



## Water Ship Up: Firm Gets \$250 Million to Make Oceangoing Desalination Vessels.

By Sally Adee  
Published March 2008



On 12 March, [Water Standard Co.](#), an international company with offices in Texas, announced that it had secured a commitment of US \$250 million to build and operate ships that would desalinate seawater and pump it to cities in need. Two international New York City-based investment funds are backing Water Standard with the equity investment, and CEO Amanda Brock says the first prototype vessels should sail out of shipyards in 2009.

According to Brock, the proposed vessels are more energy efficient and better for the environment than traditional shore-based desalination plants. Like their onshore counterparts, Water Standard's vessels will use a membrane-based desalination treatment called reverse osmosis. But unlike shore-based plants, the vessels do not have to expend much energy to draw in seawater—they sit right on the water—and they discharge the

diluted concentrate.

Their environmental impact, says Brock, is also much less severe than that of shore-based plants for two reasons: shore-based plants must take in water at high velocities to push it through the filtering membrane. Subsequently, marine life is often caught up in the stream and killed. But a desalination ship's water-intake process is low velocity, which means that any marine life inadvertently picked up is much less likely to be harmed or killed (they are also protected by a screen). Second, when reinjecting the leftover concentrate into the ocean, a vessel can dilute that concentrate at less cost and using fewer resources, because the ship is sitting in the middle of an inexhaustible supply of diluting water. Finally, Water Standard maintains that a mobile desalination vessel can respond quickly when natural disasters leave large metropolitan areas without access to safe drinking water.

Brock, who was an executive at Enron, has been CEO of Water Standard since early 2007. She sat down with IEEE Spectrum's Sally Adee for a chat.

**IEEE Spectrum:** How did you get from Enron to this point?

**Amanda Brock:** I left Enron in 1998 to run business development in North and South America for Azurix [Enron's water subsidiary]. After the bankruptcy, I went back to doing deal work. In late 2006, Andrew Gordon [Water Standard's founder and a Florida-based entrepreneur], who had been working on vessel-based desalination and wastewater treatment patents, asked me to join Water Standard. At first I was not interested.

**Spectrum:** What changed your mind?

**AB:** It's one of those things that sat with me, and I began to think about it. I had remained very involved in the water sector after Azurix, and this made a lot of sense. I began to investigate.

The U.N. statistics show there is not enough water to sustain the existing population—not to mention growth. Now add on the population's movement from rural areas to cities. By 2020, they estimate that 70 percent of the world's population will live in urban areas, within 50 miles of an ocean. That amount of pressure on the limited resources in these burgeoning cities is incredible. Now add global warming—sea levels rising, saltwater intrusion, groundwater being pumped out at such rates that aquifers are becoming brackish.

Even in Houston we have a real problem with subsidence [downward shifting relative to sea level]. We have a problem, and it's because of groundwater extraction.

**Spectrum:** Why do you think this idea got what is arguably the largest initial investment expenditure in history?

**AB:** It's getting drier. There are more people now focused on using the same resources.

If you look at the numbers on global warming—which, by the way, has a huge impact on water—the 12 hottest years in recorded U.S. history, 11 of them have been in the past 12 years.

When people first started talking about global warming, everyone thought it was a plot, some kind of conspiracy. Now we're at the point where—regardless of why—people accept that it's real. The debate of why stops. The debate becomes: What do we need to do?

**Spectrum:** But people aren't really doing very much about water, are they?

**AB:** Everyone is so tired and numb to the statistics that have been out there forever. A child dies every two minutes from waterborne disease. You've heard it so long. There are 300 million Chinese without access to a safe drinking supply.

And now in Atlanta, the lakes are drying up. Those lakes had dried so much that it became not just a state issue, it became a federal issue. I mean, the governor literally prayed for rain. Same in California.

**Spectrum:** Why do you think an idea like this can get funding now?

**AB:** Because of need and market size. There are now economic and environmental drivers. There is only so much you can get from reuse. There's increasing regulation as to how you access existing water supply. Florida, for example, has major regulations preventing additional groundwater extraction.

By the way, I'd like to add that Water Standard believes that desalination is not the answer unless it is in conjunction with water reuse and conservation.

**Spectrum:** That seems unlikely given human nature. Now you have the whole ocean—an inexhaustible source of potable water. What would motivate conservation?

**AB:** Environmentally, reuse and conservation are better than depleting existing water resources. Yes, we have a whole ocean and we can produce an inexhaustible supply. However, that uses power and infrastructure—and sure, we can do that cost-effectively, and we can mitigate many of the environmental impacts that might otherwise be brought about by desalination. But it makes sense that people should use resources they already have more effectively before they go out and seek additional resources.

**Spectrum:** Where do you put these ships? Outside cities?

**AB:** We're in talks about putting ships offshore in major metropolitan areas. But the ships can also be located offshore near nuclear facilities, refineries, major industrial locations—producing water for what that specific industry needs so that water doesn't have to come from somewhere else.

**Spectrum:** How far away from shore would a ship like this be anchored?

**AB:** It is all across the board. We can be very close to shore if there is good quality water and depth. Otherwise, we can be 8 kilometers offshore. Right now we're looking at an opportunity where we are about 8 km offshore.

**Spectrum:** How many gallons a day of potable water would one of these vessels produce?

**AB:** We are really scalable. Depending on the size of the ship, we can produce 5 million to 75 million gallons a day.

**Spectrum:** How do you get the water to shore?

**AB:** Like I said, everything is completely scalable. For short-term contracts, or for emergencies, we can use a hose system. Most ships will be built for longer-term contracts, and we could be offshore producing for 20 years, in which case we expect to utilize a seabed or buried pipeline.

And that's the real advantage. If, for example, there were some worst-case scenario, say, a typhoon, what does the ship leak into the environment? No chemicals, no oil—water. And the technology in the hose and pipeline industry has advanced to where they are virtually leakproof. But again, think of a natural disaster that causes a hose to break. There's virtually no pollution danger.

**Spectrum:** You said mobile desalination is good in emergencies. How?

**AB:** If we're in the path of a hurricane off the coast of Florida, or a typhoon off the coast of China, for example, we can very quickly get out of the way, and then, as soon as it passes, we can set up shop again and start producing fresh water for the area that same day. It's also a really good option for emergency response. If an unexpected event occurs, we can quickly move a ship to a region in need of emergency drinking water.

That's also good for investors from a risk-management perspective. At times of political unrest, for example, you can't pick up and move a land-based plant. But a ship you can immediately move out of harm's way. Better yet, when it's safe, the ship can return to bring drinking water to the population.

**Spectrum:** Where do you think the first ship will be anchored?

**AB:** That will be determined by contract, and the contract will be determined by need. It could be China, Australia; it could be the Middle East.

**Spectrum:** Do you think this will eventually replace coastal desalination facilities?

**AB:** No. The need for water supply is so great that there's room for everybody.

**Spectrum:** Would this concept also work for cleaning polluted water?

**AB:** Longer range, yes. We've been talking to people about our next line of business: vessel-based wastewater treatment. We've patented the ability to treat wastewater and pipe it back to land as gray water, which can be used for agriculture or irrigation. And we can also discharge into the ocean a cleaner stream of treated water, rather than raw sewage from land.

**Spectrum:** So a desalination vessel would solve the problems for the coastal areas, but what about the parched inland areas, like in Australia or the western United States?

**AB:** Look at it another way. Where does San Diego's water come from? It comes from a long, long way away. How does it get there? It gets pumped through aqueducts from the Colorado River, and that river is lower right now than it's ever been. Look at all the stats on Lake Mead [created by the Hoover and Davis dams, in Nevada and Arizona

What if you could say to someone in Las Vegas, "Tell you what, you keep your water here, and don't send it downstream to another city. We'll produce that water offshore." It's a displacement. You truly begin to "swap" water. We'll give you water close by, and the water you would otherwise take, you will leave for the people who live close to that water.

**Spectrum:** Seawater desalination seems like a free lunch, but it's not. People are concerned about the higher boron content in seawater as opposed to freshwater sources. And recently the World Health Organization updated its recommendations on boron intake, bringing them way down. Do your patents address boron?

**AB:** Yes, they do. There is boron in seawater, but it can be extracted very easily with membrane-based reverse osmosis, which is what we use. Both land- and vessel-based reverse osmosis systems can address boron.

It does require, depending on the boron limit, that you do what is called a second pass. And that requires additional pumping and therefore power usage, so it adds cost. But boron will not prevent seawater desalination.

**Spectrum:** So what's next? What are you doing with all that money?

**AB:** Well, first we have to buy the ship. Then we need the full design. We have to be in a shipyard. We have to talk to permitting and environmental firms. We have to talk to mooring companies.

**Spectrum:** How soon will we see a ship?

**AB:** We think next year at this time we will have a few vessels under construction. A prototype vessel will be ready 12 months after we get to a shipyard. During construction and conversion, you lay the pipeline. Then you hook up the pipeline and begin producing.

Sidebar 1

Water Standard's proposed desalination vessels could work in temporary (for example, emergency) scenarios and in more permanent situations. In a permanent installation, the vessel could sit up to 8 km off shore for up to 20 years producing potable water for coastal cities.

