

# THE EMISSION

June 4, 2019 / Issue 8



## ALMOST 50% OF COMPANY FACILITIES AFFECTED BY WATER STRESS IN HIGH EMISSION SCENARIO

Water stress is an increasingly material issue for corporations around the world. For the last 4 years, the World Economic Forum has listed “water crisis” as one of the top 5 impact risks in their annual Global Risk Report. In fact, we already are seeing a sharp decrease of water resources per capita on a global level (Ripple et al. 2017). It is no surprise then that investors are increasingly concerned and are requesting more detailed risk reports that will allow them to re-allocate capital to companies with operations that are less exposed to water stress issues, or at least allow them to identify those firms that are better able to mitigate the effects of decreased water, supplies such as new, or alternative water sources.

Share of company locations under water stress within iShares MSCI World (RCP 8.5)

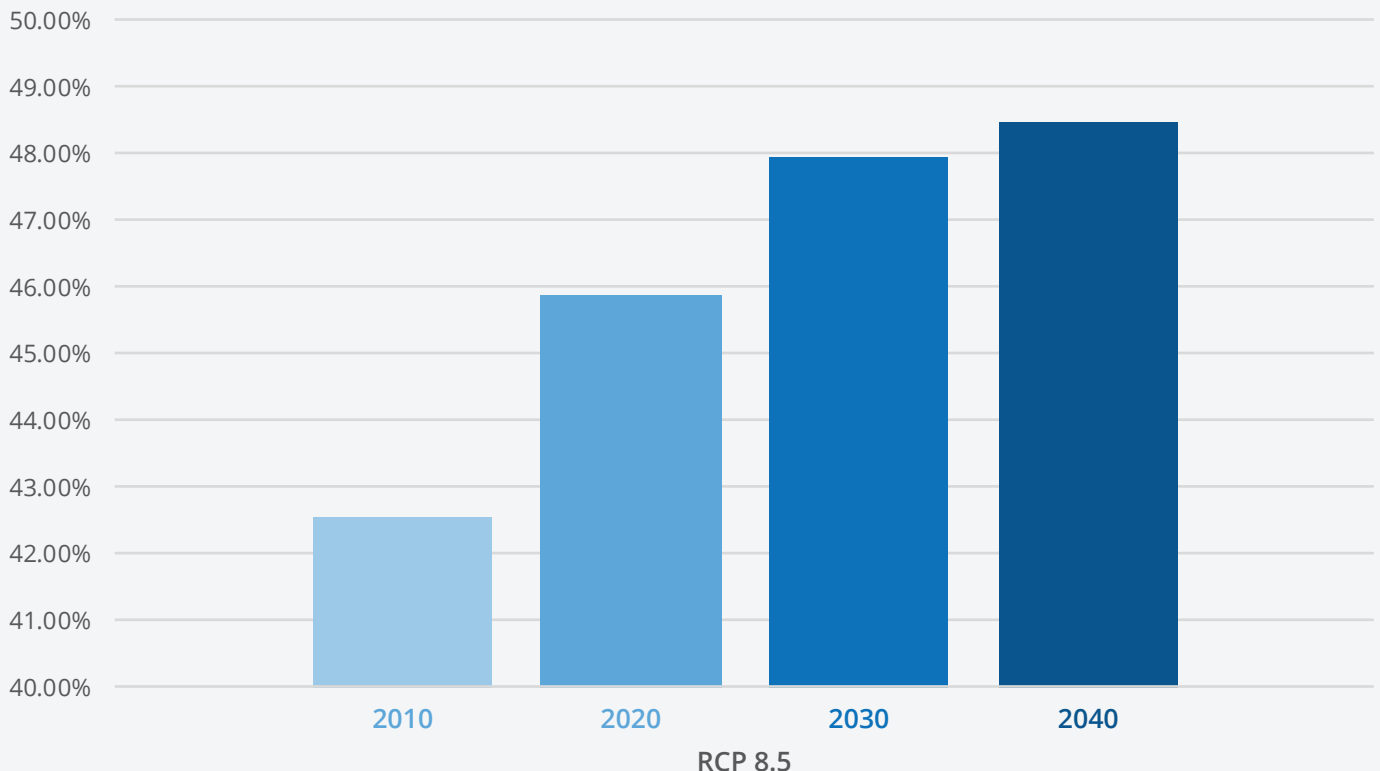


Figure 1: Number of locations in the iShares MSCI World ETF\* severely affected by water stress in the RCP8.5 (high emissions pathway) using Baseline Water Stress.

Carbon Delta's water risk research focuses on the amount of freshwater available to company facilities and understanding how changes to this may result in financial risk for companies. Specifically, Carbon Delta's proprietary global location database with more than 600,000 unique industrial and commercial sites plays a key role. Paired with each location is water stress information known as Baseline Water Stress (BWS). Mapping drought as a natural hazard in an accurate manner requires information on the water source itself; its specification of dependency. Combining geographically resolved water scarcity information from the World Resources Institute's (WRI) dataset Aqueduct with Carbon Delta's location and revenue data enables an overall water risk exposure for companies and for entire portfolios.

Freshwater availability is crucial for most sectors, whereas saline water can only be used in a limited number of sectors such as thermoelectric power generation, or in mining (USGS 2019). Factors such as water quality are of high importance for industries such as the beverages sector. The WRI Aqueduct dataset provides one of the most consistent sources for a global assessment. It includes the BWS metric that describes the amount of water used relative to freshwater available in a hydrological catchment. The WRI considers catchments with values larger than 0.4 BWS as "severely" water stressed (see Figure 1).

Future climate conditions are projected using Representative Concentration Pathways (RCPs), that were adopted by the Intergovernmental Panel on Climate Change (IPCC) in 2014 (IPCC 2019). They show the development of greenhouse gas concentrations in the atmosphere for the next decades. As RCPs are scenarios, different concentration pathways can be plotted in order to describe a range of possible outcomes. Also, RCPs are matched with Shared Socioeconomic Pathways (SSPs) that represent the societal development leading to the respective amount of emissions (Riahi et al. 2017).

For this article, we focus on the RCP 8.5 combined with SSP 2 assuming high greenhouse gas emissions. The RCP 8.5 has a pessimistic baseline with large atmospheric greenhouse gas concentrations causing more extreme effects than other scenarios.

## Water Stress and the MSCI World

The above-displayed bar chart shows the proportion of iShares MSCI World ETF\* facilities located in water-stressed regions. The share of company facilities located in water-stressed catchments increase to 48% in 2030. Comparing this to a more moderate scenario like RCP 4.5 with lower

greenhouse gas concentrations shows a clear difference caused by climate change: A future world with high greenhouse gas concentrations goes hand in hand with a larger number of company facilities affected by water stress.

Our research suggests that the shared socioeconomic pathway intersects with the effects of climate change; a scenario with high macroeconomic growth (coupled with increased energy usage and increased consumption) will have a major impact on water stress and the effects of climate change are set to significantly affect this situation further.

As the Aqueduct dataset shows persistent water risk and does not cover single drought events, it would also be possible to extend this metric.

## How should investors act?

The rise in the share of facilities located in water-stressed regions over the next decades induces an increase of drought effects on the global economy in the next 20 years. Hence, long term investment strategies should consider the absence of water as a risk driver.

Complementary research found that vulnerability of business sectors towards water stress varies largely. Therefore, we suggest focusing on analyzing particular sectors like agriculture, thermoelectric power generation, and other water intense industries. Especially for investors holding equity in these sectors, it is important to quantify water-related risks and be aware of risk sources in portfolios.

**If you want to learn more about Carbon Delta's research on water scarcity or other physical risks please do not hesitate to contact the author [atd.bokern@carbon-delta.com](mailto:atd.bokern@carbon-delta.com).**

## Sources

\*Representation of ETFs through iShares by BlackRock. Included are the following ETFs: iShares MSCI World UCITS, Core S&P 500 UCITS, China Large Cap UCITS, EURO STOXX 50 UCITS, FTSE 100 UCITS, MSCI AC Far East ex-Japan UCITS, Core MSCI EM IMI UCITS, Core DAX® UCITS. CAC 40 is obtained through Euronext.

IPCC. 2019. "SCENARIO PROCESS FOR AR5." [https://sedac.ciesin.columbia.edu/dd/ar5\\_scenario\\_process/RCPs.html](https://sedac.ciesin.columbia.edu/dd/ar5_scenario_process/RCPs.html).

Riahi, Keywan, Detlef P. van Vuuren, Elmar Kriegler, Jae Edmonds, Brian C. O'Neill, Shinichiro Fujimori, Nico Bauer, et al. 2017. "The Shared Socioeconomic Pathways and Their Energy, Land Use, and Greenhouse Gas Emissions Implications: An Overview." *Global Environmental Change* 42 (January): 153-68. doi:10.1016/j.gloenvcha.2016.05.009.

Ripple, William J., Christopher Wolf, Thomas M. Newsome, Mauro Galetti, Mohammed Alamgir, Eileen Crist, Mahmoud I. Mahmoud, William F. Laurance, and 15,364 scientist signatories from 184 countries. 2017. "World Scientists' Warning to Humanity: A Second Notice." *BioScience* 67 (12): 1026-28. doi:10.1093/biosci/bix125.

USGS. 2019. "Saline Water Use, the USGS Water Science School." <https://water.usgs.gov/edu/salineuses.html>.



## David Bokern

### Data Scientist

As a Data Scientist David works on model development and natural hazards at Carbon Delta. He has not only a background in environmental sciences but also in business. During his studies, he developed skills in environmental modelling in the field of physical geography. At the end of his masters in Environmental Systems, he wrote his master thesis about global water stress on financial markets in cooperation with Carbon Delta.

### Questions? Ideas? Talk directly to David

+41 44 552 77 60 | [d.bokern@carbon-delta.com](mailto:d.bokern@carbon-delta.com)

# CARBON DELTA

For more information, visit [www.carbon-delta.com](http://www.carbon-delta.com)  
or contact us at +41 44 552 7760 or [contact@carbon-delta.com](mailto:contact@carbon-delta.com).