Issue 189| May 1, 2015 | Focus on Desalination

This issue on desalination features the recent awarding of the Desal Prize, which challenges competitors to create innovative desalination technologies. The weekly also highlights an upcoming innovation competition, the Securing Water for Food Call for Innovations, which seeks to fund innovative ways to increase water availability and promote efficient agricultural water use. Other resources appearing in this issue are desalination reports, studies, and videos from 2014 and 2015, and links to desalination associations and journals.

EVENTS

Desal Prize Winners Announced, April 22, 2015. Link
USAID and the Bureau of Reclamation, in partnership with the Swedish International Development Cooperation Agency and the Ministry of Foreign Affairs of the Kingdom of The Netherlands, recently announced the winners of the Desal Prize, the second call for Securing Water for Food: A Grand Challenge for Development. The Desal Prize challenged innovators throughout the world to create cost-effective, energy-efficient, and environmentally sustainable desalination technologies that can provide potable water for humans as well as water that can be used for crops in developing countries. Two winning teams were selected after five finalists competed in head-to-head demonstrations.

Securing Water for Food 3rd Call for Innovations. Link
Securing Water for Food has announced its third call for innovations. Submit your game-changing innovation to increase water availability and promote efficient use in agriculture before May 22. This $12.5 million call for proposals focuses on identifying market-driven, low-cost, and scalable solutions that will enable us to improve water efficiency and wastewater reuse; enhance water capture and storage; and reduce the impacts of salinity on aquifers and food production. The third call has an increased focus on cutting-edge, advanced technologies and business models, as well as those that prioritize the engagement of women.

2nd International Conference on Desalination using Membrane Technology, July 26–29, 2015, Singapore. Link
This desalination conference will allow the dissemination and discussion of cutting-edge research. The scope will include theoretical and applied research as well as technological and industrial development. Participants will include leading academic researchers, scientists, and engineers from membrane desalination and associated industries as well as representatives of government organizations, international agencies, and aid organizations.

REPORTS/ARTICLES

Justification for Community-Scale Photovoltaic-Powered Electrodialysis Desalination Systems for Inland Rural Villages in India. *Desalination*, Nov 2014. N Wright. Link
This paper justifies photovoltaic-powered electrodialysis as an energy- and cost-effective means of desalinating groundwater in rural India and presents the design requirements for a village-level system. Saline groundwater, which underlies 60 percent of India, can negatively impact health as well as cause a water source to be discarded because of its taste.

Carbon Nanotube Membranes for Water Purification: A Bright Future in Water Desalination. *Desalination*, March 2014. R Das. Link
Low energy consumption, antifouling, and self-cleaning functions make carbon nanotube (CNT) membranes superior to conventional options. This study reviewed molecular modeling and experimental aspects of CNT-membrane fabrication and functionalization for the desalination of both sea and brackish water.

Perspectives and Challenges for Desalination in Developing Countries. *IDA Jnl Desal Water Reuse*, April 2014. N Dhakal. Link
This study explores the current membrane desalination market; estimates how many countries (and which ones) will suffer from water scarcity by 2050; and presents three case studies (India, China, and Algeria). Finally, it highlights some challenges for the implementation of desalination in water-scarce countries. The projections in this study indicate that 44 countries (2 billion people) will suffer from water scarcity by 2050.

Desalination with Nanoporous Graphene Membrane. *Science Daily*, March 2015. Link
A team of researchers led by the Department of Energy's Oak Ridge National Laboratory (ORNL) has demonstrated an energy-efficient desalination technology that uses a porous membrane made of strong, slim graphene—a carbon honeycomb one atom thick. The results are published in the March advance online issue of *Nature Nanotechnology*. ”Our work is a proof of principle that demonstrates how you can desalinate saltwater using free-standing, porous graphene,” said Shannon Mark Mahurin of ORNL’s Chemical Sciences Division, who co-led the study with Ivan Vlassiouk of ORNL’s Energy and Transportation Science Division.

Desalination Out of Desperation. *MIT Technology Review*, Dec 2014. D Talbot. Link
Desalination is ripe for technological improvement. A combination of sensor-driven optimization and automation, plus new types of membranes, could eventually allow for desalination plants that are half the size and use commensurately less energy. Among other benefits, small, mobile desalination units could be used in agricultural regions hundreds of miles away from the ocean, where demand for water is great and growing.

Desalination Technologies and Challenges Fact Sheet, n.d. Water Research Foundation. Link
Desalination can provide a reliable water supply to regions that lack adequate fresh water. Improvements in membrane technology and cost-effectiveness are making desalination more attractive. Public acceptance, brine disposal, and the approval by regulators are key for successful project implementation.

Seawater Desalination as an Option to Alleviate Water Scarcity in South Africa: The

Need for a Strategic Approach to Planning and Environmental Decision-Making. *Jnl Water Reuse Desal,* Nov 2014. G Schreiner. Abstract
In the last decade, seawater reverse osmosis (SWRO) has come to be seen by policy makers as a novel technology that will significantly advance water security in South African coastal regions. This paper explores the value of such a strategy by considering the drivers of SWRO in South Africa, the risk of unplanned large-scale SWRO implementation (with a focus on environmental impacts), and the initial steps that could be taken toward a Strategic Environmental Assessment for SWRO in South Africa.

Optimum Design of Photovoltaic Powered Sea Water Desalination System. *Intl Jnl Sci & Technol Res*, Dec 2014. B Yousef. Link
With the continuous decrease of the price of photovoltaic (PV) modules, it is becoming more attractive economically to design a reverse osmosis (RO) water desalination system using a PV system. A PV system depends on solar energy, which is more environmentally friendly than fossil fuels. RO water desalination techniques can desalinate seawater with high salinity (up to 45,000 ppm) into potable water.

Where Does Solar-Aided Seawater Desalination Make Sense? A Method for Identifying Sustainable Sites. *Desalination*, April 2014. E Grubert. Link
Global water planners are increasingly considering seawater desalination as an alternative to traditional freshwater supplies. Since desalination is both expensive and energy intensive, taking advantage of favorable natural and societal conditions while siting desalination facilities can provide significant financial and environmental returns. Currently, policy makers do not use a location-specific integrated analytical framework to determine where natural and societal conditions are conducive to desalination. This analysis seeks to fill that gap by demonstrating a multi-criteria, geographically resolved methodology for identifying suitable regions for desalination infrastructure.

Putting Water and Energy at the Heart of Sustainable Development, 2015. C Schuster-Wallace, United Nations University. Link
Optimizing performance within the Water-Energy Nexus can increase energy efficiency, decrease water pollution, reduce costs of energy and water provision, increase access to services, and reduce greenhouse gas emissions. The effective deployment of renewable energy resources around the world can be a stabilizing driver within the context of fossil fuel availability and climate change.

VIDEOS/NEWS ITEMS

Scientists are Turning Salt Water into Drinking Water Using Solar Power. *Science Alert*, April 2015. Link/Video
By inexpensively turning salt water into drinking water using sustainable solar power, a team from the Massachusetts Institute of Technology (MIT) has not only come up with a portable desalination system for use anywhere in the world that needs it, but it's just won the 2015 Desal Prize—a competition run by USAID to encourage better solutions to water shortages in developing countries. (See Desal Prize Winners under Events, above.)

Nanoporous Graphene as a Desalination Membrane, 2015. David Cohen-Tanugi, MIT. Video
In this hour-long video, an MIT student defends his thesis on the use of nanoporous graphene to desalinate water. The presentation includes a number of visual depictions of the process at

the molecular level.

Desalination: Water for a Thirsty World, 2014. Water Reuse Research Foundation. Video
Desalination is the process of removing dissolved salts and minerals from seawater or brackish water. It is a water supply technology that is practiced throughout the world and continues to be considered a viable option among water supply planners. This Water Reuse Research Foundation video was developed with support and input of a committee of technical experts.

Coca-Cola Transforms Shipping Container 'Ekocenter' to Purify Water, 2013. Video
Coca-Cola has teamed up with DEKA R&D to purify drinking water in developing countries. The project, dubbed Ekocenter, repurposes a 20-foot shipping container with solar panels and equips it with "Slingshot" water-purification technology that will help bring clean drinking water to communities in need. Slingshot is a vapor compression distillation system that boils contaminated water and separates out the clean water by vaporizing it. It then allows the pure water to condense and be collected, flushing out contaminants.

Experimental Investigation of Solar Desalination with PCM, 2015. A Roohul. Video
Forward osmosis (FO) for dewatering/desalination applications has received increasing interest due to its potential use of low-grade thermal energy, ability to operate at low pressure, and reduced tendency to foul. Developments in FO are primarily focused on two areas: expanding the availability of draw solutions that generate high osmotic pressure through nontoxic and inexpensive means and developing membranes that exhibit high flux and suitable salt rejection under FO conditions. This presentation focuses on the challenges of draw solution use and regeneration.

INFORMATION SOURCES

International Desalination Association (IDA). Link
IDA is the only global association focused exclusively on desalination and desalination technologies. A nonprofit association, IDA is associated with the United Nations as part of a growing international network of NGOs.

Desalination: The International Journal on the Science and Technology of Desalting and Water Purification. Link
Desalination is the premier international journal dedicated to communicating the latest developments in desalination, including theoretical and applied research and technological and industrial development.

Journal of Water Reuse and Desalination. Link
This journal publishes refereed review articles, theoretical and experimental research papers, new findings, and issues of unplanned and planned reuse. The journal welcomes contributions from developing and developed countries.

WASHplus Weeklies highlight topics such as Urban WASH, Household Air Pollution, Innovation, Household Water Treatment and Storage, Hand Washing, Integration, and more. If you would like to feature your organization's materials in upcoming issues, please send them to Dan Campbell, WASHplus Knowledge Resources Specialist, at dacampbell@fhi360.org.

About WASHplus - WASHplus, a five-year project funded through USAID's Bureau for Global Health, supports healthy households and communities by creating and delivering interventions that lead to improvements in access, practice and health outcomes related to water, sanitation, hygiene (WASH) and household air pollution (HAP). WASHplus uses at-scale, targeted as well as integrated approaches to reduce diarrheal diseases and acute respiratory infections, the two top killers of children under five years of age globally. For information, visit www.washplus.org or email: contact@washplus.org.