



Understanding the Water-Energy-Food Nexus

A good signal for environmental reforms and their impacts on companies.

June 2019

KEY INSIGHTS

- Water, energy, and food are three vital components for sustainable development. The interaction of these factors is commonly referred to as the water-energy-food nexus (WEF-Nexus).
- Understanding how the three components interact provides a platform for identifying and analyzing potential effects on companies and industries, most notably through the nature and pace of resulting regulatory reform.
- From an investment standpoint, water, energy, and food are each important considerations, but the emergence of water issues is often a catalyst for swift regulatory intervention.



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As Figure 1 illustrates, a multitude of factors work to drive demand for food, water, and energy—including changes in population, urbanization, diets, and economic growth. These dynamics are creating complex challenges around the globe. If one WEF-Nexus component is mismanaged, the other two will ultimately feel the impact.

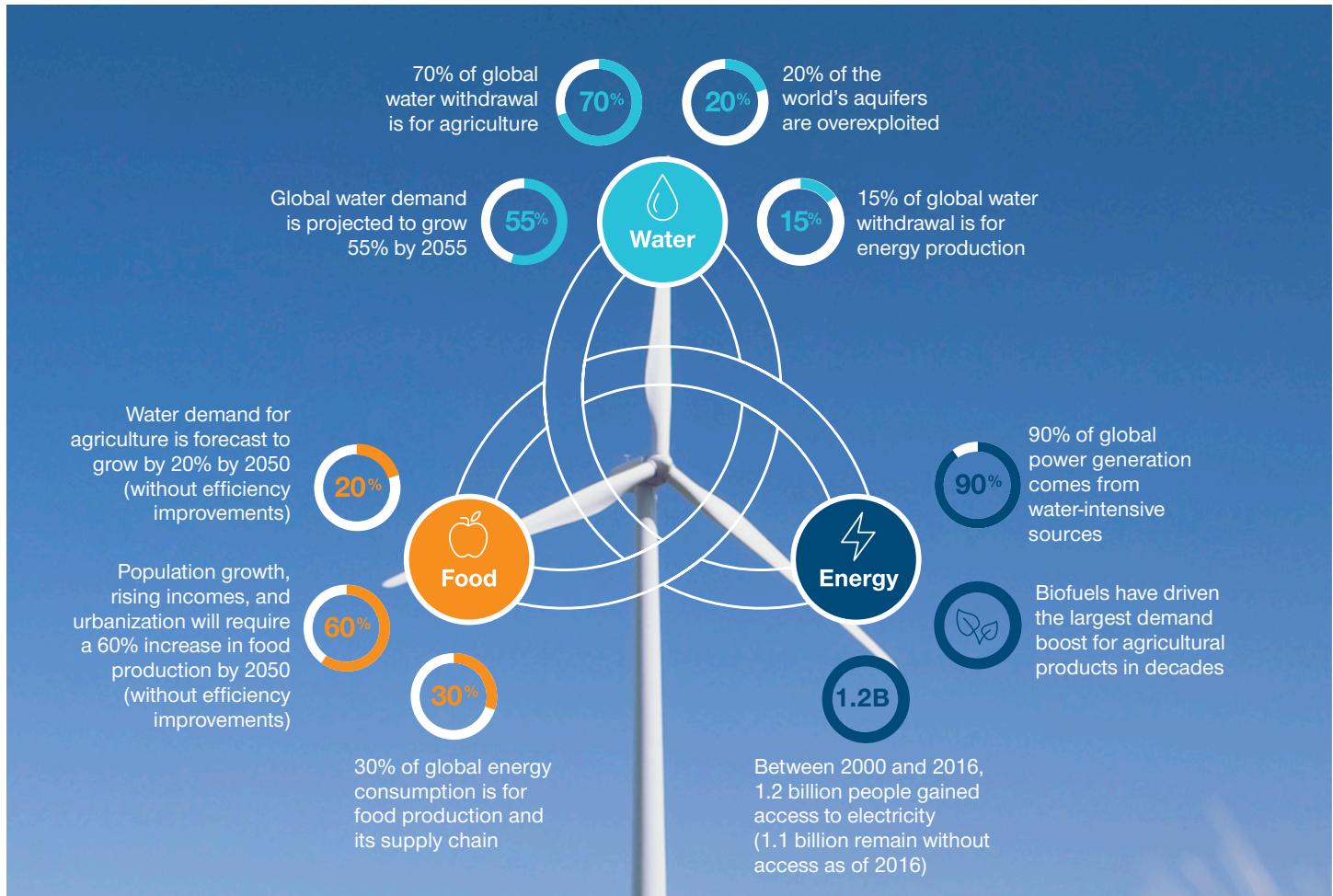
The linchpin of the WEF-Nexus is water—as a finite resource, water scarcity has a direct impact on food supply. If a local WEF-Nexus spirals out of balance, lack of water shifts from being a global, long-term sustainability concept to a more local and immediate problem. As a result, a country's water-energy-food balance can be a good indicator of the likelihood of greater environmental regulation.

The Rise of WEF-Nexus Pressures Globally

Between 2000 and 2016, 1.2 billion people around the world gained access to electricity and many emerging markets experienced rapid industrialization. Between 2000 and 2015, global electricity production increased 57% (3.0% CAGR). The overwhelming majority of this growth came from emerging markets, which grew by 135% over the period.

(Fig. 1) The Water-Energy-Food Nexus

The factors driving demand for water, energy, and food



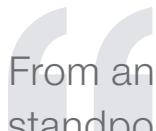
Sources: Water and Energy (UN Water 2014), Food and Agriculture Organization of the United Nations, and UNESCO World Energy Outlook (IEA 2017).

Electricity production in China and India increased 332% and 143%, respectively, while water withdrawals increased 24% and 25%, respectively.

These rapid changes have had a significant impact on each country's WEF-Nexus, which has been further compounded by the fact that neither is water-rich. Water scarcity isn't only an issue for China and India. Today, nearly a quarter of the world's population live in water-scarce regions. In the next two decades, the number of people exposed to water scarcity is expected to double from the current 1.6 billion, largely due to economic growth and urban migration.

It is typically easier for politicians to mobilize around locally impactful issues (like water scarcity, rising food prices, or pollution) than a globally focused, long-term issue like climate change. However, as the impact of climate change intensifies, scientists predict more regions will encounter water scarcity. This means WEF-Nexus pressures will become a local issue in more and more countries over time.

As the pull on this finite resource forces more regions into water scarcity, we expect greater intervention by governments as they struggle to manage their water, energy, and food resources.



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This in turn will likely have a downstream effect, impacting the energy, utility, and transportation sectors as well as other sectors indirectly exposed to the WEF-Nexus.

China represents a powerful example of how a WEF-Nexus imbalance works to drive environmental reform. Environmental regulation in China has tightened substantially as the government encourages restructuring of the country's industrial sector. China's environmental reform program began nearly a decade ago and, if successful, will drive a structural shift in the economy—with significant investment implications. Key reforms include:

- Scaling down “non-circular” industries—the imposition of water caps and pollution targets makes it more difficult for businesses that “overdemand” energy and water usage or cause waste management issues.
- Energy sector reform—the Chinese government is orchestrating a gradual shift in the power-generation mix from coal to renewables and natural gas, as well as a shift in transportation infrastructure.
- Agricultural reform—growing water shortages and soil pollution in China's main agricultural regions are driving efforts to sustainably improve agricultural yields and reevaluate the range of crops grown.

WEF-Nexus Pressures in the Investment Process

From an investment standpoint, water, energy, and food are each important considerations, but the emergence of water issues is often a catalyst

for swift regulatory intervention. The mismanagement of water resources is difficult to reverse, and because prices often do not signal a scarcity issue until too late, regulatory responses can be drastic.

Integrating water considerations into an investment process creates unique challenges. Often, the investor cannot register a direct price signal until water resources have become significantly constrained—even then, it might simply be reflected in increased regulation or shortages, rather than a price spike. This is because water markets are relatively underdeveloped compared with energy and agricultural commodities and are far less penetrated by private industry. Also, water is not easily transported, so it doesn't lend itself well to global trade. However, water trades implicitly on a large scale as it is embedded in many globally traded goods.

As current water data are not always readily available, water often needs to be considered as an intangible factor in the investment process. While an imbalance of the WEF-Nexus can be a catalyst for swift environmental reforms, it is important for investors to consider the interplay of environment, price, and security that policymakers must account for.

Insights into the WEF-Nexus provide a valuable lens from which we can better understand the potential impact of environmental dynamics on company performance. When we see one WEF-Nexus component fall out of balance, we can monitor the impacts likely to be experienced by the other WEF-Nexus components and the companies that operate within them.

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