

# White Paper

*A clean technology white paper from Brodeur Partners and Beaupre*

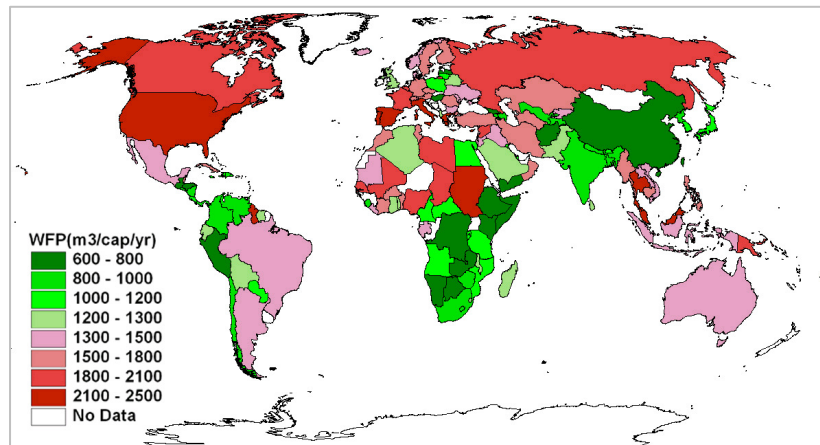
## Boosting investments in clean water technologies

*by Steve Hodgdon*

In early times wars were fought for water. These days we war for oil. Pretty soon we might be back to water. If the emerging global water crisis continues to escalate unabated, water may once again become the preeminent resource triggering world conflict. Bad water and sanitation claims more lives through disease than any war claims through guns, according to a United Nations Human Development Report. In other words, between war and water we're facing a geo-political double whammy.

Rising populations, increased agricultural demands and looming shortages caused by climate change are just some of the trends edging us toward a tipping point of a global water crisis. An estimated 1.1 billion people don't have access to clean water today, due to either lack of infrastructure,

competition for water resources, or adverse climate conditions. As many as 5 million people die each year from lack of water and water-borne diseases, says the World Health Organization (WHO).



Annual water consumption per capita...in cubic meters

Even here in the U.S. – where water once seemed a limitless, almost free resource – 36 states will face severe water shortages by 2013, according to the EPA. Look no farther than Atlanta, GA, and neighboring Southeastern locales that experienced their worst drought on record in 2007-08. And Mother Nature will continue to wreak havoc with clean water supplies as inevitable natural disasters like the Southeast Asian tsunami or the Gulf Coast hurricanes create contaminated water more deadly than the wind and waves that caused it.

With a crisis so urgent and a future so dire, why isn't there more investment in clean water technologies? Last year, less than two percent of cleantech investments were in water. It's even more surprising considering that water purification and conservation are the *original* clean technology. Egyptian civilizations dating back to 500 BC applied naturally occurring materials such as aluminum sulphate to water purification. Hippocrates invented the conical shaped

*“Investors want to see strong evidence of water investment opportunities, in which high-growth, innovative technologies generate significant revenues. Those examples are still seen as scarce.”*

water filter. And ancient Rome revolutionized urban sanitation through the engineering marvel of its aqueduct system. Yet, while the water problem is more pressing than ever, the preponderance of investment and mindshare flows into more lucrative clean energy ventures like solar, wind and biofuels. According to analyst Laura Shenkar of The Artemis Project, it's simply an ROI issue, as explained in a recent Cleantech Group article:

*Investors want to see strong evidence of water investment opportunities, in which high-growth, innovative technologies generate significant revenues. Those examples are still seen as scarce. ...Add to that the fact that this is a truly global market, and the new investor needs to scour North America, Europe and Asia as a minimum. The bottom line is a dearth of obvious choices, high multiples where it is obvious, and a great deal of due diligence to find a clean deal at a reasonable multiple.*

That's not to say that all segments of the clean water technology industry are suffering an investment drought. Water is, after all, a \$400 billion/year market.

Segments such as desalination plants – which convert seawater into freshwater for drinking and commercial uses – are experiencing an uptick in investment. More than 100 countries operate desalination plants today, with the majority of investment occurring in wealthy-but-water-poor Middle East countries like Saudi Arabia and Dubai. When you consider that oceans comprise 97.5 percent of all earth's water, sea water may seem like the ultimate renewable water resource. But first-generation desalination technologies are hardly eco-friendly. Desalination processes consume vast amounts of energy, contributing to greenhouse gasses. Sucking in large volumes of ocean water harms marine life. And buildup and disposal of salt waste products are another environmental concern.

New research aimed at tackling many of desalination's environmental concerns is underway, such as developing 2<sup>nd</sup>-generation desalination plants powered by renewable energy. But until

that time, many environmentalists worry that too much investment in current desalination projects is diverting resources from less costly and more environmentally benign alternatives.

Water filtration for industrial applications is another hot growth segment. Industry consumes approximately 60 percent of all water used in industrialized countries. Consequently, big multinationals like Siemens and General Electric have invested millions in filtration and wastewater reuse technologies to serve the growing insatiability for clean water in manufacturing, power plants, food production and other large-scale industrial processes.

This segment generates two categories of water treatments: *industrial water*, which is polluted by industrial processes and must be treated; and *cooling water* used for energy transfer (such as cooling power plants), which must be filtered at intake but can be released back into the environment without further treatment.

But, as with desalination, investments in clean water technologies for industrial applications are concentrated in the wealthy developed world and do little to address the global water crisis of the developing world. As populations grow, so does the demand for clean water at a time when supplies are shrinking.

A recent Deloitte report on *Trends Influencing the Environment, Water Treatment and Computer Technology in 2008*, argued that water has become more precious than gold, but investments in its protection have not kept pace:

*In 2000 scientists predicted that by 2025 one-third of the world's population would suffer from a shortage of fresh water. This prediction, however, came true the year before last.*

*Current investments in obtaining water are insufficient – under-investment in this respect is estimated at USD 1 billion from now till 2020. Nevertheless, state-of-the-art technologies are expected to greatly alleviate this issue, for example: the use of carbon nano-tubes in water desalination would greatly reduce energy costs and other expenses like filter cleaning agents. At present, desalinated fresh water is ten times more expensive than treated rainwater and for this reason desalination is of limited practical use in developing countries.*

What's needed are new clean water technologies that can be deployed cost effectively in the regions most urgently affected...countries which typically lack the money, infrastructure and

political will to build large-scale municipal water solutions. Fortunately, startups specializing in new water filtration, purification and treatment technologies have stepped up to offer solutions.

Some of the more cutting-edge developments being applied to clean water solutions include:

- Nanotechnology and “nanowater”
- Novel new membrane filtration systems
- Solar-driven detoxification
- Reverse osmosis
- Adsorptive micellar flocculation
- Ultra-violet water disinfection
- Hybrid Treatment Systems such as combined membrane and photo-catalytic reactors
- Ionic liquids
- Supercritical water and supercritical carbon dioxide for use in green chemistry processes, as replacements for harmful solvents

One example is a water purification device from Dean Kamen’s DEKA Research and Development Corp – the same folks who brought us the Segway. Called the Slingshot, the device can take nearly any kind of moisture, such as a contaminated local water supply, sewage or saltwater, and turn it into safe drinking water. It uses vapor compression distillation to separate clean water from the solids, and it can be powered by any readily available source of biomass fuel, such as cow dung. It also generates enough electricity to power 70 energy-efficient light bulbs. Priced in the \$1,000-\$2,000 range, Kamen aims to sell thousands of units into third-world villages where both clean water and energy sources are in short supply.

Another such innovator is WaterHealth International, whose UV Waterworks purification system was invented to provide access to affordable, clean water for everyone, regardless of economic status. In their book, *The Clean Tech Revolution*, authors Ron Pernick and Clint Wilder cited the company’s innovative business model – which includes partnerships with commercial institutions in the developing world as well as international agencies, local, state and central government officials and non-governmental organizations – as a recipe other clean water startups should emulate:

*WaterHealth International, whose technology received recognition from Discover magazine as a ‘best of the decade’ invention in 1999, believes it can deliver on its ambitious promise by embracing a developing world-centric business model. That means being involved in the entire water supply and purification process from end to end, including design, product manufacturing, financing, servicing and hiring locals to operate and run the company’s systems.*

*If companies such as WaterHealth International can beat the odds, rural development and disaster relief will offer a huge viable market...*

A perfect storm of rising populations, increased food production and declining water stocks has the potential to turn the world's original clean technology challenge – water – into one of the most valued cleantech investments. Historically, it has been difficult for entrepreneurs to make money serving the markets of the developing world. But innovation in more cost-efficient clean water solutions not only has significant investment upside, it can literally change world. Today, half of the world's hospital beds are occupied by patients suffering from a water-related disease. And 88 percent of all diseases are caused by unsafe drinking water and inadequate sanitation. Imagine the long-term prosperity that could result across the globe from alleviating those problems.

---