

State of the Water Industry 2017

A look at trends, challenges and solutions in the industry and how investors can access

In this article we will discuss the state of the Water industry and some of the potential problems countries around the world could be facing in the future if current supply and demand trends continue. We will also take a look at similar issues that exist here in the U.S. and the steps being taken to help minimize the effects of these potential water shortage problems. Next, we will give readers an idea of some current systems and methods being used to help increase efficiency in both renewable energy and water recycling systems. To help wrap things up, we will discuss a number of new technologies being used around the globe to help shore up the water supply given the increasing demand expectations down the road. On a final note, we will discuss two Nasdaq Water Indexes (both U.S. and Global), through which market participants can gain exposure via their corresponding ETFs.

World Trends

“In almost every region, population growth, rapid urbanization, rising consumption levels, desertification, land degradation and climate change have combined to leave countries suffering from severe water scarcity. These worrying trends are also making it increasingly difficult for the world to feed itself.”

Gone are the days when water supplies were predictable and farmers could depend on seasonal rains just right for growing crops. Rainfall has become erratic through either floods or droughts as climate change shifts patterns in place for thousands of years. This is also affecting industry and energy production, which relies on stable, large quantities of water.

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By 2030, global demand for water could exceed supplies by 40% unless there are major advances in allocating and using water more efficiently, according to the United Nations Global Environmental Outlook. Today, about 1.6 billion people live with "absolute water scarcity," and that's expected to rise to 2.8 billion people in less than 10 years, says the World Bank. A quarter of the world's population lives with extreme water scarcity for at least half the year. A major cause of this has been due to the fact unreliable water supplies are increasingly disrupting corporate supply chains. "Pressure on water is rising, and action is urgent," added the World Bank-led High Level Panel on Water.

This problem also has the potential to create some major economic and societal ramifications. For example, The World Bank now estimates a loss of 6% of GDP by 2050 for countries in the belt that stretches from West Africa through the Middle East, South Asia to Japan. Furthermore, High and Dry: Climate Change, Water, and the Economy decreasing water supplies exacerbate political tensions, destabilizing nations, and contributing to armed conflicts, such as we have seen in Syria. Many of the refugees fleeing Africa in 2016 did so because they could no longer grow food because long-term drought has destroyed the soil.

While most corporations have yet to take action on this looming crisis, Apple is among a small group that's beginning to take control of its water. Apple is paying for a water recycling plant in Prineville, Oregon to cool its data centers there - saving the city millions of gallons a year and ensuring a water source for the company.

Water Situation in United States

The water crisis that occurred in Flint, Michigan put the drinking water industry under intense scrutiny. Since then, studies show unsafe levels of toxic chemicals in the drinking water of 33 States. Researchers are calling for more drinking water monitoring and for a Drinking Water Data Platform that compiles analyses of US drinking water supplies in one place. Flint put the dire need for water infrastructure upgrades front and center for Americans, but how this will be accomplished is an open-ended question.

Major for-profit water companies are blamed for their role in these problems and many municipalities have, or are considering, taking back their water systems. Private water utilities currently operate about 13% of US water systems and charge prices 58% higher than municipal counterparts.

In December, President Obama signed the Water Infrastructure Improvements for the Nation (WIIN) Act.

This wide-ranging bill authorizes water projects nationwide to restore watersheds, improve waterways and flood control, and drinking water infrastructure, especially for small, economically disadvantaged communities. It includes \$170 million for communities like Flint that face drinking water emergencies, and invests in water storage, recycling and desalination for the long term in drought-stricken western states. A few of the provisions which were included in order to prevent another level such as what occurred in Flint are listed below:

- Customers must be notified if lead levels exceed federal drinking water standards
- Creates a voluntary lead-testing program for schools and childcare centers
- Creates a clearinghouse on the cost-effectiveness of various water delivery systems
- Authorizes research on innovative water technologies that can identify and mitigate sources of drinking water contamination.

The Environmental Protection Agency announced that \$271 billion in funding over five years is necessary to maintain and upgrade U.S. wastewater infrastructure. As utility water and wastewater rates continue increasing on average 7% per year, municipalities are near the breaking point to keep pace with rising demand and deteriorating infrastructure, says Bluefield Research. President Trump recently has promised a major infrastructure bill. He would turn to the private sector for funding (through huge tax breaks), rather than having the federal government foot the bill.

The advantage here is private companies could get "unfettered access to tax-exempt bonds and other public financing resources, like state revolving funds, that have historically supported public works projects," says a contributor to The Hill. This would allow private companies to consolidate more water system assets, rather than using their own money to improve infrastructure. Some call it a "privatization scam" and a "massive corporate welfare plan," which municipalities may well push back against. "It essentially amounts to a \$136 billion corporate tax credit that stands to make corporations richer without addressing much-needed infrastructure improvement."

In conclusion, Bluefield Research also estimates that 70% of the funds for infrastructure will come from ratepayers and the rest from private sources. Federal funding for water infrastructure peaked in 1976 at \$16.9 billion and has steadily fallen since to \$4.3 billion in 2014, placing the burden on states and local governments.

Water-Energy Nexus

As reliable water supplies vanish, renewable energy is increasingly viewed as crucial for energy production in a water-constrained world. Hydroelectricity, nuclear power, coal and natural gas all require enormous, stable quantities of water to operate. Electricity from coal, for example, consumes 7% of the world's freshwater. In China, almost half of the existing and planned coal plants are in water-stressed regions.

The energy industry is the world's second largest water consumer after agriculture (which uses 70% of the world's freshwater). Over the next 50 years, two-thirds of hydropower plants and 80% of coal plants may no longer be able to operate, according to the World Energy Council (WEC). In contrast, energy from solar and wind requires very little water.

To put things in perspective, just 1% of energy in Arizona comes from solar, saving 850 million gallons of water per year. If solar rose to 20% of its energy, 15 billion gallons of water would be spared, enough for 90,000 homes. Another example exists in Nebraska, where a switch from coal to wind power would help save 2 billion gallons of water each year. In 2015, the U.S. saved about 73 billion gallons of water through the use of wind energy.

A new method being used is through technological advances such as "recirculating" water systems as opposed to "once-through" systems. This involves the adoption of dry cooling, more efficient desalination processes, and reusing water from oil extraction are also paramount for reducing energy's water footprint, says WEC.

Recycling water is now a major trend

Since 2014, contracts for reuse have surpassed those for desalination. A few of the main reasons for this are recycling water is much less expensive, less energy-intensive and much better for the environment.

In San Diego County, for example, where the world's largest desalination plant recently began operating, water customers are committed to paying at least \$2,140 per square foot of water for the next 30 years. That's to supply just 10% of their water. Capturing storm water is among the least expensive options at roughly \$590 per acre-foot, and water recycling falls in the middle, says Pacific Institute.

Besides being a less expensive process than desalination, recycling water reduces the need to invest in more production capacity, and importantly, it turns wastewater treatment plants from cost centers to profit centers. Instead of a municipality paying for wastewater treatment, they get paid to sell recycled water

Future Outlook for Water Industry & New Technologies

Each year, the Water & Wastewater Equipment Manufacturers Association (WWEMA) surveys members about the water market. Orders rose for most manufacturers in 2016 and respondents are cautiously optimistic for 2017 based on recent notable demand.

In the survey, 75% of respondents say their companies are doing well, which up from 69% in 2015. Utilities are also doing well, according to Water & Wastes Digest, and say they are prioritizing investments in pipeline infrastructure, followed by collection and pumping equipment for the next two years.

Imagine H2O, a water startup incubator in San Francisco, is focused on companies that can revolutionize the use of data in the water industry. "The [water] network needs to get smart, and fast, so we can target investment, find water leaks, efficiently operate plants, monitor water quality 24/7, and automate alerts," says Tom Ferguson, vice president of programming.

This year's Water Technology Conference was held in New Orleans, taking up 300,000 square feet for technology entrepreneurs. Here are some compelling technologies coming down the pike:

- **Capturing Water from the Air:** there are several companies' currently developing ways to increase water supplies in areas of drought by literally pulling water from fog, dew and mist.
- **Access Sensor Technologies:** has developed an easy, inexpensive way to monitor water for pollutants. After a drop of water is placed on a small tester card, results come in 10 minutes for a wide range of contaminants.
- **SonicSolutions Algae Control:** is a device that floats in the water, emitting ultrasonic waves that prevent algae blooms, which are becoming a difficult water challenge. In 2014, Toledo, Ohio had to shut down its water system because of algae blooms.
- **Hydromax USA:** uses satellites in space to scan thousands of square kilometers which allows them to easily locate underground water pipeline leaks.
- **CUES Mapping Services:** uses 3D data to pinpoint pipe sags, misaligned joints, and horizontal and vertical design problems.

We will now discuss two Nasdaq Indexes that investors can gain exposure to through their corresponding ETFs.

The Nasdaq OMX US Water Index (GRNWATUSL): Methodology Basics

The Nasdaq OMX Water Index was launched on July 27, 2011. It is designed to track the performance of companies creating products that conserve and purify water for homes, businesses and industries that are listed on a U.S. exchange. The index is weighted to enhance the underlying liquidity and increase the tradability of the index components. The security types eligible for the indexes include common stocks, ordinary shares, depositary receipts (both American and Global), depositary shares, Dutch certificates, shares of beneficial interest or limited partnership interests, stapled securities and tracking stocks.

- The issuer of the security must be classified as participating in the Green Economy as determined by SustainableBusiness.com LLC
- The security must be listed on the Nasdaq Stock Market, New York Stock Exchange, or NYSE Amex
- One security per issuer is permitted
- The security must have a minimum worldwide market capitalization of \$50 million
- The security must have a minimum three-month average daily dollar trading volume of \$250 thousand

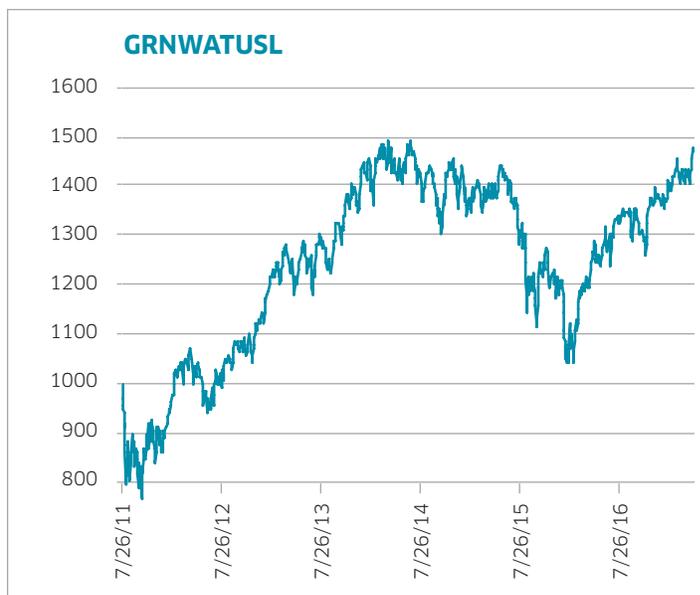
Additional information on methodology, rebalancing, and eligibility can be found here:

<https://indexes.nasdaqomx.com/Index/Overview/GRNWATUSL>

Returns & Volatility: (07/27/2011 - 4/28/2017)

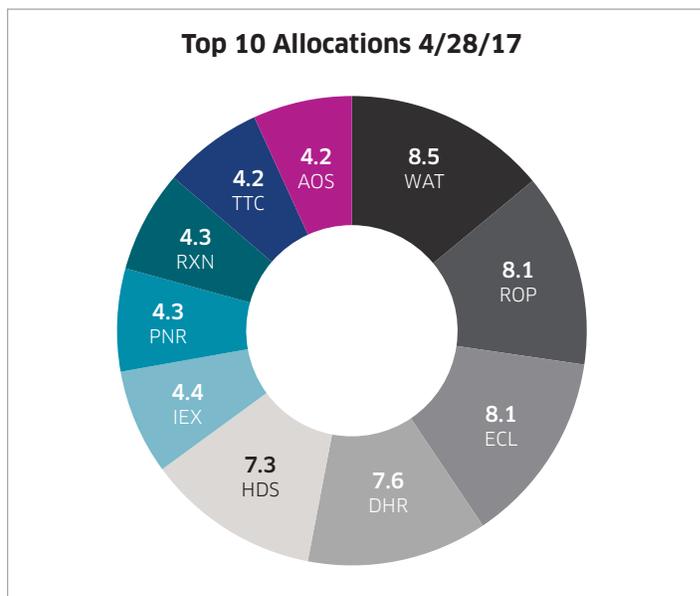
Since its inception, the cumulative return for GRNWATUSL is 46.62% with an annualized volatility of 18.92%. The annualized return since inception stands at 6.87%. Investors can gain exposure to GRNWATUSL through its corresponding ETF (PHO).

Cumulative Returns	46.62%
Annualized Returns	6.87%
Annualized Volatility	18.92%
Cumulative Returns	57.60%
Annualized Returns	7.19%
Annualized Volatility	15.16%



GRNWATUSL: Top 10 Holdings (4/28/17)

As of April 28, 2017, the index held 37 components. The largest weighted holding within the top 10 allocations was in WAT (8.5%). The rest of the allocations within the top 10 ranged from 4.2% to 8.1%.



The Nasdaq OMX Global Water Index (GRNWATERL): Methodology Basics

The NASDAQ OMX Global Water Index was launched on July 27, 2011. It is designed to track the performance of the companies creating products that conserve and purify water for homes, businesses, and industries. The Index is weighted in such a manner as to enhance the underlying liquidity and increase the tradability of the Index Securities. The security types eligible for the Index include common stocks, ordinary shares, depositary receipts (both American and Global), depositary shares, Dutch certificates, shares of beneficial interest, stapled securities and tracking stocks.

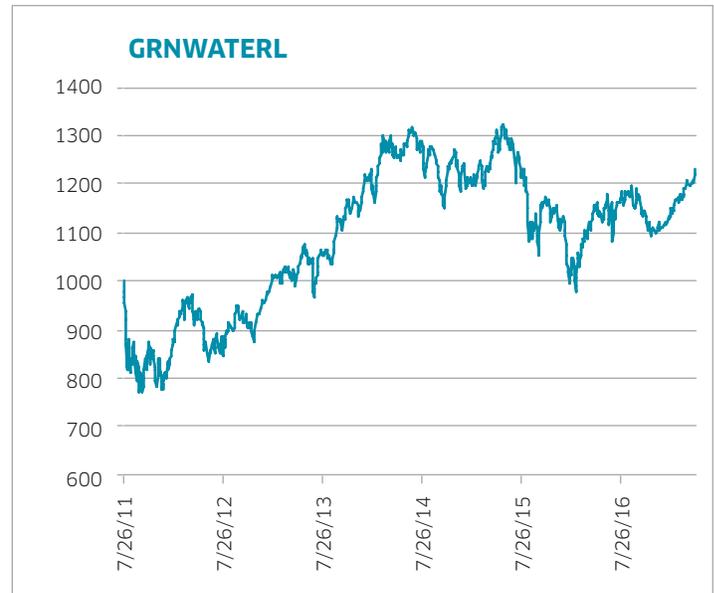
- The issuer of the security must be classified as participating in the Green Economy as determined by SustainableBusiness.com LLC
- The security must be listed on an Index-eligible global stock exchange
- One security per issuer is permitted
- The security must have a minimum worldwide market capitalization of \$50 million
- The security must have a minimum three-month average daily dollar trading volume of \$250 thousand

Additional information on methodology, rebalancing, and eligibility can be found here: https://indexes.nasdaqomx.com/docs/methodology_GRNWATERL.pdf

Returns & Volatility: (7/27/2011 - 4/28/17)

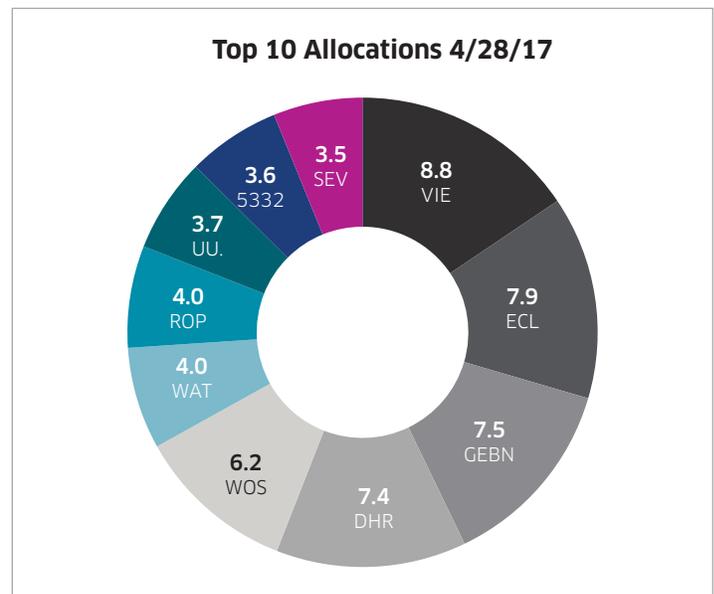
Since its inception, the cumulative return is 22.96% with an annualized volatility of 15.62%. The annualized return during our time period studied was 3.65%. Investors can gain exposure to GRNWATERL through its corresponding ETF (PIO).

Cumulative Returns	22.96%
Annualized Returns	3.65%
Annualized Volatility	15.62%



The Nasdaq OMX Global Water Index (GRNWATERL): Top 10 Holdings

As of April 28, 2017, the index held 40 components. The largest allocation was in VIE (8.8%). The rest of the allocations within the top 10 holdings ranged from 3.5% to 7.9%.



Conclusion

This article provides an update on the water industry and some of the potential problems the world could face if current supply and demand trends continue. The paper also discusses the current situation we face domestically here in the U.S., and some of the potential solutions to these problems. Next, we discuss some current systems and methods being used to help increase efficiency in both renewable energy and water recycling systems. We also give readers a brief background on some of the new technologies that are being developed in order to help form solutions to the current issues the world may face if current trends within the water industry continue. Finally, we provide a background on the methodology of two Nasdaq Water Indexes (GRNWATUSL & GRNWATERL), some basic performance and risk statistics since inception along with the top 10 holdings for each index at the end of April 2017.

1. <http://www.rona.unep.org/news/2016/rate-environmental-damage-increasing-across-planet-there-still-time-reverse-worst-impacts>
2. <http://advances.sciencemag.org/content/2/2/e1500323.full>
3. <https://portals.iucn.org/library/sites/library/files/documents/2016-069.pdf>
4. http://www.worldbank.org/en/topic/water/publication/high-and-dry-climate-change-water-and-the-economy?CID=WAT_TT_Water_EN_EXT
5. <https://www.wateronline.com/doc/apple-enters-the-wastewater-business-0001>
6. <https://www.wateronline.com/doc/unsafe-levels-of-toxic-chemicals-found-in-drinking-water-of-states-0001>
7. <http://www.waterworld.com/articles/2017/01/report-calls-for-increased-monitoring-of-drinking-water-supplies-in-the-u-s.html>
8. <http://www.waterworld.com/articles/2017/01/report-calls-for-increased-monitoring-of-drinking-water-supplies-in-the-u-s.html>
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