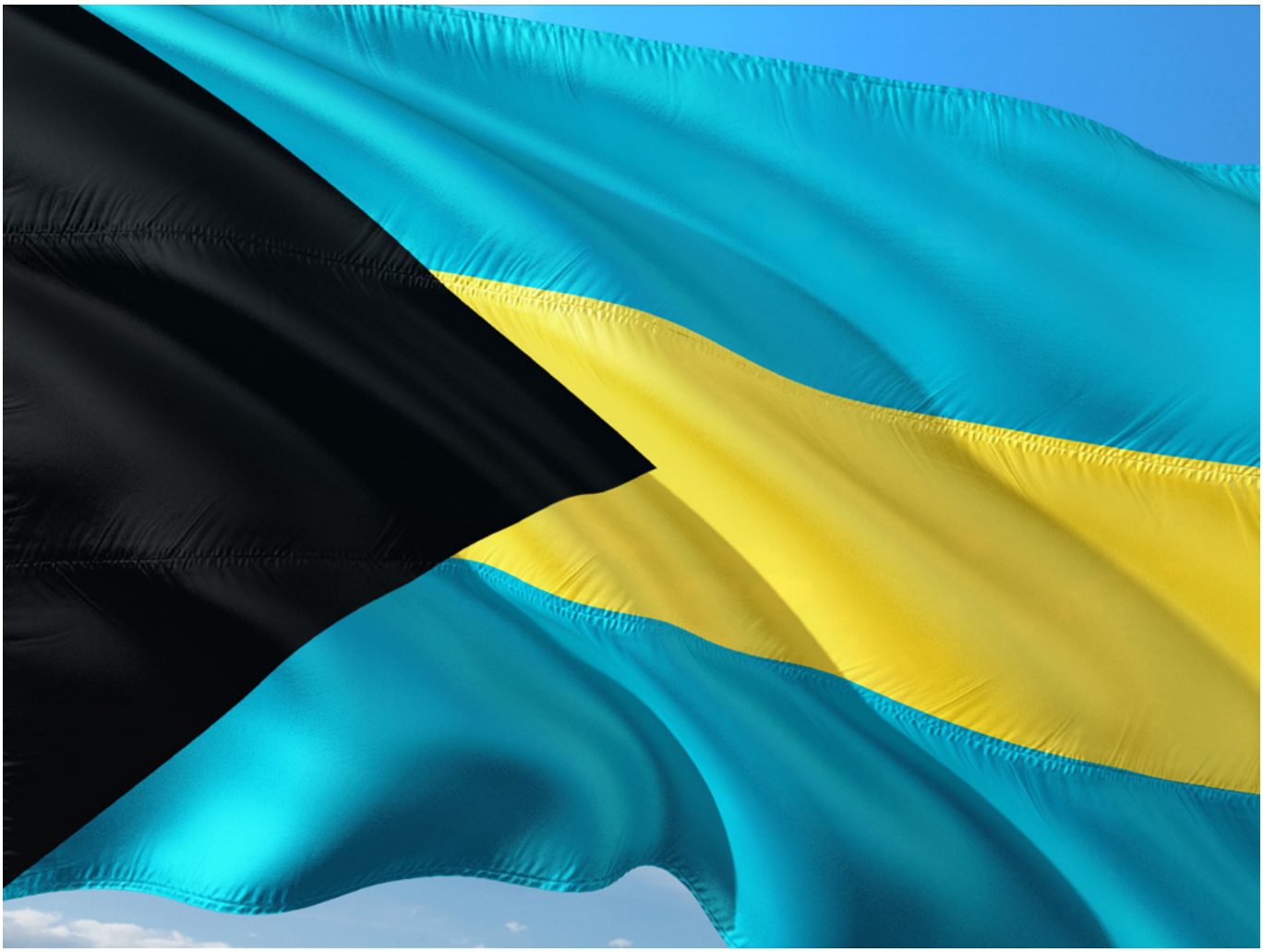
As a low-lying island nation in the Caribbean, the Bahamas relies heavily on desalination to provide its population with fresh water. So, brine is in good supply. According to the Water and Sewerage Corporation of the Bahamas, approximately 85% of the country's potable water supply is generated through seawater desalination. Meanwhile, as sea levels rise, the need for desalinated water will only increase along with commensurate volumes of brine.

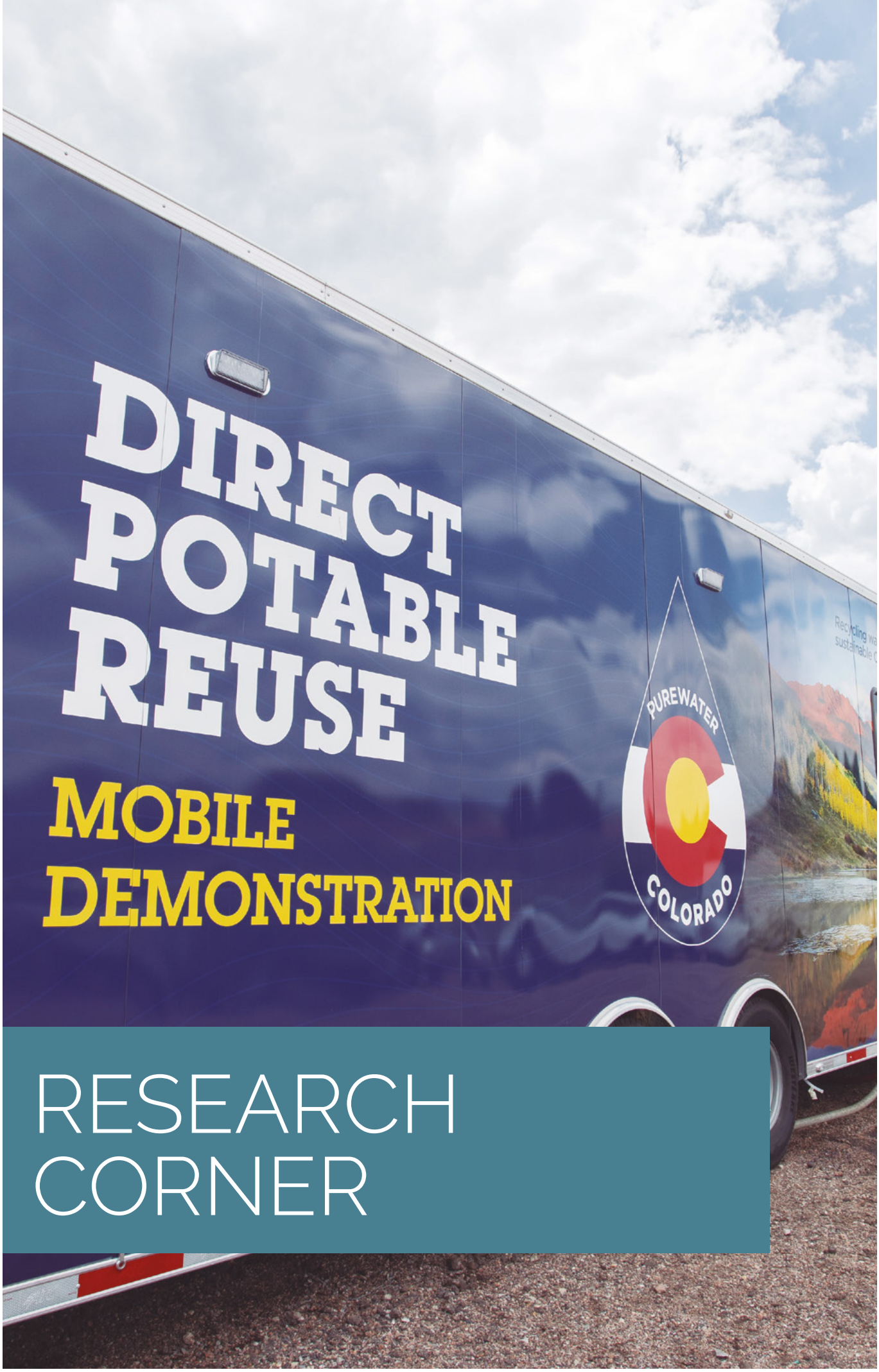
Our technology is inspired by nature, with coral reefs serving as an example of how brine can be used to produce structures. Corals concentrate carbonate ions through ion pumps, which accumulate in a brine solution in a special compartment

of the coral polyp. This brine solution is then used to facilitate the deposition of aragonite crystals that form the coral skeleton. Similarly, Partanna uses brine to embody carbonate into its concrete, providing a solution for managing brine while also contributing to mitigating climate change by sequestering carbon dioxide.

We can also repurpose brine to help heal the ocean. By converting the salts into usable cementitious materials right at the brine outlet pipe, the team aims to create underwater structures that support the regrowth of corral and the restoration of marine habitats that have been previously denigrated, whether by brine disposal or other commercial activities. The company collaborates with the King Abdullah University of Science and Technology (KAUST) on these ocean-positive solutions. These processes eliminate the need to return brine to the ocean or use expensive disposal methods.

"We heeded our own call and resolved to act - to do whatever we could - to help avert a climate-based disaster"
Hon. Philip Davis, Prime Minister of the Bahamas





RESEARCH CORNER

TASTING IS BELIEVING: INNOVATIVE MOBILE DIRECT POTABLE REUSE TRAILER

By Ms. Lauren Nicole Core, Climate and Water Writer and Filmmaker

Nature uses water over and over again, in an endless cycle of evaporation and precipitation, powered by the sun. Humans, in contrast, tend to use water only once – drawing fresh water from a local source, using it for various purposes, and then discarding the wastewater back into the environment after minimal treatment. Scientists have been working on new technologies to enable treatment and direct potable reuse of water for decades. However, the applications have been largely limited to out-of-this-world environments — such as water supply systems on the International Space Station.

Colorado Springs Utilities, Colorado School of Mines (Mines), and Carollo Engineers partnered in 2020 to create a down-to-Earth version of this technology: a mobile direct potable reuse (DPR) demonstration system (7,000 gpd) that purifies municipal wastewater for potable use. The system is now being tested and demonstrated at the Colorado Springs Utilities' JD Phillips water reclamation plant, but is due to travel to several other locations in Colorado later this year. Mines is part of the National Alliance for Water Innovation (NAWI), the U.S. Department of Energy's research program expressly devoted to lowering the cost and energy of desalination and water reuse technologies. NAWI is working to revolutionize the US water supply by enabling the affordable treatment and reuse of non-traditional sources such as wastewater.

Testing Tomorrow's Water Treatment Technology

The DPR demonstration lab is the vision of Dr. Tzahi Cath, Professor of Civil and Environmental Engineering at Mines. "If

we can take the water, and instead of just wasting it we could recover it and reuse it again for potable purposes, it will save money and energy, and it will save many problems during drought years" says Cath, "[...] communities must have a wider portfolio of sources of water to make sure that we have drinkable water under any circumstances."

While there have been previous examples of DPR technology, including units packaged in mobile systems, most of these have relied on reverse osmosis (RO), which leaves behind a waste stream of concentrated contaminants that must be managed and disposed of, also limiting the percent water recovery of the system. In contrast, the mobile DPR lab uses advanced treatment technologies — such as ozonation, biologically active filtration, ceramic microfiltration, ultraviolet disinfection with advanced oxidation, and granular activated carbon — to efficiently destroy pathogens and trap and remove contaminants of emerging concern. The mobile system also has a range of advanced sensors and automated fault detection technologies to ensure that all processes are operating properly and synchronously, and that the water meets drinking water regulations at all times. The operating data generated by the mobile lab will also help researchers to develop new control sensors and algorithms to allow such systems to autonomously operate safely, reliably, and inexpensively.

The DPR system was recently put to the test, and it passed with flying colors: close to a million gallons of water were successfully treated over the first 6 months of its operation. Colorado's drinking water quality limits were all met. All emerging contaminants of concern and disinfection by products such as per-and polyfluoroalkyl substances (PFAS), 1,4-dioxane, Tris (2-carboxyethyl) phosphine (TCEP), Tris(1-chloro-2-propyl) phosphate (TCPP), and N-Nitrosodimethylamine (NDMA) were

reduced to much below the regulatory or advisory levels. Microorganisms such as coliforms were completely eliminated from the product water. Local breweries even produced and served beer from the mobile lab-generated water.

Seeing (and Tasting) is Believing

Mines embarked on this technology demonstration project anticipating that some residents would be nervous about drinking recycled water. The system is thus designed to allow visitors to observe and interact with the water treatment process. Tourists can visit the PureWater Colorado Mobile Demonstration in Colorado Springs and watch the entire water treatment process in action. In addition to tasting the water, tourists can enjoy a scaled model of the carbon-based DPR process through the interactive exhibit. The experience is funded by a Colorado Water Conservation Board Grant, with additional support from the National Science Foundation (NSF) and other industry partners.

The mobile DPR trailer demonstrates that advanced water reuse technologies are not as far off as we think, and that you don't have to be an astronaut to use one. Advanced water treatment and reuse technologies will help to diversify water supplies and hedge against water-related risks. The DPR trailer may also help to provide clean water quickly and cost-effectively to people displaced by natural disasters and drought. The mobile DPR lab is one more step in the shift toward a circular water economy.

The views expressed in the article do not necessarily represent the views of the U.S. Department of Energy or the United States Government

About the Author

Lauren Nicole Core is a creative and strategic thinker in the climate change, wildlife conservation, and water resources space with 15+ years of research; programme/project design and development; and international cooperation experience. She has lived, worked, and gained operational experience in countries including Türkiye, Brazil, India, Sweden, and Viet Nam.

Lauren worked with multiple United Nations agencies, including the World Food Programme, United Nations Development Programme, United Nations Volunteers - Sudan, and United Nations High Commissioner for Refugees; foreign, national, and local governments, such as the City of Los Angeles and Lawrence Berkeley National Laboratory; nonprofits such as EarthWatch, World Wildlife Fund, and Gaia Amazonas; academic institutions and think tanks such as the Semel Institute for Neuroscience and Human Behavior at the University of California, Los Angeles; and businesses such as REV – Sustainability Solutions for Business.

Lauren also supports outreach and education efforts for the National Aeronautics and Space Administration (NASA), foster animals, and volunteer for wildlife rescue and rehabilitation organizations.

IDA NEWS

UNGA WATER CONFERENCE SIDE EVENT

INCORPORATING UNCONVENTIONAL WATER RESCOURCE SOLUTIONS INTO IWRM

The International Desalination Association is a co-convener of this High-Level Side Event with the Government of Spain and other organizations at the United Nations 2023 Water Conference. This high-level Side Event will occur on March 22nd, 2023, at the Instituto Cervantes.

The discussion will include key messages for stepping up the role of un-conventional resources as key assets for achieving water security and to impulse research, capacity building, and implementation initiatives.

13:00 – 13:15 Welcome and Introduction

13:15 – 14:30 Panel Discussion
Moderator:

Mr. Carlos Cosín. - Former President, International Desalination Association (IDA)

Panelists:

H.E. Teresa Ribera Rodríguez, Vice-President and Minister for the Ecological Transition and Demographic Challenge, Kingdom of Spain

Mrs. Barbara Pompili, Chair of the Water Governance Initiative, OECD, France

H.E. Mariam bint Mohammed Almheiri, Minister of State for Food and Water Security, United Arab Emirates

Mr. Loïc Fauchon, President, World Water Council, France

H.E. Prof. Hani Sewilam, Minister of Water Resources and Irrigation, Arab Republic of Egypt

Mr. Saroj Kumar Jha, Global Director for Water Global Practice, World Bank, USA

H.E. Juan Carlos García Pérez de Arce, Minister of Public Works, Republic of Chile

14:30 – 15:00 Informal Lunch Networking

See you soon in New York

IDA – US CHAMBER OF COMMERCE SIDE EVENT

Wednesday, March 22, 2023
14:30 - 17:00
Landmark Room, 28th floor, Millennium Hotel, One UN Plaza

AGENDA

14:30 - 14:40 Welcome Remarks:

Shannon McCarthy, Secretary-General, International Desalination Association

Marty Durbin, Senior Vice President, Policy, U.S. Chamber of Commerce

Announcement of Global Industrial Water Reuse Champion Award

- Celebrate inaugural winners of the Industrial Water Reuse Champion Award.
- Launch the award globally.
- Highlight best practices and policy solutions

14:40 - 15:10 Featured Remarks:

- Hon. Teresa Ribera Rodríguez, Deputy Prime Minister and the Minister for Ecological Transition of Spain
- H.E. Mariam bint Mohammed Almheiri, Minister of State for Food and Water Security, United Arab Emirates
- H.E. Prof. Hani Sewalim, Minister of Water and Irrigation, Egypt
- Rep. Grace Napolitano (D-CA-31)
- Estelle Brachlianoff, CEO, Veolia
- Hon. Usha Rao Monari, Under Secretary-General, UNDP

15:10 - 16:20 Fireside Chat—Why Water Reuse and Desalination are Critical to Address Water Scarcity

Moderator:

Jon Freedman, Senior Vice President, Global Government Affairs and Policy, Veolia, International Desalination Association

- Saroj Kumar Jha, Global Director, World Bank Group, Global Water Practice
- Sharon Nappier, National Water Reuse Leader, Environmental Protection Agency
- Fady Juez, President, International Desalination Association, Managing Director, Metito
- Gavin Van Tonder, Board Director, International Desalination Association, Executive Director, NEOM Water
- Carlos Cosin, Fmr. President, International Desalination Association, CEO, Almar Water Solutions
- Imad Makhzoumi, Board Director International Desalination Association, CEO, Enoia

16:20 - 16:30 Industrial Water Reuse Champion Winners

- Andrew Aulisi, Vice President for Global Environmental Policy, PepsiCo

16:30 - 17:00 Q&A

17:00 Adjourn

HONORING INNOVATION IN DESALINATION AND WATER REUSE: THE BEGINNING 600A.C.-1975

Development of the knowledge of desalination and its progressive application, mainly marine
600 a.c.

1850 to 1950
Industrial production of distillation-based desalination units for marine and land-based applications grows and consolidates. Multistage units progressively appear

The desalination plant of Las Salinas, Chile, is built, using only renewable energy, sun and wind
1878

1928
Multi-stage evaporator installed in Curação

1957
Prof. Silver from Glasgow University patents the Multi-Stage Flash (MSF) Evaporator and opens the way to large scale application

Researchers at UCLA develop first RO Membrane
1959

President Kennedy turns on the first Seawater Conversion plant in Freeport, Texas
1961

1963
First practical spiral wound module by General Atomics

First municipal SWRO plant goes online in California
1965

The timeline is a shortened overview to give a sense of the development of desalination by referring to the two technologies which have dominated the market and showing how IDA has accompanied this development.

D.T. Bray of Fluid Systems designs first multi-leaf spiral wound element
1968

DuPont Comercializes 4-inch B-9 brackish element & first RO energy recovery patent granted to Hashemi
1969

First BWRO plant commissioned using 89 elements in Ghadamis, Libya
1972

First SWRO plant commissioned using DuPont B-10 elements in Bermuda by Polymetrics
1974

IDE receives patent on use of aluminum tubes in horizontal shell MED with brine and product flash chambers
1975

1967
First commercially successful hollow fiber module by DuPont

1973
IDA Established
Ft. Lauderdale, FL - NWSIA/WSIA Conference

1974
Newport, CA - NWSIA/WSIA (IDA) Conference

1975
Ocean Reef, FL - NWSIA/WSIA (IDA) Conference

INDUSTRY AND SUSTAINABLITY AWARD WINNERS

The 2022 IDA World Congress Awards Program recognized the excellence, innovation, and dedication in the desalination and water reuse industry in multiple categories.

INDUSTRY AWARD WINNERS

Best Public-Private Partnership

METITO
Commitment to a Cleaner Environment

Most Innovative Utility

PUB SINGAPORE'S NATIONAL WATER AGENCY

Best Private Company

GS Inima

Most Innovative Company

GRADIANT
NEW POSSIBILITIES FOR WATER

Best Performing Company in Water Reuse for Brine Mining

المؤسسة العامة لتحلية المياه المالحة
Saline Water Conversion Corporation (SWCC)

SUSTAINABILITY AWARD WINNERS

Best Implementor of UN Sustainability Development Goal 6 Water for All (SDG6)

osmoflo

Best Corporate Social Responsibility Project

ArcelorMittal

PRESIDENTIAL AWARDS

The Presidential Awards went to (from top to bottom) H.E. Eng. Khalid Al Qureshi, CEO, SWPC, for his visionary role and leadership of the Saudi Water Partnership Company (SWPC), Mr. Eduardo Orteu Berrocal for his support in the new initiatives to expand IDA activities, including the publication of the first special edition of the Red Book and Award of Distinction to Dr. Mike Dixon, CEO, Synauta, for his outstanding dedication as the IDA Congress Technical Program Co-Chairman.

H.E. Eng. Khalid Al Qureshi
CEO, Saudi Water Partnership Company (SWPC)

Mr. Eduardo Orteu
Of Counsel, Gómez-Acebo & Pombo

Dr. Mike Dixon
CEO, Synauta

2022 LIFETIME ACHIEVEMENT AWARDS

For years of outstanding achievements, contributions, and dedication to the Desalination and Water Reuse Industry, IDA honored two individuals with this prestigious award.

Hon. Fouad Makhzoumi
Executive Chairman & CEO, Future Pipe Industries GroupFuture

I am honored to receive the International Desalination Association Lifetime Achievement Award for contributing to the water and desalination sector. I served on the Board of Directors for multiple terms, and as President has been a source of pride for me. Witnessing the growth of the IDA since its inception five decades ago and now celebrating its 50th anniversary is a humbling experience. The desalination industry and the water sector are at a pivotal moment. I believe that water conveyance, reuse, and desalination are crucial in providing clean and fresh water to people worldwide.

As an international entrepreneur and philanthropist, I founded The Makhzoumi Foundation alongside my wife, May. Our foundation is a vocal advocate for peace, development, and human rights in the Middle East and North Africa. We are significant donors to numerous charities and aid organizations in the region. Our mission is to improve the quality of life for vulnerable and marginalized communities in the Middle East and North Africa by providing education, health, social services, economic development, and environmental protection services.

One of our initiatives, WaterVision, aims to help countries in the Middle East and North Africa access clean and sustainable water. Through this initiative, we provide access to safe and reliable water for millions of people in the region. Additionally, we tirelessly support the development of innovative water transfer technologies to improve water efficiency, reduce water loss, and improve water quality. My commitment to preserving and advancing the cause of providing access to safe, reliable, and sustainable water in support of the IDA is unwavering.

Dr. Emilio Gabbrielli

International Water Consultant

Receiving the Life-Time Achievement Award from IDA President Carlos Cosin in front of so many members of the desalination community, which I have tried my best to serve for years, has been a great honour. It has meant a lot to me also because I have pursued a career in desalination believing in its potential to ensure a better life for all, and I like to think that the Award also recognises this commitment.

However, I have had this privilege also thanks to a lot of luck.

I discovered desalination and its potential for ensuring human well-being in Peru in 1977, when by chance I participated in the construction of a solar still for a rural community with access only to polluted saline ground water. When I went back to Italy, I was lucky to find plenty of opportunities in desalination because MSF applications were booming in Northern Africa and the Middle East.

I joined Italconsult, partner of Weir, where I gained a broad experience, from design all the way to plant management. I recognized that MSF units, once started, went on beautifully, and that the key to successful production were auxiliary systems such as water intake and post treatment, whose design I pioneered. I was lucky again when, after going to Australia with Italimpianti, in 1987 I was able to join Permutit and get involved in the upcoming new technology, RO, and the first large zero-discharge schemes.

In 2003-2008 I had the privilege to lead the Global Water Partnership, which helped me to understand the policy side and social dimension of water resources management. With this exception my career has mainly continued in desalination till now. I have witnessed its transition from expensive technology for the few, who could afford it, to becoming a mainstream water resource alternative, which was my dream. In recent years I even discovered, and I am supporting, the Água Doce program, which provides safe drinking water to hundreds of isolated rural communities in Northern Brazil: what more could I ask for?

But the luckiest thing has probably been knowing Miriam Balaban early on. She encouraged me to try to join the Board of the IDA in 1987 and campaigned for me to be elected. My participation in IDA since, and several of its affiliates, has been a most fulfilling part of my professional career. During the last 35 years I have had the privilege to know the incredible people of the desalination community, enlarge and deepen my knowledge and have a platform for promoting the sustainable use of desalination to ensure a better life for all.

Thank you, IDA!

TECHNICAL PROGRAM AWARDS

Winners of the Technical Program Awards, along with a commendation announcement (new to the Congress) included the following:

State-of The Art Award

The paper that best presented the application of an established desalination or water reuse technology to reflect the best engineering practices in all aspects of the project or topic presented is significant for the global water industry.

Winner: Mr. Aatman Shah, Business Development Director (MENA), Nanostone

Paper: Nanostone Water Innovative Ceramic Membrane Technology in Water Treatment Applications

Commendation: Mr. Mohannad Malki, CEO/Technical Director, American Water Chemicals (AWC)

Paper: The Perils of Using Chloramines for Pre-Treatment of Water Reuse RO

Research and Development Award

Paper that best presents fundamental or applied research of a technology or concept related to desalination or water reuse is at a pre-commercialization stage but shows exciting signs of development that could lead to impactful discoveries or technologies once at maturity.

Winner: Dr. Victor Monsalvo, Head of Eco-efficiency Area, Innovation and Technology, Aqualia

Paper: Sea4Value: Novel Technologies in Seawater Desalination to Extract Minerals and Metals from Seawater Brines

Commendation: Mr. Borja Blanco, CEO, Aqua Advise

Paper: Membrane Design of a Sub-Sea Desalination System

TECHNICAL PROGRAM AWARDS

Innovation Award

Paper that best presents innovative desalination or water reuse technology that has reached the commercial stage is not yet considered to be widely adopted but is likely to become a game-changer for the industry.

Winner: Eng. Dragan Tutic, CEO & Founder, Oneka Technologies

Paper: Wave-Powered Desalination: A Sustainable Way to Increase Resilience to Water Scarcity

Commendation: Dr. Richard Stover, VP of Technology, Gradiant

Paper: Energy Recovery Devices in Advanced and Emerging Reverse Osmosis Applications

Environment and Sustainability Award

The paper best presents a desalination or water reuse topic, case study, a technology, or any project in such a way that demonstrates how desalination can be applied while respecting the environment and applying the best sustainability principles.

Winner: Mrs. Miriam Brusilovsky, Technical Director – Assets, IDE Technologies, and Media Manager, Israeli Desalination Society

Paper: Israel as a Model for Environmentally Responsible Desalination

Commendation: Dr. Matthew Brannock, Technical Director – Water & Brine Process, GHD

Paper: Water for Hydrogen Production: Challenges and Opportunities Supported by Real-World Case Studies

YOUNG LEADERS AWARDS

YLP Best Paper

Paper best presented by a member of the IDA Young Leaders Program demonstrating scientific originality relevant and vital to the fields of desalination and water reuse.

Winner(s): Dr. Antonella De Luca, Head of Competence Center Environmental Solutions, Omya / Dr. Anat Lakretz-Mashiah, Desalination Process engineer, Mekorot Water Co., Desalination & Special Projects Division (co-authors)

Paper: Techno-Economic Evaluation of Magnesium Replenishment Options After Desalination

Commendation: Mr. Abdulaziz Alghamdi, PDP Mechanical Engineer, ACWA Power

Paper: Twenty Percent Internal Renewable Energy Powering RO Plant

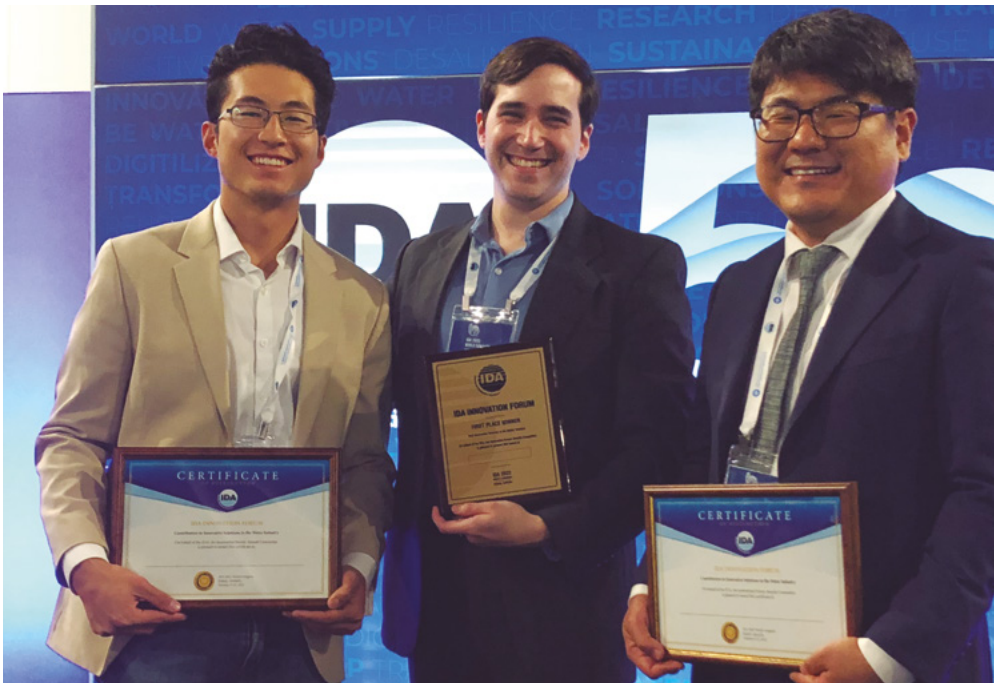
Emerging Leader – Achievement Award

This award goes to an IDA Young Leader's Program member whose contribution to the desalination and water reuse industry has shown a track record of positive leadership and originality.

Winner: Dr. Antonella De Luca, Head of Competence Center Environmental Solutions, Omya

IDA INNOVATION FORUM AWARDS

The IDA Innovation Forum, new to the World Congress, was specifically designed to introduce new and innovative solutions from universities, research centers, technology developers, and start-up companies to major organizations in the water and energy sectors, venture capitalists, developers, and investors. Three winners emerged:



(L to R, Jonathan Bessette, David Warsinger, Junghyo Yoon)

Sponsored by:

aqualia

CARAMONDANI group
You can depend on it®

First Place Winner

Mr. David M. Warsinger, Assistant Professor, Purdue University, Mechanical Engineering & Birck Nanotechnology Center – Presentation on: First batch Osmotically Assisted Process

Second Place Winner

Mr. Jonathan Bessette, PHD Candidate, Massachusetts Institute of Technology, Global Engineering and Research Laboratory – Presentation on: Direct Drive Renewable Powered Electrodialysis Desalination

Third Place Winner

Mr. Junghyo Yoon, PhD Research Scientist, Massachusetts Institute of Technology, Research Laboratory of Electronics (Founder of NONA Technologies, Inc.) – Presentation on: Ion Concentration Polarization Portable Desalination Unit 10 Kg

YOUNG LEADE

IDA ANNOUNCES NEW CO-CHAIRS FOR YOUNG LEADERS PROGRAM

The International Desalination Association (IDA) has announced the appointment of Antonella de Luca, (Omya, Switzerland), Daniele Strongone (American Water Chemicals, Spain) and Rory Weaver (FEDCO, UK) as co-chairs of the organization's Young Leaders Program (YLP).

The YLP was launched in 2009 at the IDA World Congress in Dubai to provide networking, mentoring and learning opportunities to IDA members under 35. Since then, hundreds of desalination professionals have passed through YLP events and activities.The co-chairs are excited to build on the previous success of the YLP in bringing together young professionals for opportunities to learn and network together. All active IDA members aged 35 or under are invited to take part in the YLP, and should contact membership@idadesal.org to register their interest.

IDA Secretary General Shannon McCarthy stated, "We congratulate the incoming co-chairs of the IDA YLP program and look forward to working with them to create new opportunities and exciting collaborations among our YLP members and longstanding experts in the sector."

ERS PROGRAM

Antonella de Luca is the Head of Competence Center, Environmental Solutions at Omya, and is based in Switzerland. "Our main goal this term is to create a strong synergy between the IDA targets and the young leaders' commitment. The idea is to actively connect the leaders of tomorrow to the focused initiatives of the IDA board, aiming for an enhanced contributions from, and professional growth for emerging desalination professionals. Teamwork makes the dream work, here we go!"

Daniele Strongone is the Business Manager EMEIA & APAC at American Water Chemicals, and is based in Barcelona, Spain. "During this term, I would like to make the YLP a real asset for the IDA, becoming an arm that the Board of Directors can rely on. My key goal for this term is to increase the number of active and committed YLP members and work together to create several initiatives: from IDA talks, to improving our social media presence, and preparing valuable sessions for each IDA conference."

Rory Weaver is Director of Marketing and Business Development at FEDCO, and is based in London, UK. "We are aiming to improve engagement in YLP activities across the board, including both virtual and in-person activities, and to build on the success of the IDA mentoring program. These initiatives build connections between the IDA YLP and more general membership, and can transform the careers of desalination professionals through the sharing of knowledge, contacts and experiences.

Reflecting on over a decade of YLP activity since he co-founded the initiative, H2O Innovation COO **Guillaume Clairet** said, "When we were brainstorming about the IDA YLP back in my San Diego apartment in 2008 we had no idea what it would become, or whether it would make any sort of difference. It's amazing to see that 15 years later it has become so well organized and is making such a positive impact in integrating young professionals into the global desal community!"

WATER POSITIVE, THE TIME FOR WATER ESG CRITERIA

By Ms. Shannon McCarthy, Mr. Alejandro Sturniolo, and Mr. Matt Armstrong

We are living in a transformative time. The significance of being environmentally united is finally internationally recognized, and the commercial and economic advantage of being environmentally friendly is gaining traction within the business community.
Major global corporations are making meaningful and considerable efforts to invest in the recovery of the ecological flow of our natural bodies of water by becoming Water Positive, a term used to describe an industry or corporation that makes more water available than it uses. Google, Facebook, Microsoft, PepsiCo, Gap, Dupont, Heineken, and British Petroleum, are among the internationally recognized companies leading the way worldwide to return more water to nature than they consume. Their actions are commendable, considering that the Water Positive initiative does not support extracting water from natural resources.

Being Water Positive is about creating a system of sustainability, and sustainability is balancing the activity cohesively and collaboratively with the resource and the environment. Fortunately, increasingly global companies are seeing the economic and environmental advantages of adopting these environmental, social, and governance (ESG) philosophies. ESG criteria are fast becoming a fundamental pillar of corporate strategy.

The impact of the water crisis is no longer only affecting individuals in disadvantaged communities. The imminent threat to the business economy is becoming increasingly real. We see this in industries like chemical manufacturing and mining, where commodities play a fundamental role in the world economy, and most notably in food and beverage production, where increasing investment competition for water rights has adverse effects in areas of the world suffering from food crises.

To avoid depleting the planet's limited supply of fresh water, companies must look beyond their operations and supply chains and fully grasp the environmental philosophies that will create a sustainable future for their business and the world. The commitment to be Water Positive is not a matter of individual reputation but rather a planned phase of the operation that will help companies achieve long-term objectives of aligning themselves with the United Nations Sustainability Goals. A straightforward way business can return pure water to nature is to purify non-potable water through seawater desalination and municipal or industrial wastewater purification. These non-conventional but well-vetted sources can generate a reliable and high-quality water supply and are now recognized by the United Nations to offset water scarcity. The International Desalination

Association (IDA) has been active since 1973, is present in more than 60 countries, and is allied with 15 affiliated associations.

The IDA advocates that the public and private sectors commit to a sustainable Water Positive lifestyle and reward positive performance with carbon footprint credits that allow a business or nation to release a defined amount of carbon dioxide or other greenhouse gas. With the overall objective of becoming carbon neutral, any CO2 released into the atmosphere from human activity must be balanced by an equivalent amount being removed. Becoming carbon-negative

It is no longer enough to Reduce, Reuse and Recycle; to achieve a Water Positive balance, we need to recover and return more water than we use in our production processes.

requires a company, sector, or country to remove more CO2 from the atmosphere than it emits.

As demonstrated with carbon credit trading, we can now grow the economy, create jobs, and develop exports while simultaneously recharging our natural water sources. It is no longer enough to Reduce, Reuse and Recycle; to achieve a Water Positive balance, we need to recover and return more water than we use in our production processes. Thanks to technological advances in water purification solutions and alternative energies, non-conventional water sources are now positioned as the best option to supply natural water resources, delivering high purity water.

And because of these advancing technologies, and because we live in such a transformative time, we must now consider adding a fourth "R" to our environmentally sustainable acronym – Recharge. Since the days of the industrial revolution, we have sacrificed nature to meet the demands of development as a society.

Today it is time to reverse this default behavior and use technological advances to work in favor of the environment. Unlike the effort to moderate carbon emissions, purifying water from non-potable water is relatively inexpensive, and the technology is here.

The philosophy of attaining a Water Positive lifestyle through non-conventional water sources is sustainable and predictable. It will work without damaging the environment or limiting the production of manufacturing operations allowing us to set aside any conflicts that develop due to confrontations concerning available water. History demonstrates that no good ever comes from these discords, and a Water Positive existence will help relieve the daily challenges that 2.6

billion people suffer from water stress. This number will increase to 3.9 billion, half the world's population, by 2050 if we do not act swiftly and urgently. Collateral impacts of not acting in an imperative manner will also impact the world's food supply and limit our capacity to provide food to the 7.8 billion people in the world today and the 10 billion projected by the year 2050.

The urgency to act is upon us. The technology is tested and accessible. Our uncertainties and insecurities with innovative and revolutionary approaches to solving problems are the only things preventing us from moving this initiative forward. For the good of the people and the planet, we must set aside this archaic mentality and start paving a path to a brighter future today. Be Water Positive today!

Ms. Shannon McCarthy

Mr. Alejandro Sturniolo

Mr. Matt Armstong

be water positive


50 IDA
International Desalination Association
Years of Innovation in Desalination and Water Reuse
IDA SEVILLE SUMMIT ON
Water & Climate Change
15-18 October 2023 | Seville, Spain
REGISTRATION IS NOW OPEN
Submit your abstract by 31 March
https://wcc.idadesal.org/registration/
Under the Patronage of Hon. Teresa Ribera Rodríguez, Deputy Prime Minister and the Minister for Ecological Transition of Spain
GOBIERNO DE ESPAÑA
MINISTERIO PARA LA TRANSICIÓN ECOLÓGICA Y EL RETO DEMOGRÁFICO
Endorsed by Hon. Antonio Muñoz, Mayor of Seville
Sevilla.
Supporting Affiliates:
AEDyR
ASOCIACIÓN ESPAÑOLA DE DESALACIÓN y REUTILIZACIÓN
European Desalination Society
ALADYR
ASOCIACIÓN LATINOAMERICANA DE DESALACIÓN Y REUSO DE AGUA

IDA/PARTNER EVENTS

2023 WATEREUSE SYMPOSIUM
5-8 March 2023
Atlanta, Georgia, USA

UN 2023 WATER CONFERENCE
22-24 March 2023
New York, USA

OZWATER'23
10-12 May 2023
Sydney, Australia

EDS CONFERENCE ON DESALINATION FOR THE ENVIRONMENT, CLEAN WATER AND ENERGY
22-25 May 2023
Limassol, Cyprus

CAPACITACIÓN EFECTIVA ALADYR ESPAÑA
5-9 June 2023
Alicante, Spain

XIII AEDYR CONGRESO INTERNACIONAL
13-15 June 2023
Cordoba, Spain

IDA SEVILLE SUMMIT ON WATER AND CLIMATE CHANGE
16-18 October 2023
Seville, Spain

CARIBDA 2024 CONFERENCE & EXPOSITION
9 - 12 July 2024
Nassau, Bahamas

Check IDA and Our Affiliates Events Here

IDA WELCOMES NEW MEMBERS

AQUA SCIENCE AND TECHNOLOGY LTD

aquascience.io

Aqua Science and Technology Ltd specializes in providing water management products and services to its wide portfolio of clients across different sectors, from the smallest company to the largest plant.

We are one of the leading companies in desalination services across the Indian Ocean with above 40 desalination/reverse osmosis plants installed, commissioned and operated.

Our trained engineers and technicians have excellent troubleshooting skills giving us an edge over our competitors and establishing ourselves as an expert in the field.

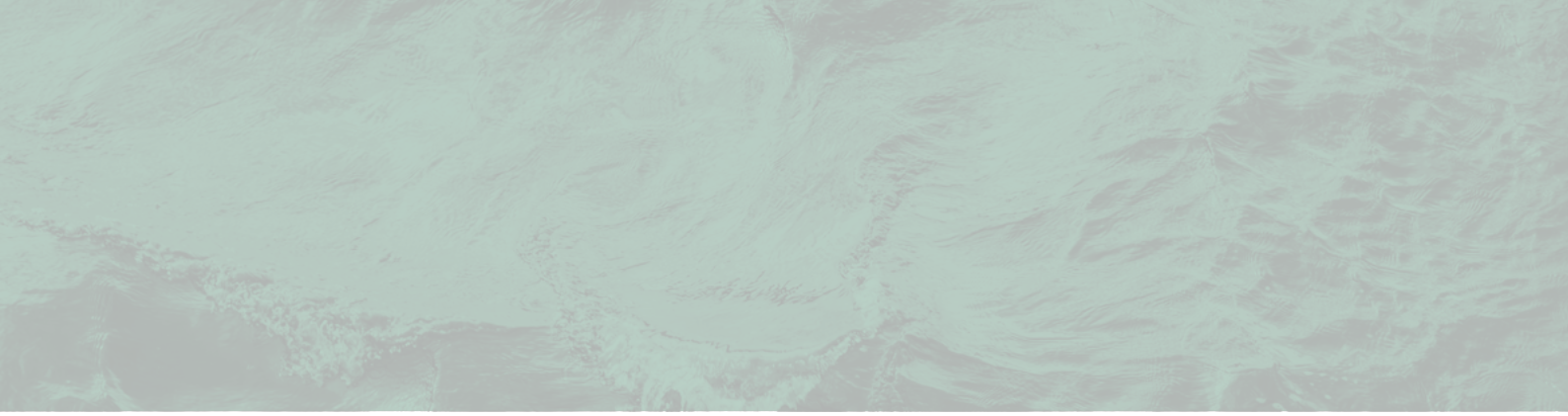
Besides desalination plants, we also offer other water treatment services such as STP installation and operations, treatment of cooling towers and boilers, and disinfection of potable water systems, amongst others.

We take pride in our innovative and anticipative approach by always being customer oriented.

CRAMSA

cramsa.cl

Our purpose is to be a sanitary company that provides quality drinking water and sanitation service to increase water availability in the Region of Antofagasta, taking care of the environment and contributing to the sustainable development of the territory.



JDCEXEC INTERNATIONAL (JDCH2O)

jdch2o.com

JDC International is a consultation management company. We strive in sharing our knowledge and expertise through application of this knowledge in conducting market assessments, benchmarking, site audits, innovation recommendations and efficiency improvements alongside training and coaching. Above all enabling water users to become water positive by recycling onsite treated wastewater, black and grey, for reuse in toilet flushing, irrigation, etc. onsite. We address water scarcity, reduces health risks with treated sewage and increases the green environmental footprint, linking the food water energy nexus. The Fusion Series Treatment Systems are drop-in wastewater treatment units designed for decentralized applications where the effluent quality needs to meet or exceed Domestic Water Source (DWS) standards. It follows the exact same treatment process as a municipal activated sludge plant, including denitrification and phosphate reduction. Power consumption ranges from 60 w (1,700 lpd) to 336 w (15,000 lpd). In series systems allow for treatment of bigger volumes. Due to the low power consumption, it can also operate on solar power.

IDA WELCOMES NEW MEMBERS

MEGA VESSELS INC

megavesselswater.com

The innovative Mega-Vessel membrane system developed by Mega-Vessels Inc. is a unique proprietary patent technology with a wide area of water treatment applications including seawater, brackish water desalination, water reclamation and nanofiltration water softening. The Mega Vessel desalination system is capable of producing drinking water that meets US Environmental Protection Agency and international (WHO) water quality standards at total cost and energy consumption which are significantly below those of traditional desalination systems.

PARTANNA

partanna.com

Partanna is a technology company that is pioneering commercially scalable carbon-removal solutions.

Partanna has developed a carbon-negative concrete that is more eco-friendly and offers higher specifications than traditional cement. Partanna's products are just as strong, versatile, and cost-effective as traditional concrete – but are produced with minimal carbon emissions.

Partanna is made from natural and recycled ingredients, including steel slag and brine.

Production of cement creates 2.3 billion tonnes of carbon dioxide per year, representing 8% of global CO2 emissions. This is largely due to the extent to which the material is used: concrete is the second-most-consumed product on the planet, after clean water. It's also thanks to its carbon-intensive method of production.

Partanna captures significant amounts of carbon during its lifecycle. This means that developments built with its technology generate carbon credits (both Avoidance and Removal credits). This advantage has been verified by Verra's Verified Carbon Standard (VCS) Program.

TAQA

taqa.com

Established in 2005, the Abu Dhabi National Energy Company (TAQA) is a diversified utilities and energy group headquartered in Abu Dhabi, the capital of the United Arab Emirates, and listed on the Abu Dhabi Securities Exchange (ADX: TAQA). TAQA provides nearly all the critical power and water infrastructure for the Emirate of Abu Dhabi.

TAQA has significant investments in power and water generation, transmission, and distribution assets, as well as upstream and midstream oil and gas operations. The company's assets are in the United Arab Emirates as well as Canada, Ghana, India, Iraq, Morocco, Oman, the Netherlands, Saudi Arabia, the United Kingdom and the United States.

TAQA is committed to becoming the recognized low carbon power and water champion in Abu Dhabi and beyond and will achieve net zero emissions by 2050. Its strategy includes ambitious growth plans in renewable power generation, energy efficient reverse osmosis water desalination and in the development of power and water transmission and distribution infrastructure.

For more information, please visit: www.taqa.com and follow us @TAQAGroup on LinkedIn, Twitter, Instagram and YouTube.

NX FILTRATION

nxfiltration.com

NX Filtration is a fast-growing company that develops and manufactures hollow fiber membranes and modules for use in ultrafiltration and direct nanofiltration applications. The low fouling, chlorine tolerant hollow fiber construction provides removal of organics, e.g., micro-pollutants, pharmaceuticals, medicines, PFAS and insecticides in one simple cost effective step.

NX Filtration's technology is ideally suited for waste water re-use applications and for polishing of surface water to drinking water standards. Other applications include decentralized water treatment, color removal, softening, and partial desalination for industrial, process and municipal applications.

The membrane products of NX Filtration are capable of producing drinking water from surface or waste water in a single step.

IN MEMORIAM: DR. IRVING MOCH

On behalf of the IDA community, we would like to express our sincere condolences on the passing of long-standing IDA member and board member Dr. Irving Moch, Jr., in September 2022.

Dr. Moch received multiple degrees from Columbia University, New York City, and worked in the water treatment industry for over six decades. Dr. Moch's career included forty years with the DuPont Company in various capacities in Marketing, Manufacturing, Engineering, and Research and Development and management of his consulting organization that specialized in all facets of water treatment. In addition to being past Director and Editor of the International Desalination Association (IDA), Dr. Moch was also Director Emeritus and former International Liaison Committee chair and Hall of Fame inductee of the American Membrane Technology Association (AMTA), as well as a member of the American Water Works Association (AWWA) Water Desalting Committee to name a few. We acknowledge Dr. Moch's exemplary commitment to the desalination and water reuse industry; his water treatment expertise and efforts helped pave the way for future leaders.

SOLVING

THE WATER PROBLEM IN EVERY CITY

We model the expertise in supporting knowledge on **Water Management, Waste Water Treatment & Process Technologies** in disruptive times.

BOOK YOUR TRAINING

CONTACT US:

+971 55 290 5593

www.JDCH2O.com

nellie@jdcexec.com

Join IDA

BE PART OF THE COLLECTIVE MOVEMENT TO SECURE FRESH WATER #WATERACTION

Join or Renew your IDA Membership for 1 July, 2022- 30 June 2023.

idadesal.org

Advertise in IDA GLOBAL CONNECTIONS today!

IDA Global Connections offers companies an outstanding opportunity to show their support for the IDA and advanced water treatment industry that we serve, while reaching approximately 10,000 industry professionals around the world.

IDA offers a variety of sponsorship opportunities. For details, please visit **www.idadesal.org** or contact **sponsorships@idadesal.org.**

DOWNLOAD DE THE MEDIA KIT **HERE!**


IDA GLOBAL CONNECTIONS
The Elements Needed to Achieve Lower Desalination Tariff's
IDA GLOBAL CONNECTIONS
Non-conventional Water Solutions to Offset Global Water Scarcity
IDA GLOBAL CONNECTIONS
Investing in Tomorrow's Potential
IDA GLOBAL CONNECTIONS
Responding to Fresh Water Needs in sub Saharan Africa
IDA GLOBAL CONNECTIONS
Ensuring the Sustainability Of Water Resources
IDA GLOBAL CONNECTIONS
The Woman, the Legend

50 IDA
International Desalination Association
Years of Innovation in Desalination and Water Reuse

Connecting People and Ideas to Water Solutions

Address
100 Conifer Hill Drive
Suite 108
Danvers, MA 01923 USA

Phone
+1-978-774-0959

Web
www.idadesal.org