

EDS WEBINAR

The Future of Brine Mining: Challenges and Opportunities for Resource Recovery and Energy Efficiency

Wednesday 27. May 2024, 16:30-17:45 CET



Moderator:

Nikolay Voutchkov

Executive Director of the NEOM Water Innovation Center, Saudi Arabia

Background

Nikolay Voutchkov is the Executive Director of the ENOWA Water Innovation Center. ENOWA is a world-class Energy, Water, and Hydrogen company founded in NEOM, Saudi Arabia. NEOM Water sector is focused on improving water performance sustainably, building off the implementation of a world class, smart and connected, water infrastructure in NEOM, utilizing the latest, and future innovation and technology with the best minds in the industry.

Abstracts / Program

❖ **Harvesting the Blue Gold: Standardizing Brine Valorization from Seawater**

Christos Charisiadis

Brine Innovation Manager - NEOM portfolio Brine Innovation Manager - NEOM portfolio
Worley · Full-time

❖ **The Future of Brine Mining – Paradigm Shift From Thermal to Membrane Systemes**

Nikolay Voutchkov

Executive Director of the NEOM Water Innovation Center

❖ **RO Resource Recovery:**

Minimise Energy Use for Brine Mining, Nutrient Valorization, and Metals Recovery

Erik Desormeaux

Director of Application Development at Energy Recovery, Inc.



Christos Charisiadis

Brine Innovation Manager - NEOM portfolio Brine Innovation Manager - NEOM portfolio, Worley · Full-time

Bio

Christos Charisiadis serves as the Brine Innovation Manager, focusing on Zero Liquid Discharge (ZLD) and Brine Mining. In his role, he conducts technical research, develops sustainable solutions, and collaborates with industry partners to support a vision of a greener, more sustainable future. With a passion for environmental conservation, he navigates international collaborations, manages projects, and explores wastewater treatment technologies. Christos is dedicated to advancing environmental innovation and promoting sustainable practices.

Abstract:

Harvesting the Blue Gold: Standardizing Brine Valorization from Seawater

The vast expanse of Earth's oceans holds tremendous potential for addressing global freshwater shortages and supplying critical minerals. Seawater brine valorization offers a sustainable solution, but its full potential can only be realized through standardized practices. The water community needs to understand the imperative for standardization in brine valorization practices and the array of benefits it unlocks, from environmental stewardship to economic prosperity.

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Nikolay Voutchkov

Executive Director of the NEOM Water Innovation Center, Saudi Arabia

Bio

Nikolay Voutchkov is the Executive Director of the ENOWA Water Innovation Center. ENOWA is a world-class Energy, Water, and Hydrogen company founded in NEOM, Saudi Arabia. NEOM Water sector is focused on improving water performance sustainably, building off the implementation of a world class, smart and connected, water infrastructure in NEOM, utilizing the latest, and future innovation and technology with the best minds in the industry.

From 2009 to 2023, Mr. Voutchkov was the Founder and the Director General of Water Globe Consultants, a US company providing engineering consulting and training services in the field of desalination and water reuse worldwide. For 11 years prior to 2009, Mr. Voutchkov was a Chief Technology Officer and Corporate Director of Poseidon Resources, a US company specializing in developing desalination and water reuse projects. In this capacity, Mr. Voutchkov has served as an expert technical advisor to project developers of over a dozen desalination projects in the US, Mexico, Australia, the Middle East, South Africa, Indonesia, and Singapore.

He participated in the development of the 4th edition of the WHO Guidelines for Drinking Water Quality and assisted with the development of UN-Water Analytical Brief on Unconventional Water Resources (2020); the FAO Guidelines for use of desalinated water in agriculture, as well the World Bank's Technical Paper on desalination (2019). Mr.

Voutchkov has authored over 10 technical books in the field of desalination and water reuse and is a Diplomate of the American Academy of Environmental Engineers.

Abstract:

The Future of Brine Mining – Paradigm Shift From Thermal to Membrane Systemes

Science and practical experience with valorization of minerals from brine produced by desalination plants has advanced significantly over the last five years. Traditional brine mining and zero liquid discharge systems built in the recent two decades are based on thermal evaporation technologies to concentrate and crystallize minerals contained in brine. Capital costs of such systems are at typically 3 to 5 times higher than the cost of the desalination plant producing the brine, and energy costs exceed 75 kWh/m³ of processed brine. These high cost and energy expenditures have rendered mineral harvesting from brine significantly less competitive than traditional terrestrial mining of the same minerals.

New brine mining technology trend that has emerged recently is replacement of thermal technologies for brine concentration and crystallization with membrane-based systems that result in several times lower cost and energy demand for harvesting of minerals from brine. This presentation discusses the latest membrane technology trends such as selective SWRO membranes, membrane brine concentration systems and membrane crystallization systems that are changing the paradigm of brine mining, including the monovalent-bivalent NF based separation in traditional brine mining systems.

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Erik Desormeaux

Director of Application Development at Energy Recovery, Inc.

Bio

Erik Desormeaux is Energy Recovery's Director of New Applications. He is a registered Civil Engineer with 20 year of experience in the global water and wastewater industry with a focus on water reuse, ZLD, and resource recovery projects.

Abstract:

RO Resource Recovery:

Minimise Energy Use for Brine Mining, Nutrient Valorization, and Metals Recovery



This presentation will cover how pressure exchanger and reverse osmosis technology can be used to facilitate resource recovery while lowering energy consumption, costs, and carbon emissions. Energy Recovery will provide an overview of the industries that can benefit from incorporating resource recovery into their wastewater treatment process, the resources that can be recovered from these waste streams, and potential system designs. Applications include waste streams from seawater desalination, manure and food waste digestates, lithium-ion battery manufacturing and recycling, and others that include valuable minerals and resources.

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