

NanoH<sub>2</sub>O designs, develops, manufactures and markets reverse osmosis (RO) membranes that change the fundamental economics of desalination. Based on breakthrough nanostructured materials and industry-proven polymer technology, NanoH<sub>2</sub>O's thin-film nanocomposite ("TFN") **QuantumFlux**<sup>TM</sup> membranes dramatically improve desalination energy efficiency and productivity. Exhibiting the highest permeability (flux) on the market, **QuantumFlux** membranes match best-in-class salt rejection while purifying water from a broad range of sources, and fit into new and existing desalination plants worldwide.

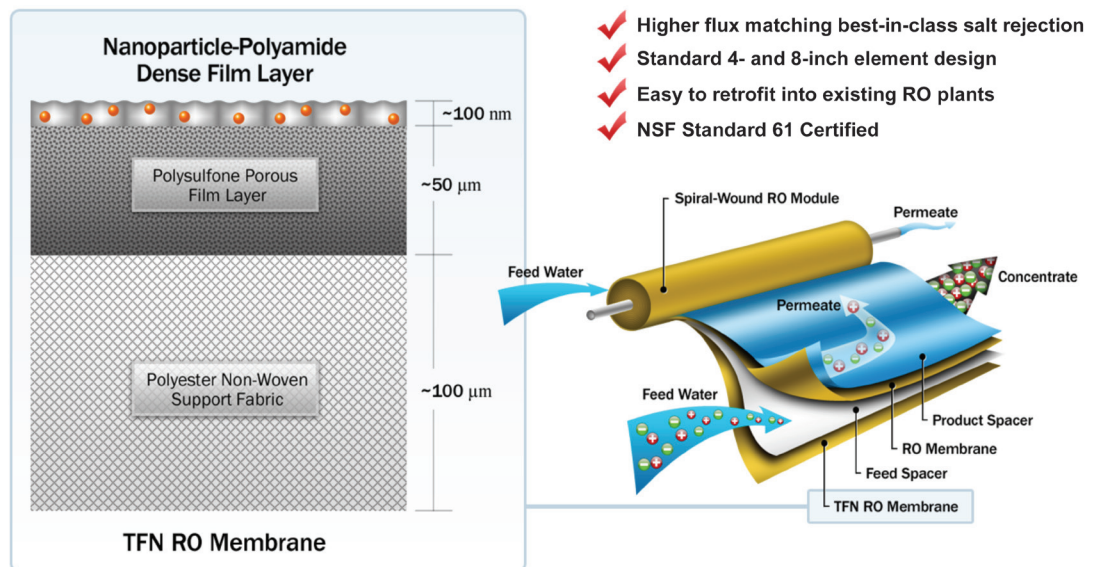
Founded in 2005, NanoH<sub>2</sub>O has raised over \$35 million (USD) in venture capital. After extensive membrane development and testing, NanoH<sub>2</sub>O recently commenced commercial operations at its manufacturing and R&D facility located in El Segundo, California.

## QuantumFlux Membrane Technology

Our **QuantumFlux** membranes use nanotechnology to change the structure of the thin-film surface of an RO membrane (Figure 1). It is this thin-film that dictates the permeability and salt rejection of the membrane and therefore the economics of a desalination plant. Nanostructured materials are introduced into the synthesis process of the traditional polymer film that produces an RO membrane, thus making a true nanocomposite material.

**Figure 1**

Cross-section of a NanoH<sub>2</sub>O TFN **QuantumFlux** membrane for RO applications.

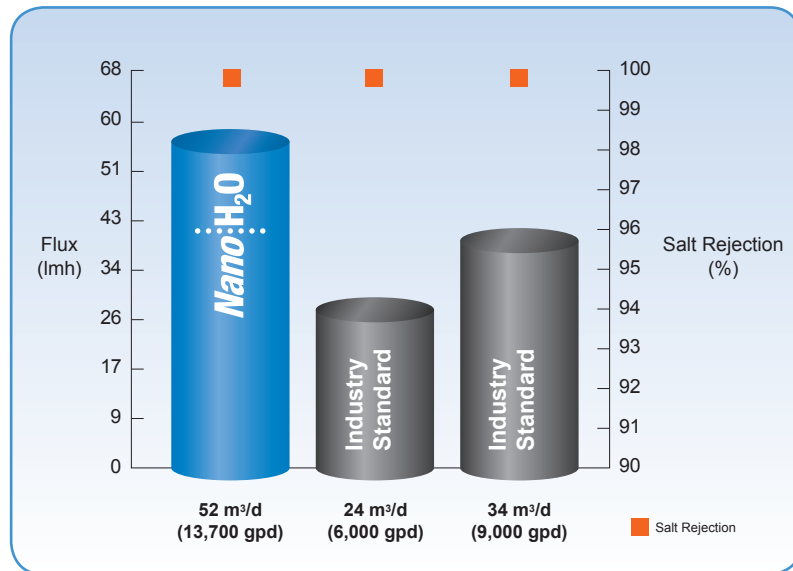


**QuantumFlux** membranes have demonstrated a 50-100% increase in permeability when compared to the installed base of RO membranes while maintaining the same level of salt rejection (Figure 2). The membranes are industry-standard elements that can be installed in any RO desalination plant. NanoH<sub>2</sub>O manufactures and assembles 4-inch and 8-inch spiral wound elements in its El Segundo, California production facility. The company has proven nanocomposite membrane performance through extensive field testing at the U.S. Navy Desalination Testing Facility at Port Hueneme in Oxnard, California and at customer sites around the world.

NanoH<sub>2</sub>O has a portfolio of 4 patents and 11 patent applications protecting TFN membrane technology. Extensive prior art analysis as well as initial patent office actions indicate both the patentability and freedom to operate for the company and its products. NanoH<sub>2</sub>O is confident in its position as the first entity to file on nanocomposite RO membranes.

## Figure 2

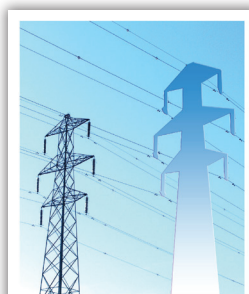
NanoH<sub>2</sub>O *QuantumFlux*<sup>TM</sup> membranes significantly increase flux while matching best-in-class salt rejection when compared to other commercial seawater membranes.



## Benefits of *QuantumFlux* Membranes

By addressing the key issues of energy costs and capital expenditures, NanoH<sub>2</sub>O's *QuantumFlux* membranes can create significant cost savings.

NanoH<sub>2</sub>O's membranes can reduce energy usage by up to 20%, or increase production capacity by up to 70% while leaving operating costs virtually unchanged, or reduce an RO plant's footprint by as much as 40%. Such changes are significant for a customer, as energy can make up as much as 60% of a desalination facility's operating expenses and increasing plant capacity typically requires major capital expenditures and an expansion of plant footprint.



Up to 20%  
**Less Energy**

or



Up to 70%  
**More Water**

or



Up to 40%  
**Smaller Plant**

## Changing the Economics of Desalination

With its nanocomposite membranes, NanoH<sub>2</sub>O is transforming the fundamental economics of desalination and providing water sustainability to parts of the world where water is sparse. For more information, please call us at +1 424.218.4000, locate us at 750 Lairport Street El Segundo, California 90245-5006 USA or online at [www.nanoh2o.com](http://www.nanoh2o.com).

**NanoH<sub>2</sub>O**