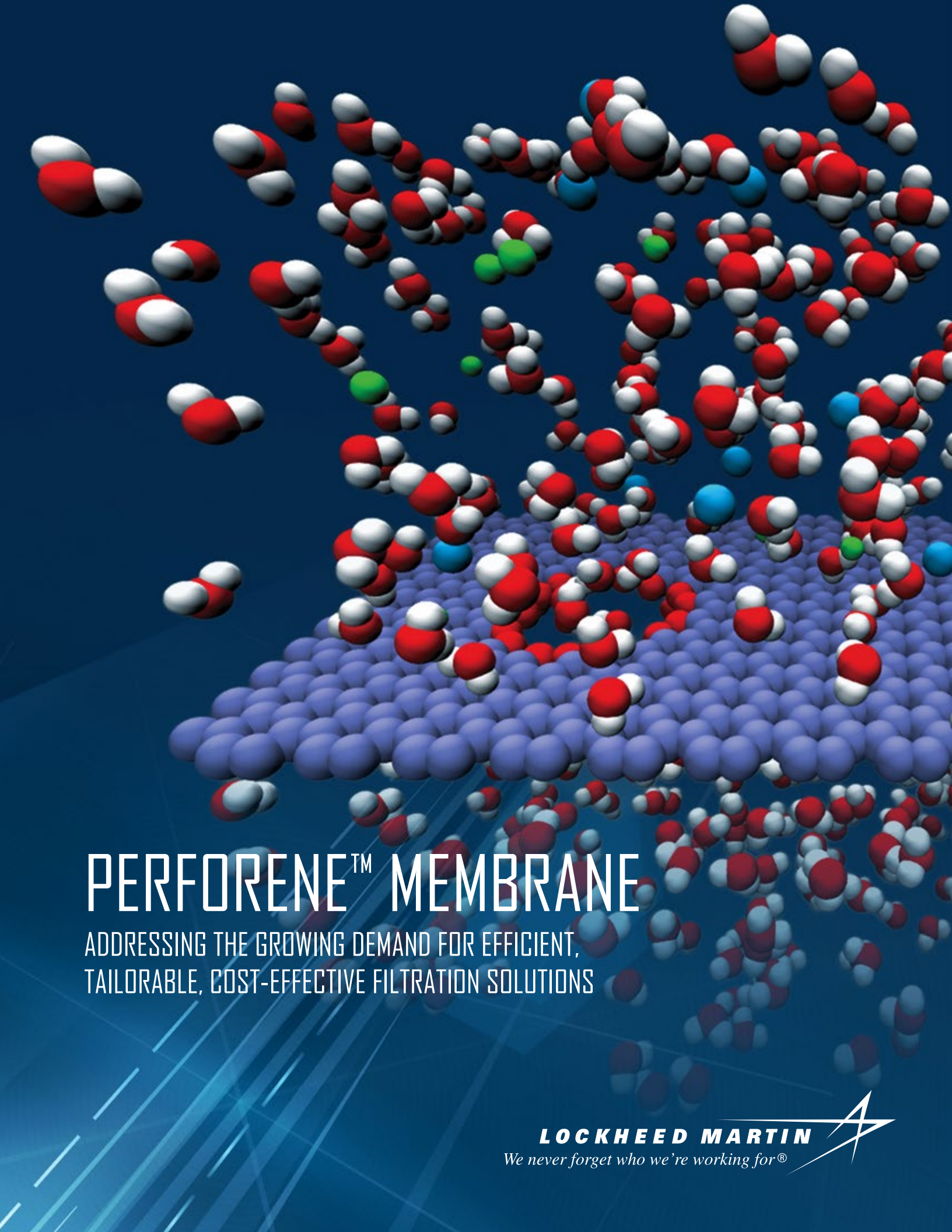

PERFORENE™ MEMBRANE

ADDRESSING THE GROWING DEMAND FOR EFFICIENT, TAILORABLE, COST-EFFECTIVE FILTRATION SOLUTIONS

LOCKHEED MARTIN

We never forget who we're working for®

LOCKHEED MARTIN'S PERFORENE™ MEMBRANE

With a distinguished 100-year track record of breakthrough performance, Lockheed Martin is addressing rapidly-changing global priorities that will shape our future. Lockheed Martin is engineering a filtration solution that is readily extensible to a multitude of applications. The United States Patent and Trademark Office recently issued Lockheed Martin a patent for the Perforene membrane's application to water filtration.

WHAT IS THE PERFORENE MEMBRANE?

Lockheed Martin's Perforene membrane – the thinnest membrane possible – is a perforated, one-atom thick sheet of graphene, which will feature holes that are as small as one nanometer in diameter. Integrating the Perforene membrane within a filter of a larger system, it can trap sodium, chlorine and other ions and, at the same time, dramatically improve the flow-through of water molecules and reduce clogging and pressure on the membrane and filter, as well as reduce energy usage of the larger system.

THIS UNIQUE PERFORENE MEMBRANE WILL BE:

- Tolerant of high pH conditions, harsh cleaning chemicals, hydrocarbons and other chemicals in the environment
- Can operate at high temperatures
- Up to two orders of magnitude more permeable than today's industry standard material
- Stronger than steel of comparable thickness, withstanding high pressures needed for desalination
- Conductive and hydrophobic, reducing fouling tendency in desalination applications

PERFORMANCE EXPECTATIONS FOR SEAWATER DESALINATION

- Up to 5x membrane flux improvement with fewer required elements for a given permeate production
- 10-20% reduction in energy consumption due to pressure reduction
- Fouling reduction of up to 80% with corresponding energy savings and increased membrane life

NOT JUST FOR SEAWATER DESALINATION

The Perforene family of membranes are tailorable to selectively filter or capture a wide variety of particle sizes, making it readily extensible to other filtration and harvest applications, including:

- Waste water treatment
- Pharmaceutical material harvest and purification
- Energy/power generation
- Mining
- Food and beverage
- Manufacturing

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PIRA# NVG201308002