

## NIKOLAY VOUTCHKOV, PE, BCEE

Mr. Voutchkov is an internationally recognized expert in the field of desalination and membrane application technology with extensive experience in supporting the environmental review, development, procurement, financing and implementation of large desalination projects worldwide.

For over 11 years, prior to founding Water Globe Consulting (WGC), Mr. Voutchkov was a Corporate Technical Director and a Chief Technology Officer for Poseidon Resources, a company specialized in the development of wastewater and desalination 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, Middle East, South Africa, Indonesia and Singapore.

### PROFESSIONAL EXPERIENCE

#### *Water Globe Consulting, LLC* *April 2009 – Present*

As Founding President of Water Globe Consulting, Mr. Voutchkov provides independent engineering advisory services for all phases of desalination project implementation: from inception and feasibility evaluation; to environmental permitting and licensing; conceptual and detailed design; and oversight of project construction, and long-term operation.

#### **Seawater Desalination Projects in the US**

Mr. Voutchkov serves as an independent consultant to the owners and/or investors of the following large seawater desalination projects in the US:

*50 MGD Carlsbad BOT Seawater Desalination Project, California* – technical support to the project owner/equity investor Poseidon Resources with: project planning, site selection; intake and outfall system design; selection of key treatment processes including pretreatment and reverse osmosis systems; and product water conditioning for corrosion control and disinfection. Mr. Voutchkov has also assisted with contractor procurement; environmental permitting; project power purchase agreement negotiations; and preparation of plant design and operation and maintenance (O&M) plans and specifications.

***50 MGD Huntington Beach BOT Seawater Desalination Project, California*** – expert support to the project owner Poseidon Resources with project planning, design and environmental review and contractor selection of oversight.

***50 MGD Camp Pendleton Seawater Desalination Project, California*** – review of plant design and construction and O&M cost estimates on behalf of the project owner, the San Diego County Water Authority; and technical assistance with preparing of the financial model and cost-of-water production projections of the project under various demand and technology scenarios.

***25 MGD Tampa Bay Water Seawater Desalination Plant, Florida*** – retained by Acciona Agua-American Water O&M Consortium to complete critical review of desalination plant operations and maintenance regime and to develop plan for optimization of plant performance and reduction of annual O&M costs.

***15 MGD Long Beach Seawater Desalination Project, California*** – independent technical advisor to the City of Long Beach Water Department tasked with assistance in the development; environmental review and design of city's desalination project.

***20 MGD West Basin Seawater Desalination Project, California*** – expert advisory services to West Basin Municipal Water District in district's desalination project development and environmental review.

***Water Reuse Research Foundation – Evaluation of New Technology***  
Co-principal investigator for independent evaluation of the energy savings and performance efficiency of NanoH<sub>2</sub>O SWRO nano-particle enhanced membranes and of the Desalitech close-circuit seawater desalination technology.

***Water Reuse Research Foundation – Biofouling Study*** Co-principal Investigator for study of biological fouling of seawater reverse osmosis membranes.

**Advisory Services for Desalination Projects Worldwide**

Mr. Voutchkov was retained to provide independent engineering services, including design review and implementation oversight, of some of the largest seawater desalination plants in the world under construction or operation today.

***48 MGD SWRO Plant in Qatar – Site Selection Study for Kahramaa*** – Mr. Voutchkov was retained by Kahramaa, to complete a site-selection study for a new large SWRO desalination plant in Qatar. The study involved review of alternative plant sites and preparation of recommendation for selection of preferred site.

***Feasibility Evaluation of the Use of Package RO Desalination Plants for Emergency Water Supply for Kahramaa, Qatar*** – Mr. Voutchkov was retained by Kahramaa to prepare recommendation and cost estimate for procurement of mobile desalination units for emergency water supply of Qatar.

***12 and 48 MGD Seawater Desalination Plants in Qatar.*** Mr. Voutchkov has completed feasibility study for the installation of 12 MGD SWRO desalination plant on the site of the existing 1,200 MW power plant operated by Ras Laffan Power and Water Company in Qatar and for a new 48 MGD desalination plant currently under development by the same owner. Water Globe Consulting has managed the procurement of turnkey contractors for the construction of the two reverse osmosis desalination projects and is assisting with the negotiations of water supply agreement with the local public utility which will be purchasing the desalinated water – KAHRAMAA.

***5 MGD Seawater Desalination Plant, Sohar, Oman – Assistance with Plant Commissioning and Acceptance Testing*** – at present Mr. Voutchkov is assisting Majis Industrial Services in Sohar, Oman with the commissioning of the company's desalination plant in Sohar, Oman which is designed to provide potable and industrial water supplies to the Sohar Industrial Zone.

***5 MGD Seawater Desalination Plant, Sohar, Oman – Procurement of O&M Contractor*** – Mr. Voutchkov is conducting procurement of O&M contractor for 5 MGD SWRO plant on the behalf of Majis Industrial Services in Sohar, Oman. The scope of activities includes preparation of procurement

tender, development of contractual documentation for private O&M services and assistance with contractor selection and O&M contract negotiations.

***20 MGD Desalination Plant, Salalah, Oman – Troubleshooting of Pretreatment System and Enhancement of Plant Operations*** – Mr. Voutchkov has service contract with SembCorp, Oman for operation and maintenance support, troubleshooting and enhancements of the Salalah desalination plant in Oman.

***45 MGD Fujairah Seawater Desalination Plant, United Arab Emirates.*** Mr. Voutchkov provides ongoing operations and maintenance support services to SembCorp including periodic plant process performance review and optimization; improvement of pretreatment system operations and reverse osmosis membrane system productivity and water quality.

***55 MGD Al Dur Seawater Desalination Plant, Bahrain.*** Mr. Voutchkov has provided advanced operator training services for reverse osmosis seawater desalination plant operation, troubleshooting and optimization for Al Ezzel O&M Company, a subsidiary of Suez Environment.

***40 MGD Desalination Plant Feasibility Study, Durban, South Africa*** – Mr. Voutchkov serves as an expert desalination project planning and design advisor to Aurecon for the development of seawater desalination project for Umgeni Water in Durban, South Africa. The project will serve municipal and industrial water supply needs in the Durban area.

***16 MGD Desalination Plant Feasibility Study, Port Elisabeth, South Africa*** – Mr. Voutchkov provides expert support services for the development of a large desalination project in Port Elisabeth in South Africa, which is aimed to serve new industrial developments and municipal areas in the north-eastern city zone.

***66 MGD Sydney Water Desalination Plant, Australia.*** Since 2007, Mr. Voutchkov has been involved as an independent advisor to Sydney Water in the development of procurement documentation and the selection of turnkey contractor for the engineering, construction and O&M of the Sydney Water seawater desalination plant. He served as an independent project advisor to Sydney Water and has completed review of key the design packages for key project components, including the plant pretreatment system and of the

startup, commissioning and acceptance testing documentation of the desalination plant.

***80 MGD Adelaide Seawater Desalination Plant, Australia.*** At present Mr. Voutchkov provides technical advisory services to Aurecon on the review and technical evaluation of key project deliverables of the Adelaide seawater desalination project which when constructed will supply drinking water to the Southern Australia Water Corporation.

***5 MGD Anchol Seawater Desalination Plant, Jakarta, Indonesia.*** Mr. Voutchkov has completed detailed design review of the seawater desalination project and assistance with plant startup and commissioning.

### ***Poseidon Resources Corporation, Stamford, CT, USA 1998 – 2009***

#### ***Corporate Technical Director & Chief Technology Officer***

Mr. Voutchkov served as company's lead technical advisor to the lenders and equity investors of all company projects. Mr. Voutchkov's corporate managerial and fiscal responsibilities included:

- Project Planning, Conceptual and Detailed Design, and Construction and Commissioning;
- Project Environmental Review and Permitting;
- Technical Assistance to Project Lenders and Equity Investors in the Development and Financial Closing of All Company Projects;
- Project Due Diligence and Asset Valuation for Equity/Ownership Acquisition;
- Procurement of EPC and O&M Contractors for Projects Developed by Poseidon;
- Project Scoping and Feasibility Analysis for Investment;
- Management of All Phases of Project Implementation – from Pilot Testing and Design Review, through Construction, Start-up and Commissioning to Routine Facility Operations/Asset Retention and Enhancement;
- O&M Contractor Oversight, Budget Management and Auditing During the Operational Phase of All Projects;
- Day-to-day Profit and Loss Responsibility for the Engineering, Construction, Technology Development and Implementation Associated with All Company Projects.

*Malcolm Pirnie, Inc., Newport News, Virginia, USA  
1994-1998*

*Associate – Manager of Regional Water/Wastewater Engineering Services Group*

Supervised water and wastewater project engineering services group of company's Southeast Regional office. Retained staff, managed day-to-day staff operations and was responsible for establishing staff performance goals and incentives. Formed, guided and mentored multi-disciplinary project teams to produce on-time/on-budget delivery of complex water projects. Developed new municipal projects and clients, and was fiscally responsible for project profit & loss management. Oversaw planning, permitting, design, and construction of large water and wastewater utility infrastructure. Built and managed cross-functional teams with other company offices and groups to expand company's services into utility project asset management, and O&M contract procurement for municipal clients.

*MWH Consulting Engineers, Pasadena, CA, USA  
1991-1994*

*Supervising Engineer*

Project leader for over a dozen of large water/wastewater infrastructure projects, part of the \$3.4 billion Clean Water Program for the City of Los Angeles, California. Responsible for the development of master plants, process design and implementation of a number of municipal and industrial wastewater treatment plants, and water reclamation facilities in Southern California.

**PROFESSIONAL REGISTRATION AND CERTIFICATION**

Registered Professional Engineer, Commonwealth of Virginia, USA.

Board Certified Environmental Engineer - American Academy of Environmental Engineering, USA.

## **PROFESSIONAL RECOGNITION**

2013 – Water Reuse Research Foundation Service Award

2012 – US Patent 8,206,589 B2 – Desalination System and Method for Integrated Treatment of Brackish Concentrate and Seawater.

2010 – US Patent 7,749,386 B2 of July 6, 2010 – Desalination System.

2010 - Board Member of the Research Advisory Committee of the Water Reuse Research Foundation;

2007 - Trendsetter – Public Works Magazine;

2006 - Grand Prize for Excellence in Environmental Engineering – American Academy of Environmental Engineers;

2006 – Annual Project Innovation Award – International Water Association;

2005 - Best Overall Technical Paper Award – Biannual Conference of the International Desalination Association, Singapore.

2005 - Keynote Speaker - Specialty Conference on Desalination of the Australian Water Association, Adelaide.

2005 – US Patent 6,946,081 of September 20, 2005 – Desalination System.

## **PUBLICATIONS IN THE DESALINATION FIELD**

Mr. Voutchkov is a principal contributor to a number of technical manuals and books in the field of water supply and wastewater treatment. He is one of the lead authors of the 2007 Manual of Water Supply Practices - Reverse Osmosis and Nanofiltration – published by the American Water Works Association (AWWA M46).

In 2008 Mr. Voutchkov was commissioned by the Australian Water Association to develop guidelines for seawater pretreatment which are currently implemented for large desalination projects in Australia, US and elsewhere.

Mr. Voutchkov has chaired the Desalination Technology Committee responsible for the development of the newly released World Health Organization's (WHO) Guidance for the Health and Environmental Aspects Applicable to Desalination. The WHO Desalination Guidance defines policy framework for development of environmentally safe desalination plants which produce drinking water meeting WHO's public health and safety protection goals.

Mr. Voutchkov has also received recognition for co-authorship of the "Millennium Ecosystem Assessment", an environmental policy publication prepared by international team of experts, which work was awarded the 2006 Zayed International Prize for the Environment.

## **Books**

Voutchkov, N., *Desalination Engineering: Operation and Maintenance* McGraw Hill, USA (In print - 2014)

Hoek, V.M. E and V. Tarabara. (Editors) Encyclopedia of Membrane Science and Technology, *Chapter* - Seawater Desalination - Cost and Technology Trends, John Willey and Sons (2013).

Voutchkov, N., *Desalination Engineering: Planning and Design*, McGraw Hill, USA (2012)

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Lazarova, V., Choo, K. H., Cornel, P. (Editors) Energy Water Interaction of Water Reuse, *Chapter 16 – Energy Use for Desalination – Current Status and Future Trends* (2012).

AWWA, Voutchkov, N., H. Hunt, Chapter – Environmental Impacts and Mitigation Measures *in Desalination of Seawater, Manual of Water Supply Practices M 61* (2011)

Voutchkov, N., *Desalination Cost Assessment and Management*, Water Treatment Academy, Division of Technobiz-Communications, Ltd. (2011)



Voutchkov, N., *Desalination Plant Concentrate Management*, Water Treatment Academy, Division of Technobiz-Communications, Ltd. (2011)

Cotruvo, J., Voutchkov, N., Fawell J., Payment, P., Cunliffe, D., Latteman, S. (Editors), *Desalination Technology: Health and Environmental Aspects of Desalination*, CRC Press & IWA Publishing (2010)

Voutchkov, N., *Seawater Pretreatment*, Water Treatment Academy, Division of Technobiz-Communications, Ltd. (2010)

Voutchkov, N., *Pretreatment Technologies for Seawater Desalination*, Australian Water Association, Sydney, Australia (2008)

Li, N.N., Fane, G. A., Ho W.S.W, Matsuura, T. (Editors) N. Voutchkov and R. Semiat, Chapter – Seawater Desalination, in *Advanced Membrane Technologies and Applications*, John Wiley and Sons, Inc. (2008)

Wilf, M., Awerbuch, L., Bartels, C., Mickley, M., Pearce, G., Voutchkov, N., Chapter – Budgeting of Membrane Desalination Projects in *The Guidebook to Membrane Desalination Technology, Reverse Osmosis, Nanofiltration and Hybrid Systems, Process, Design, Applications and Economics*, Balaban Desalination Publications (2007)

AWWA, Voutchkov, N., R. Bergman, Chapter – Facility Design and Construction in *Reverse Osmosis and Nanofiltration, Manual of Water Supply Practices M 46, Second Edition* (2007)

## Articles

- Birnhack, L., N. Voutchkov, O. Lahav, Fundamental Chemistry and Engineering Aspects of Post-treatment Processes for Desalinated Water – A Review, *Journal of Desalination*, Vol. 273, Issue 1, June 2011, pp. 6-22 (2011)
- Voutchkov, N., Overview of Seawater Concentrate Disposal Alternatives, *Journal of Desalination*, Vol. 273, Issue 1, June 2011, pp. 205-219 (2011).
- Voutchkov, N., Seawater Desalination: Current Trends and Challenges, *Desalination – a Filtration + Separation Publication*, Vol.5, Issue 2, pp.4-7, October (2010)
- Voutchkov, N., Considerations for Selection of Seawater Pretreatment System, *Journal of Desalination*, Vol. 261, Issue 3, pp. 354-364, October (2010)
- Voutchkov, N. Salinity Tolerance Evaluation Methodology for Desalination Plant Discharge, *Journal of Desalination and Water Treatment*, pp. 1 – 7, September (2009)

- Agus, E., Voutchkov, N., Sedlak, D., Disinfection By-products and Their Potential Impact on the Quality of Water Produced by Desalination Systems: A Literature Review, *Journal of Desalination*, Vol. 239, pp.214-237 (2009)
- Voutchkov, N., Conventional and Membrane Filtration: Selecting a SWRO Pretreatment System for Desalination, *Desalination - a Filtration and Separation Publication*, Vol. 4, Issue 1, pp. 5-8 (2009)
- Voutchkov, N., Planning for Carbon-Neutral Seawater Desalination in Carlsbad, California, *Environmental Engineer: Applied Research and Practice Journal*, pp. 34-43, Summer (2008)
- Voutchkov, N. Repaso de Opciones de Disposicion de Agua de Mar, *Agua Latinoamerica*, Volumen 8, Numero 1 (2008).
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- Voutchkov, N., A Carbon Action Plan for California Desalination Plant, *Water, Journal of the Australian Water Association*, pp.50-54 June (2008)
- Voutchkov, N., Desalination Planning: Green Desalination in Carlsbad, California, *Desalination, a Filtration + Separation Publication*, Vol. 3, Issue 2, pp. 6-10 (2008)
- Voutchkov, N., Recent Technological Advances Make Seawater Desalination More Affordable, *AMTA Solutions*, pp. 1-10, Summer (2008)
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- Dietrich, J., N. Voutchkov, Comparison of Membrane and Granular Media Pretreatment, Toxin and Boron Rejection Results and Energy Recovery at Desal Plant, *Ultrapure Water*, pp.55-60, September (2008)
- Voutchkov, N., California Desalination Report with More than a Grain of Subjectivity, *Journal of Water Conditioning and Purification*, January (2007)
- Voutchkov, N., Assessing Salinity Tolerance of Aquatic Life to Desalination Plant Discharges, *Asian Water*, pp.13-16, January/February (2007)
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- Voutchkov, N., California Opens Up to Desalination, *Government Engineering*, pp.26-27, May/June (2007)
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  - Voutchkov, N., Beach Well Intakes – Feasibility Consideration for Large Seawater Desalination Plants, Asian Water, pp. 24-28 (2005)
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