



CONNECTIONS

May / June 2017

Connecting People and Ideas to Water Solutions

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Nomination Period for 2017-2019 Board of Directors Is Now Open

With the two-year term of IDA's current Board of Directors set to expire on October 19, 2017, IDA's Membership and Elections Committee is seeking candidates for election to its 2017-2019 (Term 18) Board of Directors.

Nominations

All persons who have been continuous active members in the IDA since June 6, 2016 are eligible to stand for election. One of the major criteria in considering candidates is their ability to provide leadership and make significant positive contributions to IDA. Candidates should be knowledgeable about IDA's mission and policies and be prepared to assist in further developing IDA's vision, programs and services. In addition, they should be prepared to dedicate a significant amount of time to their duties should they be elected; for example, direc-

tors are expected to prepare for and attend two board meetings per year, actively participate in IDA's committees, undertake special assignments and respond promptly to communications from Committee Chairpersons and IDA Headquarters.

All nominations should be sent to the IDA office to the attention of IDA Secretary General, Ms. Patricia A. Burke, at paburke@idadesal.org. Current directors who wish to stand for re-election should email Patricia Burke prior to July 25, 2017.

Candidate Eligibility

To be placed on the ballot, candidates must have been: (1) selected by the Membership and Elections (M&E) Committee; (2) proposed by letter or petition by at least five Class I and Class II members or their designated representatives from the

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message

from the Secretary General

Patricia Burke



It seems hard to believe that another year has rolled by and it's once again time to renew your membership in IDA, as the new membership year will begin on July 1. On behalf of all of us at IDA, I want to thank you for being a member and look forward to the opportunity to serve once again as your point of connection to the global desalination and water reuse community.

IDA brings together people, knowledge and new ideas that are shaping the planet's water future. Our membership represents leaders in all sectors of our industry, from municipal and industrial end-users to solutions providers, suppliers and technology developers, researchers, consultants, members of academia and government. Members come from all around the world – more than 60 countries are represented – and that reach continues to grow as more regions of the world embrace the critical role desalination and reuse play in managing current and future water resources.

Our World Congress and specialty conferences are known for not only the technical content but also as important venues for connecting with colleagues and forging new relationships, and discussing the latest developments, trends and best practices. IDA members can take advantage of substantial discounts in registration fees for these events, which provide one-on-one access to an unparalleled international network that is a tremendously valuable resource for growing our members' business, broadening horizons and keeping them abreast of the latest advancements and developments.

IDA has always promoted educational opportunities. We continue to offer member-only programs to advance that goal with our fellowship and scholarship programs, IDA Academy courses, and mentoring program for the

next generation of leaders in our industry. Our library of publications, including papers and Proceedings from our many events, is a tremendous resource available at no cost to members.

I encourage you to renew your membership now – and hope that you will invite a colleague to join as well.

On another note, our cover story in this issue focuses on nominations for the Board of Directors. Composed of industry leaders from around the world, our prestigious Board provides governance for the Association, setting its direction and providing oversight of its operations. If you would like to be directly involved in charting IDA's course and qualify based on the requirements outlined in our cover article, please consider running for the Board.

Serving on the Board offers a tremendous opportunity to deepen your involvement in IDA as we work together to help advance the role of desalination and water reuse in solving the world's water challenges. In fact, the desalination and water reuse industry is unlike any other in the world, because clean water is our planet's most precious – and most threatened – natural resource. By choosing a career in desalination and water reuse, each of us has a unique opportunity to contribute to the world's well-being. I can think of few industries that offer that opportunity or place such a responsibility on each of us, every day.

In conclusion, I want to emphasize that IDA is your Association. We are proud to represent the global desalination and water reuse community. We are here to serve you and the industry at large. We encourage you to take advantage of our many benefits, and we also hope that you are inspired to become even more engaged in IDA's future and the future of our industry. ■

Nomination Period for 2017-2019 Board of Directors Is Now Open (Cont.)

continued from page 1

same region; or (3) submit a written request to the M&E Committee to be considered for election and be sponsored by at least five Class I and Class II members or their designated representatives.

Candidates must be prepared to serve the desalination and water reuse community as a whole rather than espouse the particular interest of any single entity. They must maintain confidentiality when appropriate, and avoid prejudiced judgments on specific issues. The candidate should also have good standing within the desalination and water reuse industry.

Regional Representation

In order to assure proper regional representation, directorships are allocated in proportion to the number of Class I and Class II members in good standing in each region. Twenty-one directors may be elected to the Board of Directors, and each region may have at least one and no more than seven. Based on the membership numbers, the regional allocation of directors for the 2017 election is as follows:

| | |
|--------------------------|----|
| Europe | 5 |
| Latin America, Caribbean | 1 |
| Middle East, Africa | 7 |
| North America | 4 |
| Pacific Asia | 4 |
| GRAND TOTAL | 21 |

Elections

Directors are elected by a direct vote of IDA's Class I and Class II members. The Membership and Elections Committee asks that each candidate provide a biography and brief description of what he or she intends to contribute to the Association. Ballots will be posted on the website on August 8, 2017 and voting will begin. IDA members will be able to log in and vote electronically. Voting will close on September 27, 2017. Results will be posted on the IDA website by October 1, 2017, and members will be notified of the results by email.

Schedule

| | |
|---|--------------------|
| Nomination start date | June 6, 2017 |
| Nomination close date | July 26, 2017 |
| Voting for the 2017-2019 IDA Board of Directors Election Opens | August 9, 2017 |
| Voting for the 2017-2019 IDA Board of Directors Election Closes | September 27, 2017 |
| Results Announced and Posted | October 1, 2017 |

For more information on the Director elections, please contact Patricia Burke at paburke@idadesal.org ■

This new section in IDA Connections features perspectives from leaders in the global desalination and water reuse industry. We are honored to present an interview with H.E. the Governor of Saline Water Conversion Corporation (SWCC), Eng. Ali bin Abdulrahman Al-Hazmy, to inaugurate this series.



Eng. Ali bin Abdulrahman Al-Hazmy,
Governor of Saline Water Conversion Corporation



المؤسسة العامة لتحلية المياه المالحة
Saline Water Conversion Corporation

An Interview with H.E. the Governor of SWCC, Eng. Ali bin Abdulrahman Al-Hazmy

(IDA) In your opinion, what is the most important aspect of the transformation of SWCC to a holding company and eventual privatization?

(Al-Hazmy) We are excited by the many benefits that will result from the privatization of SWCC as part of the broader objectives set forth in the National Transformation Plan and Vision 2030. The most important aspect of the transformation has always been customer oriented. We are committed to providing access to high quality water at affordable prices across the Kingdom of Saudi Arabia and are seeking long-term strategic partners from the private sector that will help to shoulder this mandate. We have a parallel responsibility to our employees who have dedicated their careers to preserving this most vital of natural resources. We believe that merging private sector capabilities with SWCC's world class assets and experience will create a win-win for consumers.

(IDA) What is the current status of the transformation and when do you expect that it will be completed? What benefits will the privatization program bring to the Kingdom?

(Al-Hazmy) We have already made significant progress along the road to privatization, and the transformation of the sector remains on track. We are actively engaging the private sector in this process to ensure that we find the right partners to sustainably propel the sector forward. While the transformation will be completed along the timeline set forth in the National Transformation Program, the benefits will continue to be realized over the long run. The decisions that are made today will ensure water security for the next generation and it is of upmost importance that we are successful.

(IDA) What is SWCC's relationship with the National Water Company (NWC)?

(Al-Hazmy) Since its establishment in 2008, NWC has been a vital partner in SWCC's mission to deliver high quality water at affordable prices throughout the Kingdom. Going forward, the strong commercial and professional relationship will continue to serve as a foundation for the industry as efficiencies are unlocked by the private sector.

(IDA) Please tell us about some of the new desalination projects in the Kingdom under your leadership.

(Al-Hazmy) SWCC's going to privatization will involve the private sector in its future projects. There are current desalination projects under SWCC by EPC contractors as follows:

- Construct the largest multi-effect distillation (MED) project in the world with a total production capacity of (91200) m³/day in the Shoaiba plant.
- Three seawater reverse osmosis (SWRO) desalination plants to provide potable water to the Haql Plant – Phase 3, Duba Plant – Phase 4, and Al-Wajh Plant – Phase 4, with a production capacity of (16000) m³/day for each plant.
- Jeddah- 4 reverse osmosis (RO) with a total production capacity of (400000) m³/day in the Shoaiba plant

(IDA) The Kingdom has certainly taken a global lead in development of renewable energy programs in connection with desalination. What is the status of this program, and what new developments do you expect to see?

(Al-Hazmy) Saudi Arabia continues to explore opportunities to incorporate untapped renewable energy resources into its long-term energy policy. SWCC is helping pioneer this initiative through its Research Institute in Al Jubail and its partnership with local and international agencies to develop a solar desalination strategy that will optimally integrate renewables into the potable water sector across the Kingdom.

SWCC is also collaborating with leading researchers at King Abdulaziz City for Science and Technology (KACST) to establish the largest solar-assisted desalination plant in the world in Al Khafji. Upon completion, the RO desalination plant will use PV solar system to produce 60,000 cubic meters of fresh water per day.

We are proud to be on the forefront of solar-assisted desalination technology. We envision that in the near future, solar-assisted desalination plants will operate on a commercial scale for remote areas, where fossil fuel production costs are prohibitively high.

(IDA) How do you see the close cooperation with IDA continue to evolve, such as in implementing new technologies, education and exchange of information?

(Al-Hazmy) SWCC's unique relationship with IDA dates back to its founding. Both SWCC and IDA are leading bodies in the desalination industry, pioneering seawater desalination technology and the exchange of research and professional development.

SWCC plays a leading role in a number of IDA initiatives including the Desalination Academy, fellowships, seminars, conferences, courses and publications. SWCC is proud to support the IDA in their shared objective to support the development of the global desalination industry. Our partnership is in accord with the strategic plan set forth in Vision 2030 to develop and expand sustainable desalination solutions across the Kingdom. ■

The Potential for Water Treatment Membranes Based on Carbon Nanomaterials



**By Dr. Graeme K Pearce,
Membrane Consultancy
Associates**

Carbon-based products have been widely used in the water and wastewater treatment industry for decades, providing filtration and adsorption media including Granular Activated Carbon (GAC) and Powered Activated Carbon (PAC). Carbon is considered an inexpensive method for trace contaminant removal. Indeed, costs are so low that the media may be single use and not regenerated.

Products based on carbon nanomaterials are at the other end of the cost and performance spectrum. They hold the promise of exceedingly high performance with targeted removal of specific contaminants, and could even be used as a generally applied low energy technology for desalination. This article explores the various technology options, considers their status and outlook, and examines their potential future impact.

Definitions

There are several approaches to making membranes from carbon, yielding products which differ widely in properties, performance, and status. Figure 1 shows the relationships between the different options.

This article will consider the properties of the various carbon nanomaterials (CNM), comparing carbon nanotubes (CNT) with the various graphene based options, but with a primary focus on the most commercially advanced option, namely graphene oxide.

General Benefits of Carbon Nanomaterials

CNMs have been widely studied for their potential in water applications for the past decade. Interest was initially focused on CNT and graphene, but recently, versions of graphene oxide (GO) have been considered to be more practical for commercialization. CNMs hold the promise of radically enhanced performance, namely:

- Exceedingly high permeability
- Extremely high and tunable selectivity
- Low fouling/anti-fouling characteristics

However, although these advantages are clearly attractive, it is not necessarily possible to exploit their full potential in commercial products. Indeed, issues of cost, robustness, and stability may outweigh performance factors. Furthermore, despite proven low fouling advantages, carbon-based membranes have been found to potentially encourage bacterial adhesion and hence bio-fouling. This has necessitated the modification of more recent versions of these membranes to introduce bio-static properties to counter the problem.

Carbon Nanotubes

CNT membranes comprise a relatively thin film of carbon atoms that form an array of cylindrical pores. The pores may be vertically aligned in a systematic structure, or randomly aligned. The pore size generally spans 1-2 nm up to 50 nm, so effectively encompasses the middle of the nanofiltration (NF) range up to coarse ultrafiltration (UF). CNT membranes require modification after initial formation to remove catalyst residuals, which ensures that the pores are open. The structure is also functionalized to reduce hydrophobicity. This has added significantly to the cost and complexity of manufacture.

CNT membranes offer the promise of extremely high

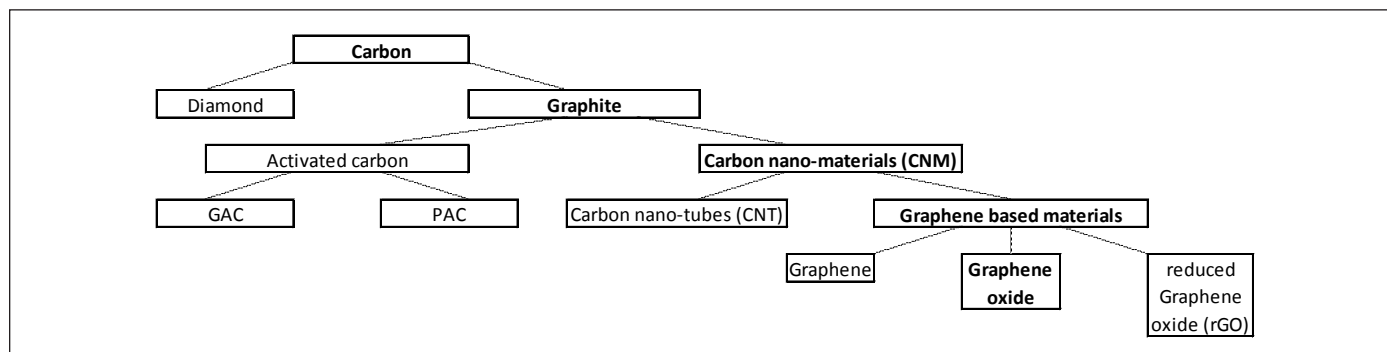


Figure 1: The Hierarchy of Carbon-based Products Used in the Water Industry

permeability, which has to be exploited to counter the significant cost premium of manufacture. However, UF tends to be limited by the particle concentration arriving at the surface, and the potential for particles to enter the pores. If higher permeability is exploited by increasing the flux, the particle concentration will increase at the surface and trans-membrane pressure will increase. This will make pore plugging more likely and exacerbate fouling. Anti-fouling properties are not designed to combat this type of particle fouling, but are focused instead on resisting adsorptive fouling from organics. It is therefore by no means clear whether an expensive membrane with anti-fouling/high permeability properties will offer a capital cost advantage.

It is possible to take advantage of high permeability by reduced energy operation. However, the energy cost of UF is not that high, and although low energy cost operation is always to be welcomed, it is unlikely that this would be a sufficient cost driver to encourage CNT adoption in UF.

The arguments above are based on the premise that CNT membranes will be expensive due to development experience so far. Manufacturing cost competitive with current ceramic membranes would completely alter the prospects for this technology.

Graphene-based Materials

The first graphene-based material to be considered as a potential membrane has been graphene itself. A membrane can be formed from an ultrathin layer, potentially just one atom thick. Thin graphene layers can be surprisingly strong, with 200 times the strength of structural steel. Pores of 0.75 to 0.9 nm can be created in the graphene membrane, which make it potentially suitable as an RO or tight NF membrane. The pore size can potentially be modified, giving the promise of highly tuned selectivity.

As with CNT, graphene membranes have up to now been prohibitively expensive. Furthermore, graphene has the same potential disadvantage as CNT in that the non-oxidized surface is hydrophobic. However, the ultrathin layer ensures that laboratory samples of these membranes have exhibited very high permeability.

Graphene oxide (GO) offers another option for this group of graphene based materials. These membranes com-

prise multiple layers of oxidized graphene sheets, with pores being defined by the inter-layer spacing to create a nano-capillary structure. There are opportunities to functionalize the surface of these GO sheets to modify selectivity or anti-fouling properties, or to partially reduce the oxide sites to form reduced graphene oxide (rGO). Figure 2 shows the potential manufacturing routes to GO and rGO via graphene itself, i.e., 'a' or graphite, i.e., 'b'. Exfoliation refers to the separation of the individual layers of graphite oxide to form GO.

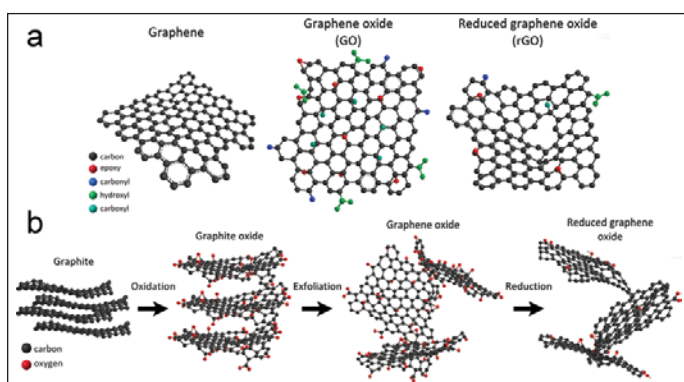


Figure 2: Manufacturing route options for graphene based membranes

(Diagram taken from open access source, www.intechopen.com/books/recent-advances-in-graphene-research/graphene-based-materials-functionalization-with-natural-polymeric-biomolecules)

Unlike UF, RO is not prone to particle fouling by pore plugging. An excessive particle concentration in the feed channel would still be highly detrimental to performance, but this is more an issue for module and process design rather than for the membrane itself. RO is more likely to be limited by organic adsorption. The highly hydrophilic GO membrane would therefore provide a significant advantage.

GO and rGO Membranes

The oxidized graphene membranes offer the important advantage of intrinsic hydrophilicity and anti-fouling character. A broad range of laboratory and pre-commercial membranes have been made which can be characterized as belonging to this family of materials, with some showing highly promising performance. The membranes can be pure materials, or mixed matrix materials with common polymeric such as polysulfone, polyethersulfone or polyvinylidene difluoride. It is also possible to apply the membrane as a coating to a polymeric membrane or substrate. The added GO component increases permeability

and enhances selectivity. The additional cost is relatively modest, and the procedures to make the additive and incorporate it within a polymeric structure are straightforward. It is therefore likely that this will be the means by which graphene-based membranes begin to make their impact in the membrane water market.

The Potential of GO Membranes in Desalination

The energy claims for new graphene-based membranes need to be viewed with some care, since many of the energy costs are effectively fixed costs and would not be reduced by an enhanced membrane.

Seawater desalination is much more energy intensive than surface water treatment or wastewater reuse, and is a potentially attractive target for an improved energy efficient membrane. Most modern highly efficient seawater desalination plants operate at around 3 kWhr/m³, which is ten times the energy cost of surface water treatment and three times that of wastewater reuse.

For highly saline feeds such as seawater, the minimum theoretical energy to overcome the osmotic pressure is around 0.7 kWhr/m³ of water produced, depending on the source salinity. The membrane then imposes additional energy requirements to the osmotic pressure due to permeability constraints. For current membranes, taking into account energy losses across the membrane, the practical minimum is around 1.5 kWhr/m³ for the RO membrane itself, i.e., 0.8 kWhr/m³ higher than the theoretical minimum energy required to overcome the osmotic pressure at zero recovery.

The process then imposes further energy penalties to achieve a cost effective plant. For example, most plants operate with as high recovery as possible in order to reduce feed abstraction and pre-treatment costs, and this raises the average salinity. Seawater plant recovery typically falls in the range of 40 to 60%, increasing the salinity of the feed by a factor of between 1.67 to 2.5 times the incoming feed concentration. This increases the practical minimum energy for a process to be economic to at least 2.25 kWhr/m³.

It is possible that development of a highly permeable GO membrane could reduce the energy inefficiency of current RO membranes, i.e., such a membrane could

potentially address a target of 0.8 kWhr/m³. However, it is unlikely that it would help to address other process losses. The target is therefore restricted to a small but significant proportion of the total energy use of desalination, i.e., somewhere between 20-30%. If it reduced energy use of the membrane itself by 50-67%, it might realistically save 0.5 kWhr/m³. This would be an important contribution, but desalination would still be by far the most energy intensive water resource option.

In a Total Water Cost (TWC) analysis for seawater desalination, electric power is the single largest component of cost typically accounting for around 50% of the 20 year life cycle cost. An energy reduction of 0.5 kWhr/m³ would reduce TWC by 8% for the same membrane price, which would be very significant for the industry. Such a benefit would be sufficient to cover a significant increase in membrane price.

Conclusions

- Membranes based on carbon nanomaterials including carbon nanotubes and graphene-based materials offer the promise of exceptionally high performance, but so far have been expensive and difficult to manufacture.
- More recent developments of graphene oxide membranes appear to offer a more realistic value proposition, since there are several practical manufacturing options.
- The performance of graphene oxide membranes is sufficiently encouraging to offer a strong driver for energy saving in desalination; using graphene oxide membranes would be justified even if the membrane was significantly more expensive than current RO membranes.
- Though generally low fouling, membranes made from carbon nanomaterials can be prone to bio-fouling due to bacterial adhesion, and a bio-static modification may be required for desalination applications.

Dr. Graeme Pearce is Principal of Membrane Consultancy Associates (www.membraneconsultancy.com), a practice providing expert advice and guidance in membrane technology for liquid separations. He can be reached at

gpearce@membraneconsultancy.com ■

Amane Advisors Shares Insights in IDA Connections' Trendwatch Section



Digital Transformation in the Water Sector, Part One: Digital Is a Priority

By Gigi Karmous-Edwards

The term “digital transformation” seems to be popping up everywhere, across most sectors. Is this a drive-by-trend that we will witness in the water sector, or is it the beginning of a long-lasting, fundamental shift in the way water is delivered to society?

In this installment of a series on the role of the digital world on the water sector, we discuss some of the key barriers to digital technology adoption in water and help define the term “digital.”

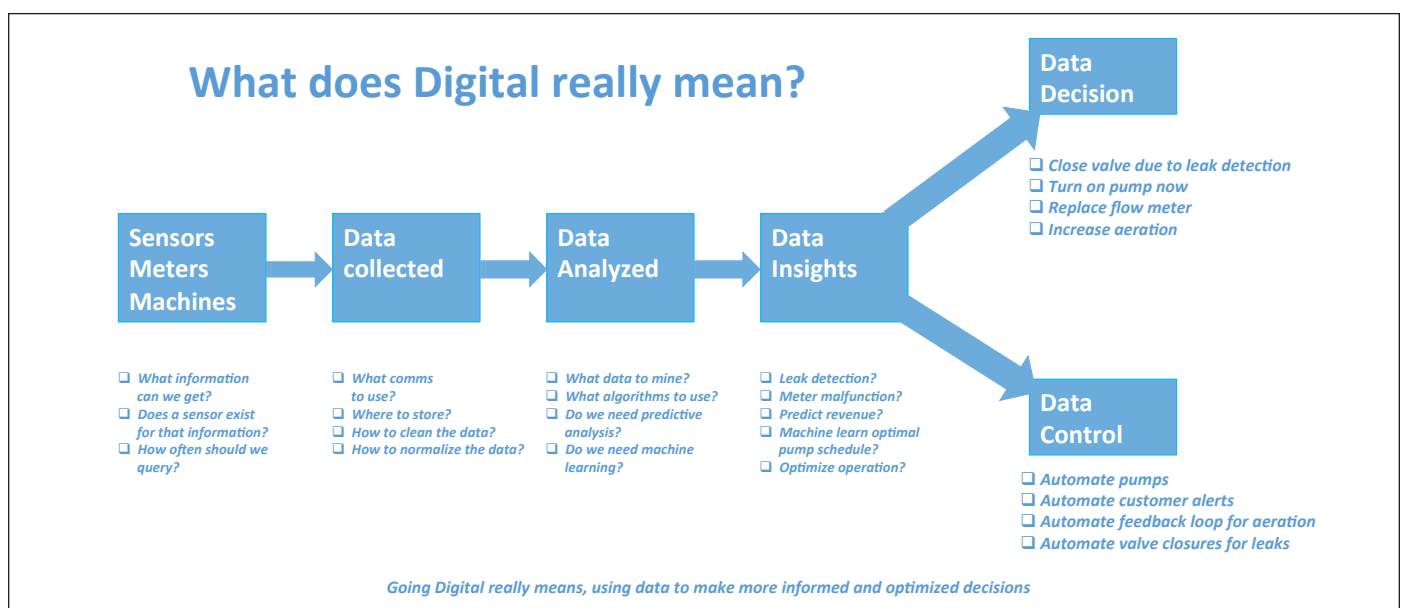
Amane Advisors interviewed 123 utilities, technology providers, and investors as part of a knowledge effort on digital transformation of the water sector. These surveys yielded original insights, trends, and predictions on the digitization of the water sector. One of the interesting findings was that 90 percent of utilities, on a global level, do see digital solutions as a high priority and would like to have an increase in adoption. Although utilities view digital solutions as a high priority, only half of utilities are satisfied with the rate at which they adopt digital.

So, why is the water sector further behind other industry segments in terms of digital transformation? In the past, this has been explained mainly by the risk-adverse nature of the water industry, as water utilities are critical infrastructures, and the market is fragmented.

However, the Amane knowledge effort revealed that there are deeper reasons for some of the barriers to adoption. These include the following factors: a slow and complex procurement cycle, a lack of digital culture within utilities, small budgets for digital solutions, and a lack of staff skills. These barriers can be further broken down into understanding the role and development of technology business cases, or the role or lack of training within a utility, for example. All of these issues are resolvable.

Technology vendors can also do more to simplify and improve the procurement process by creating stronger business cases for their solutions, providing solutions that include mechanisms that makes integration with legacy systems easy, and providing more training and support to utilities that implement digital solutions.

These are just some of the insights gleaned from the interviews. To resolve some of these barriers to digital technology adoption, Amane is bringing together a group of 50 utilities from around the world to help accelerate digital technology adoption by working through these current challenges to help develop real, impactful solutions.



Digital Defined

At the start of the interviews, water sector leaders asked for clarification about the term “digital”. In the context of the knowledge effort, digital is defined as the use of data to make more informed and optimized decisions. Data collection and analysis is accomplished using a set of technologies required for most solutions.

The key components of digital solutions include:

- The objects recording the data, such as sensors, meters, machines (pumps, digester, etc.)
- Communications infrastructure
- Data store
- Data analysis to provide insights
- Human control decisions, or machine control decision (automation)

These are among the foundational technology components needed for digital solutions in a utility. Overlying these technologies are people, processes, and leadership’s commitment to innovation and a strong customer focus to take full advantage of digital transformation.

For the next installment, we will discuss the role of a utility’s digital strategy on the rate of digital technology adoption. A key finding: Successful digital transformation of a utility goes beyond process change; it includes the development of a digital culture within the organization. The rate of digital adoption is dependent on establishing a clear vision of the goals and outcomes, designing and implementing a digital strategic plan and getting the internal culture right.

Gigi Karmous-Edwards is a Director of Digital Business for Amane Advisors, an advisory firm specialized in the water sector. She can be reached at gigi@amaneadvisors.com ■

Young Leaders Spotlight

Nomination Period Has Begun For 2017-2019 IDA Young Leaders Program Committee

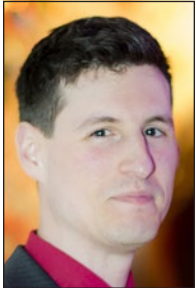
IDA is looking for young professionals who want to be part of this exciting initiative by serving on the Young Leaders Program Committee. This Committee consists of five Regional Coordinators representing Europe, North America, the Middle East/Africa, South/Latin America and the Caribbean, and Pacific Asia, plus five Special Technical Coordinators.

Both the Regional and Special/Technical Coordinators shall be self-nominated from existing IDA members who have been continuous active IDA members for one year and are 35 years of age or younger at the start of the membership year (July 1). The nomination period for the 2017-2019 Committee is June 6, 2017 - July 26, 2017.



For more information about the YLP and the Committee Election, please visit the YLP’s dedicated website, www.idaylp.org , or contact Nancy Pagels at npagels@idadesal.org. ■

Latin America Country Profile: Brazil



By Francisco Virgili, Global Water Intelligence

The largest and most populous country in Latin America, Brazil has rich hydrological resources and a wide range of climates, including dense tropical rainforest to arid landscapes in the northeast of the country. Although an abundance of surface water is found in the Amazon Basin, accounting for 75% of Brazil's freshwater, it is only easily accessible by about 4% of the population. With a growing urban population and diversified industrial activity, Brazil has the potential for growth in its desalination and reuse markets, and signs are emerging that leaders are creating the necessary country-wide narrative that will allow them to move beyond increased demand and poor management to address their pressing climactic and water-shortage issues.

Desalination has largely been utilized for industrial purposes in Brazil, particularly in the offshore oil and gas sector. Utilizing nanofiltration to remove sulfate ions from injected seawater in offshore drilling is a common practice to prevent scaling, and this contributes to 1.2 million m³/d of the 1.5 million m³/d of installed capacity in this sector. Depressed oil prices have greatly reduced demand, but nanofiltration for sulfate removal should see a resurgence as commodity prices rally and offshore production increases, which could be as early as 2018 or 2019. Other industries that contribute to desalination include pulp and paper, food and beverage, and mining. Aimed at reducing the water stress in the arid northeast, a government initiative to provide \$60 million to develop desalination was approved by committee in the upper house of the federal government in 2016, and it's possible that industrial customers may be the first to benefit, as the timetable to approve and develop projects can be much quicker than in the public sphere. While not yet allocated, it seems that the highest level of government is beginning to take notice of the significant hurdles created by water scarcity and are seeking a diversified approach to water resources. Also in the northeast, Ceará Province has been an example of the success of desalination as a solution to water scar-

city in the municipal sector. Awarded in 2015, the Ceará Freshwater Program allocated \$16 million in state funds to provide over 200 desalination systems in 48 municipalities, with capacities ranging from about 10 to 30 m³/d.

On larger scales, Brazil has begun to seriously contemplate the possibility of tapping unconventional water resources with municipal desalination plants, but this is still a bumpy road, as is exemplified by the recently suspended invitation for expressions of interest for an 86,400 m³/d SWRO in Fortaleza. As a result of urbanization, industrialization and extreme drought, Rio de Janeiro and São Paulo are areas of extreme water scarcity that would benefit largely from desalination, and while two projects have been proposed for Rio de Janeiro to serve more than one million people, the easing of drought conditions in 2016 and insecure financial situation make these medium- to long-term solutions.



São Paulo is the industrial heartland of Brazil and as discussed, has steadily growing demand that is outstripping its available resources. Being 70 km from the coast and 800 m above sea level, however, poses problems in terms of the financial burden of desalination due to the additional high cost of pumping to that altitude, particularly at the scales necessary to help meet demand. A complementary solution, however, may exist in utilizing water reuse.

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As the government places stricter controls over the granting of permits for direct water withdrawal from groundwater and surface water sources, industries are being forced to seek alternative sources for their operations. The anticipated completion of a national reuse policy study in 2017 should provide a clearer picture of how reuse can be implemented nationally and inform a legal framework that will open doors for both potable and non-potable reuse applications.

Francisco Virgili is Head of Data Analysis at Global Water Intelligence. He can be reached at fv@globalwaterintel.com. ■

Panels and the Innovation Theater Add to Technical Program at IDA World Congress

In addition to four days of technical sessions in the IDA World Congress Technical Program, the 2017 Congress will include panels, roundtables and workshops to address a wide range of topics in water reuse and desalination.

Approximately two thirds of the 300+ accepted abstracts will be presented in 28 sessions, a record in number of assigned oral presentations compared with previous Congresses. Session co-chairs are working on selecting oral and poster presentations.

The poster presentations offer opportunities for delegates to interact with presenters. Selected posters will be on display in a prominent location in the Exhibition area, providing an opportunity to meet the presenters during the breaks and engage in discussions about each topic.

The World Congress will also feature the IDA Innovation Theater, which was very popular at the 2015 World Congress in San Diego. The Theater provides an opportunity for companies or individuals to present information about their technological developments, or about commercialized products and services.

The Congress will also showcase Plenary Panel Discussions and Panel Sessions hosted by world renowned moderators and panelists. Plenary Panel Discussions will be held in the Theater at the end of each day, and the Panel Sessions will be parallel with the Technical Sessions.

There will be regional panels including one devoted to our host country Brazil, and we will organize several of

them in collaboration with the international organizations such as the World Bank, UNESCO and FAO.

Potential topics include:

- What is the Future of Desal and Reuse in LATAM?
- Regulations in Brazil
- Petrobras and the Brazilian Oil & Gas Industry
- Desalination and Water Reuse: Lessons Learned in Brazil
- World Bank Desalination and Water Reuse Workshop
- The Water, Energy and Food Nexus and the Impact of Desalination, Water Reuse and Circular Economics
- Meet the CEOs - Clients: Desalination and Reuse Projects from A to Z
- Meet the CEOs - Suppliers: Market Trends and Challenges for 2020
- Is MENA Redressing the Desalination Strategy?
- Meet the Professors and IDA Young Leaders
- Energy and Environment Blue Paper: The Challenges of Desalination and Renewable Energies ■

IDA Welcomes Three New Sponsors for World Congress

IDA is pleased to announce that SUEZ, SWCC and Veolia will be sponsors of the 2017 World Congress.

Silver Sponsor:



We are in the era of the resource revolution. In a world facing high demographic

growth, runaway urbanization and the shortage of natural resources, securing, optimizing and renewing resources is essential to our future. SUEZ delivers wastewater treatment services to a population of 58 million of people and reuses 882 million m³ of purified wastewater. SUEZ also recovers 16.9 million tons of waste each year and produces 3.9 million tons of secondary raw material and 7 TWh of local and renewable energy. Finally, SUEZ helps its customers to avoid the emission of 9.5 MtCO₂ of greenhouse gas. With 83,921 employees, SUEZ, which is present on all five continents, is a key player in the sustainable management of resources. SUEZ generated total revenues of €15.3 billion in 2016.

Bronze: SWCC and Veolia



المؤسسة العامة لتحلية المياه المالحة
Saline Water Conversion Corporation

Saline Water Conversion Corporation (SWCC) is a Saudi government corporation responsible for desalinating sea water, in order to augment the supply of potable water to coastal and inland cities in the Kingdom. It is also the second largest electric power producer in the Kingdom.



With more than 100 years of experience in desalination, Veolia is a world leader in assisting municipalities and industries implement desalination strategies. Veolia specializes in seawater or brackish water desalination plants and units of all sizes, utilizing four types of solutions: Multi-Stage Flash Distillation, Multiple Effect Distillation, Reverse Osmosis and Hybrid desalination, coupling MED and RO. Veolia produces more than 12.9 million cubic meters of desalinated water daily. ■

CIRRA / IRCWR Becomes Latest Brazilian Strategic Partner for World Congress



CIRRA / IRCWR
CENTRO INTERNACIONAL DE REFERÊNCIA EM REÚSO DE ÁGUA
INTERNATIONAL REFERENCE CENTER ON WATER REUSE

CIRRA / IRCWR, the International Reference Center for Water Reuse, a non-profit organization working on water resources management,

particularly on water conservation and reuse, has become the latest Brazilian strategic partner for the 2017 IDA World Congress.

CIRRA is a non-profit entity, linked to the Department of Hydraulic and Sanitary Engineering of the Polytechnic School of the University of São Paulo. This privileged institutional feature allows its integration into an up-to-date scientific infrastructure composed of qualified members with the potential to meet the demands of the water conservation and reuse sector.

In order to promote and provide technical and human resources to stimulate conservation practices, CIRRA has the basic functions to develop appropriate research and technology, provide training and disseminate information aimed at promoting the institutionalization and the regulation of the practice of reuse in Brazil.

CIRRA aims to establish agreements with public entities and government agencies for the development of master plans and reuse and environmental sanitation programs, evaluating projects and providing technical support. CIRRA also provides services directed to the attention of private institutions, corporate consulting, industries and research centers, with the objective of establishing conservation programs, providing technical support to develop projects and studies, and proposing corrective and alternative measures in the area of water reuse, minimization of water demand and effluent generation. ■

IDA Academy Presents Four Training Sessions at World Congress



The IDA Academy is offering four half day training sessions at the World Congress, two pre-Congress programs and two post-Congress sessions. Delegates may register for one or multiple courses (please note there are discounts for multiple Academy courses), but each session is structured to be an independent and stand-alone training.

Pre-Congress training will be held on Sunday, October 15. The morning session (8:00a-12:00p) focuses on "Using Traditional Reverse Osmosis & Membrane Filtration for Water & Wastewater Minimization." The afternoon session (1:00p-5:00p) covers "Using Non-Traditional RO & Emerging Membrane Technologies for Water & Wastewater Minimization." Mr. David H. Paul, who has more than 40 years' experience in high-tech water and wastewater treatment, is the instructor for both courses.

Post-Congress courses take place on Friday, October 20. The morning session (9:00a-12:45p) addresses "A Comparison of Manufacturers' Technology for Membrane Filtration used in Water & Wastewater Treatment." The afternoon session (2:00p-5:45p) covers "A Comparison of Manufacturers' Technology for Membrane Bioreactors (MBR) used in Wastewater Treatment. Dr. Graeme Pearce, a well-known expert in the field of water and membranes with more than 30 years' experience in membranes, will teach these sessions.

For more information or to register, please visit wc.idadesal.org/workshops/ida-academy ■

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IDA Names Dubai as Site for 2019 World Congress



IDA has selected Dubai as the site for the 2019 World Congress on Desalination and Water Reuse. The Dubai Electricity & Water Authority (DEWA) of the United Arab Emirates, recognized globally as a sustainable, innovative world-class utility, will host the Con-

gress, which is widely regarded as the preeminent event for the global desalination and water reuse industry.

"We are honored to welcome Dubai Electricity & Water Authority (DEWA) as host of the 2019 IDA World Congress, and look forward to working together to make this important event one of the most successful in our history. We look forward to bringing our flagship event back to Dubai, where we presented our highly successful 2009 World Congress under the patronage of His Highness Sheikh Mohammed bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE and Ruler of Dubai," said Patricia A. Burke, IDA Secretary General.

"DEWA is eager to host the 2019 IDA World Congress. I would like to take this opportunity to emphasize our support and efforts hand-on-hand towards the success of this world-class event. DEWA is committed to sustainability and raising awareness about the importance of rationalizing water consumption, protecting the environment and conserving natural resources. These themes are also important aspects of the IDA World Congress, providing an ideal forum to help advance these goals," said Saeed Mohamed Al Tayer, Managing Director and Chief Executive Officer of DEWA.

Mr. Al Tayer added that DEWA currently produces potable water predominantly through the multi-stage flash (MSF) distillation process integrated with its combined

cycle cogeneration plants. The MSF process is very efficient in that waste heat is utilized to meet Dubai's requirements for water. As of today, DEWA's total water production capacity consists of 470 MIGD out of which 445 MIGD is MSF based. The remaining 25 MIGD is based on seawater reverse osmosis (SWRO) technology.

Techno-economic feasibility studies which were conducted confirmed the feasibility of adoption of SWRO utilizing clean energy sources instead of conventional thermal desalination technologies for all future desalination capacity expansion up to 2030. The total production capacity is forecasted to reach 750 MIGD by 2030 out of which 305 MIGD will consist of SWRO based plants.

This decoupling of power and water production is expected to result in efficiency improvements and operational flexibility of the system leading to reduced fuel consumption and hence cumulative savings of up to AED 13 billion by 2030.

With an aim to preserving natural resources and protecting the environment, DEWA continuously encourages all its customers to rationalize their electricity and water use through various awareness programs, campaigns, awards and innovative initiatives. Between 2009 and 2016, savings of over 1.5 TWh of electricity and 6.2 billion imperial gallons of water were realized, which is equivalent to over AED 967 million. These savings are equivalent to offsetting around 831,000 tons of carbon emissions, which equates to planting 944,000 trees.

The award was made to Dubai after a rigorous review of bids by IDA's Site Selection Committee. The process included thorough analysis of information detailed on a numeric scorecard, followed by site visits to four final candidates and a vote by the IDA Board of Directors. Details about dates and the venue for the 2019 World Congress will be announced shortly.

The other finalists for the 2019 World Congress were Barcelona, Spain; Busan, South Korea; and Muscat, Oman. In all, IDA received eight proposals, a record number of contenders for the World Congress. The other bidders were from Canada, South Africa, India and Malta. ■



WSTA Holds 12th Gulf Water Conference



جمعية علوم وتقنية المياه
Water Sciences and Technology Association

In March, the Water Science and Technology Association (WSTA), an IDA

Regional Affiliate, organized the 12th Gulf Water Conference, "Water in the GCC ... Towards Integrated Strategies." The following report was prepared by Shannon McCarthy, 1st Vice President of IDA, and Ali Redha, Executive Director of WSTA.

The WSTA 12th Gulf Water Conference, held in Manama, Bahrain, 28-30 March 2017, was conducted under the patronage of His Royal Highness Prince Khalifa Bin Salman Al Khalifa, Prime Minister of the Kingdom of Bahrain. Participants included GCC governments, international organizations, universities and private sector companies. Abdul Rahman Mohammed Al Mahmoud, WSTA President, graciously presented IDA with a crystal sculpture at the conference opening ceremony.

The conference addressed the need for integrated (national and regional) water strategies, planning, and management and for the integration of water requirements including water-related sectors such as food/agriculture, energy and industry while minimizing pollution of the atmosphere and water resources.

In addition, regional and national water strategies should be compatible with the globally agreed-upon 2030 Agenda for Sustainable Development, the Sustainable Development Goals, and climate change commitments. The challenges of integrating strategies and master plans to form a framework into which more detailed plans can be fitted is monumental, but a successful response is vital. The conference presented and shared the experiences and best practices of different countries in improving water sustainability and the water needs of the arid GCC and Arab countries.

The IDA and WSTA jointly conducted a special panel session entitled "The Water-Energy Nexus and the Impact Desalination, Water Reuse and Renewable Energy Technologies Have on Water Sustainability in the GCC Region." WSTA Advisory Board Member, former WSTA President and former distinguished IDA Board Member, Dr. Abdulmajeed Alawadhi and IDA 1st Vice President, Shannon McCarthy, developed the session co-chaired by Dr. Mohammad A. K. Al Sofi, (WSTA Advisory Board Member, long standing IDA Member, former head of SWCC Research Center) and Ms. McCarthy.

The session described the concept of the water-energy nexus, and possibilities for more efficient production of water and energy. The ideal implementation of this con-

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cept appears to be an integrated strategy that forecasts the requirements for each, and selects the resources and processes to produce them on the basis of sustainability of water and energy resources and the environment and the lowest total costs compatible with these conditions.

Trends and obstacles in the development of integrated strategies to satisfy water and energy requirements were discussed. This included the role of integrated water and electric power plants in an integrated water-energy nexus strategy, and overcoming the problems of functional and professional silos and the tendencies of government and industry to focus on providing water and energy for only a single activity or product.

The GCC nations are the largest users of seawater desalination. With growing populations and limited conventional water resources, they are likely to become even larger users of desalinated seawater. GCC nations are ideally situated to use solar power. The first large-scale desalination plant totally dependent on solar power is nearing completion in Saudi Arabia. Many panelists and participants agreed this technology combination is likely to become a major supplier of fresh water.



(Left to right) Participating in WSTA's 12th Gulf Water Conference were Carlos Cosin, CEO of AlmarWater and IDA Director; Prof. Miriam Balaban, Secretary General of the European Desalination Society; Shannon McCarthy, 1st Vice President of IDA; and Dr. Adil Bushnak, former President of IDA and WSTA.

The panel included the following experts: Dr. Adil Bushnak, former President of IDA and WSTA, Co-Chairman of Moya and member of the IDA Foundation Committee; Mr. Carlos Cosin, CEO Almar Water Solutions, Board Member of IDA; Prof. Miriam Balaban, Secretary General, European Desalination Society; Prof. Waleed K. Zubari, former President of WSTA and Chairman of the WSTA Scientific Committee, and Professor at Arabian Gulf University. ■

Membrane Industry Association of China (MIAC) Becomes IDA's Newest Regional Affiliate



IDA welcomes the Membrane Industry Association of China (MIAC) as its newest affiliate organization. Co-founded by the State Administration of Petroleum and Chemical Industry of China, Chinese Academy of Sciences and State Oceanic Administration of China, MIAC was registered with the Ministry of Civil Affairs of China in 1995. MIAC was formed by units of the membrane industry in China. It is a national non-profit organization spanning different regions and departments.

The aim of the association is to provide members services, safeguard members' legitimate rights and interests, carry out national policy laws, strengthen exchanges and cooperation within the industry, strengthen engineering technical communication and application development, promote industry technology advancement, improve the economic benefit of the industry, expand foreign exchanges, and promote the development of industry, building a well-respected and advanced industry association.

MIAC collaborated with IDA to hold the IDA World Congress in Tianjin in 2013 and the Desalination Forum in 2012. In 2014 and 2016, MIAC organized two delegations to visit Singapore International Water Week, an event jointly supported by IDA.

The 2016 Asia-Pacific and Indian Ocean Rim Region International Desalination Forum was held in Beijing. Emilio Gabbrielli, President of IDA, was invited as a guest of honor and delivered a keynote speech at the Forum.

At MIAC's 25th anniversary ceremony in 2015, MIAC presented its International Cooperation Award to Patricia Burke, IDA's Secretary General, in recognition of IDA's continuous support to the association.

At present, MIAC has more than 451 company members and 130 individual members, including the major companies and individuals engaged in membrane science and technology research and scientific research application, teaching, design, production and engineering application.

MIAC becomes IDA's ninth regional affiliate. IDA also has seven association affiliates, bringing to 16 the number of organizations in its growing affiliate network. ■

The 10th International Desalination Workshop (IDW) 2017 Takes Place in November



This year, IDA's Association Affiliate the Korea Desalination Plant Association (KDPA), Busan Water Authority (BWA), and the

Global Desalination Research Center (GDRC) will hold the 10th International Desalination Workshop (IDW), with four domestic desalination research groups (GMVP, FOHC, seaHERO2, KORAE) as co-organizers.

The workshop takes place November 22 -25, 2017 in Busan, Korea.

As climate change and water scarcity are big issues all over the world, interest in desalination and water reuse technologies is increasing. Since 2007, the International Desalination Workshop has brought together leaders in the field of desalination and water reuse and enabled them to discuss their work and learn from each other.

This year, the KDPA-APDA Joint Forum will be held with IDW2017. APDA (the Asia-Pacific Desalination Association) is an Association Affiliate of IDA.

For more information, please visit desalist.gdrc.or.kr ■

IDA Participates in EuroMed 2017



IDA participated at EuroMed 2017, "Desalination for Clean Water and Energy: Cooperation around the World" held in May in Tel Aviv, Israel and organized by IDA's Regional Affiliate the European Desalination Society. Emilio Gabbrielli, President of IDA (third from left), spoke at the opening of the conference, the eighth event in EDS' EuroMed series and the tenth in the Mediterranean region.

World Congress Spotlight (Cont.)

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IDA Connections Welcomes Announcements about New Products and Services to be Unveiled at World Congress

The next (July/August) issue of IDA Connections is the World Congress Preview edition. IDA invites exhibitors to submit information about new products or services that they plan to introduce at the World Congress for inclusion in that issue.

The deadline for submissions is July 15, and they can be sent to editor Ann Seamonds at seamonds@seamonds.com.

com. You may include a photo of the product or service being introduced; it must be a high resolution jpeg file sent as a separate attachment. Company logos will not be accepted.

Please note that IDA will not accept corporate profiles or other company information, and inclusion of all materials is subject to editorial review. Exhibitors wishing to run a company profile in Water.desalination + reuse, IDA's official member magazine, should contact Faversham House's International Sales Manager at sales@desalination.biz for more information. ■

IDA Member Benefits

Your IDA Member Benefits at a Glance

IDA is the point of connection for the global desalination and water reuse industries, bringing together people, ideas and knowledge to advance sustainable water solutions. Gain new perspectives, build your business and advance your career by staying connected to the IDA community. Your IDA membership has many benefits to offer so renew today at ida.enoah.com/Log-In! If you know someone who may want to become a member, please have them contact us at membership@idadesal.org or visit our website: www.idadesal.org/membership.

| IDA Membership Benefits | *CORPORATE | | INDIVIDUAL | | | | STUDENT, NON-PROFIT LIBRARIES, INDIVIDUALS from LDCs | | |
|---|------------|-----|------------|------|------|------|---|-------|-------|
| | I-A | I-B | II-A | II-B | II-C | II-D | III-A | III-B | III-C |
| Reduced registration fees at IDA World Congresses and Conferences | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Complimentary Conference Proceedings on IDA website (full technical papers) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Complimentary subscription to Water. desalination + reuse, IDA's quarterly magazine | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Complimentary online Membership Directory | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Annual online subscription to IDA Connections IDA's newsletter | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Complimentary copy of the IDA Desalination Yearbook | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Complimentary copy of IDA's Desalination at a Glance | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Eligibility to apply for the IDA Channabasappa Scholarship | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Eligibility to apply for the IDA Fellowship Program | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Eligibility for membership in the IDA Young Leaders Program (age limits apply) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Annual edition of Who's Who in Desalination + Reuse 2017 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 10% discount for two-year corporate & specific individual memberships | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| Reduced fees on exhibition stands at IDA exhibitions | ✓ | ✓ | | | | | | | |
| Loyalty Exhibitor Discount Program | ✓ | ✓ | | | | | | | |
| Price reduction for additional employees of corporations | ✓ | ✓ | | | | | | | |
| 200-word company profile published in the online Membership Directory | ✓ | ✓ | | | | | | | |

* Applies to individuals of the corporation under Class II-B, II-C, II-D

Calendar of Events

IDA 2017 World Congress on Water Reuse and Desalination

October 15 - 20, 2017
São Paulo, Brazil
wc.idadesal.org

5th Water Arabia Conference & Exhibition

October 17 - 19, 2017
Al-Khobar, Saudi Arabia
sawea.org/waterarabia2017

Aquatech Amsterdam 2017

October 31 - November 3, 2017
Amsterdam, The Netherlands
aquatechtrade.com/amsterdam

KDPA-APDA Joint Forum

November 24, 2017
Busan, Korea
desalist.gdrc.or.kr/main

IDW 2017

November 22 - 25, 2017
Busan, Korea
desalist.gdrc.or.kr/main

AWWA/AMTA 2018 Membrane Technology Conference & Exposition

March 12 - 16, 2018
West Palm Beach, FL
amtaorg.com/event/2018

Desalination for the Environment Clean Water & Energy

May 6-10, 2018
Nantes, France
edsoc.com

CaribDA 2018 – Biennial Conference & Exposition

May 29 - June 1, 2018
Curaçao
caribda.com/event/caribda

Singapore International Water Week 2018

July 8-12, 2018
siww.com.sg

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