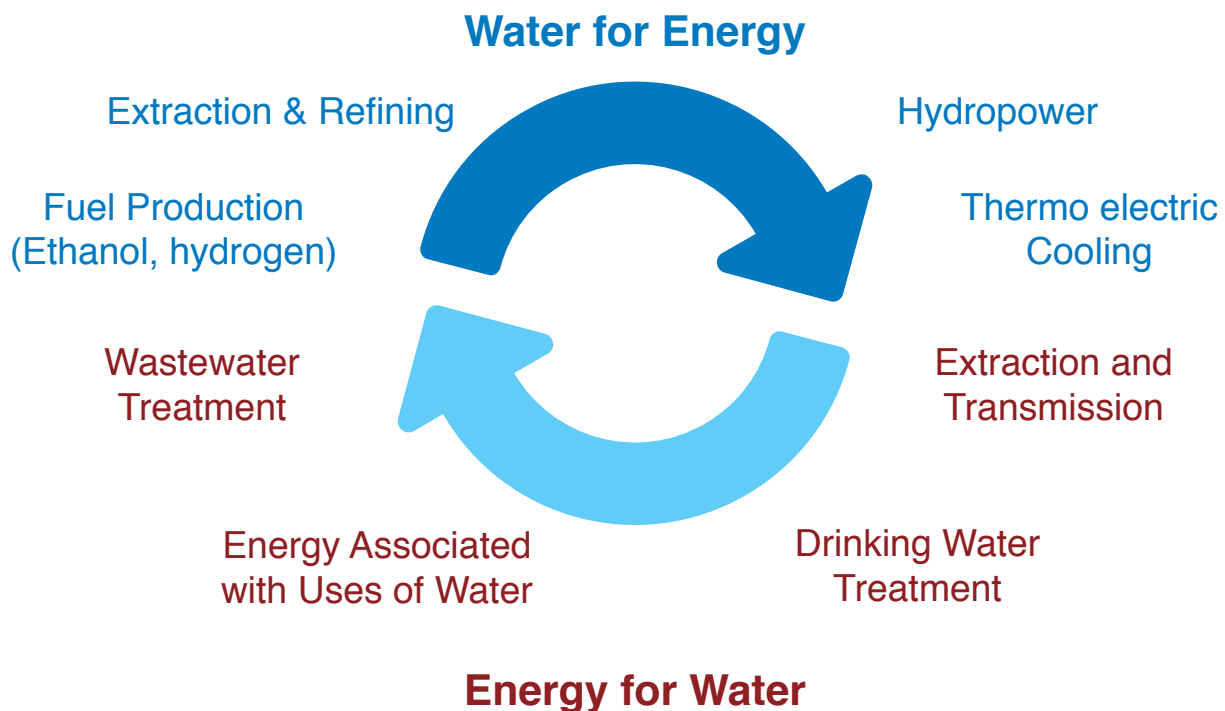


The Energy-Water Nexus: An Emerging Risk

“The competition between water and energy needs represents a critical business, security, and environmental issue, but has not yet received the attention that it merits. Energy production consumes significant amounts of water; providing water, in turn, consumes energy. In a world where water scarcity is a major and growing challenge, meeting future energy needs depends on water availability –and meeting water needs depends on wise energy policy decisions.”
[World Policy Institute and EBG Capital, March 2011](#)

While there’s been a substantial amount of attention paid to a company’s energy use and carbon footprint, only recently have businesses, organizations and governments begun to chronicle the impact water has on energy. The water-energy nexus is straightforward and reciprocal: generating energy consumes vast amounts of water, and providing clean water consumes vast amounts of energy. Demand for more energy will drive demand for more water, and demand for more water will drive demand for more energy.

Water is essential for extracting, refining, processing, and transporting all forms of energy, including fossil fuels. Coal and nuclear plants as well as data centers – the size and numbers of which continue to grow – consume vast amounts of water used as coolant. Treating, distributing and using water requires enormous amounts of energy, too. Interestingly, the relationship between energy and water is highly interconnected as the graph below illustrates:



The Shift to Alternative Energy Will Significantly Impact the Energy-Water Nexus

Many of the world's largest economies are beginning to transition to energy sources less reliant on fossil fuels, or carbon. While not necessarily an accepted truth in some circles in this country, we believe carbon will eventually be monetized, making it more costly for both businesses and individuals to continue using coal as a primary power source.

As we shift towards cleaner energy, some alternatives can significantly increase freshwater demands. Three specific examples of the anticipated growth in renewable energy requirements help to illustrate this point:

First-generation biofuels consume [20 times](#) as much water for every mile traveled compared to gasoline.

All-electric vehicles will place added strains on utilities to provide this power. A study in Environmental Science & Technology, "The Water Intensity of the Plugged-In Automotive Economy," finds that every mile of all-electric driving actually consumes about [three times more](#) water than a mile driven with gasoline power.

Clean coal typically refers to carbon capture and storage (CCS) technologies, defined by the [Department of Energy](#) as "the process by which CO₂ is isolated from the emissions stream, compressed, and transported to an injection site where it is stored underground permanently." DOE found that pulverized coal plants outfitted with CO₂ capture equipment use [twice as much water](#) for thermal cooling as do conventional coal plants. For gasification coal plants, water demand rises [about 14 percent](#) with the addition of carbon capture technology.

Water consumption by energy type in the United States:

Energy type	Total water consumed per megawatt hour (m3/MWH)	Water consumption required for U.S. daily energy production (millions of m3)
Solar	0.0001	0.011
Wind	0.0001	0.011
Gas	1	11
Coal	2	22
Nuclear	2.5	27.5
Oil	4	44
Hydropower	68	748
Biofuel (1st generation)	178	1958

Source: "Linking Water, Energy & Climate Change: A proposed water and energy policy initiative for the UN Climate Change Conference, COP15, in Copenhagen 2009," DHI, Draft Concept Note, January 2008. See: http://www.semide.net/media_server/files/Y//water-energy-climatechange_nexus.pdf

Adding to the Strain

A growing middle-class population will put an additional strain on natural resources – including water. The middle class in developing countries represents the fastest-growing segment of the world's population. This will have a profound impact on resource consumption as income growth both results from and increases industrial growth and consumption. Homi Kharas, a researcher at the Brookings Institution, estimates that by 2020 the world's middle class will grow to 52 percent of the global population, up from the current 30 percent. The middle class will almost double in poor countries where sustained economic growth is quickly lifting people above the poverty line. For example, by 2025, China will have the world's largest middle class, while India's will be 10 times larger than it is today. All told, in the next twelve years, the ranks of the middle class will swell by as many as 1.8 billion.

Business Implications

This market shift to alternative energy sources, combined with the middle-class population explosion in developing countries, will eventually impact both the access to and consumption of water for companies around the globe. Indeed, investors are beginning to take an active interest in the risk exposure for companies accessing and consuming water. Last year, the [Carbon Disclosure Project](#), on behalf of 137 of its institutional investors worth about \$16 trillion in assets, sent its first annual [Water Disclosure questionnaire](#) to more than 300 of the world's 500 largest companies, initially focusing on sectors that are water intensive or are particularly exposed to water-related risks. This year's survey will be expanded to include additional industry sectors.

Further, reports from international leading business organizations, including the [World Economic Forum](#) and the [World Business Council for Sustainable Development](#), have recognized the water-energy nexus as the next area of challenge and opportunity for the business community.

What Can a Business Do Now?

The nexus between water and energy is certain to create major challenges for the private sector and further complicate policies and politics as the U.S. struggles to adjust to a world where environmental and social concerns increasingly require difficult trade-offs. For many businesses, it means that now is the time to begin identifying the potential political-business trade-offs that may need to be made in a few years. It also underscores the need for companies to create strategic relationships and initiate dialogues with potentially adversarial NGOs. On the flip side, it also provides many in the business community with the ability to start thinking about innovative ways to address this nexus and in so doing, establish themselves as thought leaders.

From a business operations standpoint, here are a few suggested steps that any company can take now:

- Place responsibility for water-related issues at the Board or Executive Committee level
- Integrate water consumption into your company's overall climate and energy risk assessments

- Develop specific water policies, strategies and plans with measurable outcomes
- Identify linkages and tradeoffs in management of water and energy
- Identify water-related business opportunities
- Be as transparent as possible about the energy and water relationship as well as the tradeoffs a company is making in the management of this issue Identify linkages and tradeoffs in management of water and energy
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