

MURKY WATERS? Corporate Reporting on Water Risk

A Benchmarking Study of 100 Companies



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A Ceres Report



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Ceres is a national coalition of investors, environmental groups, and other public interest organizations working with companies to address sustainability challenges such as water scarcity and climate change. Ceres directs the Investor Network on Climate Risk, a group of more than 80 institutional investors and financial firms from the U.S. and Europe managing over \$8 trillion in assets.

UBS is a global firm providing financial services to private, corporate, and institutional clients. The UBS Investment Research SRI & Sustainability research team was formally established as part of the Investment Bank at the end of 2004, in response to steady demand from UBS clients for such research. SRI & Sustainability Investment is an active asset management approach, that takes financial, fundamental, and also environmental, social, ethical, and governance issues into account in the implementation of investment decisions.

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FOREWORD FROM CERES

Full corporate disclosure of material business issues is a core foundation for smart investment decision-making. Emerging risks and opportunities that will impact corporate bottom-lines – including those associated with environmental, social, and governance (ESG) issues – must be included in financial filings. We need to learn from the recent financial meltdown where hidden subprime mortgages and credit default swaps destroyed trillions of dollars of wealth. Material business issues should not be glossed over or ignored.

Global water scarcity is one emerging risk that all companies should be focused on – and one about which investors need information. The combination of rising global populations, rapid economic growth in developing countries, and climate change is triggering enormous water availability challenges around the world. Electric power generators, food producers, and other water-intensive industries are especially vulnerable, both in their operations and their extensive supply chains.

The U.S. Securities and Exchange Commission recently highlighted the water issue in its new “interpretive guidance” that clarifies what public companies need to disclose to investors about the climate-related risks and opportunities that they face. “Changes in the availability or quality of water...can have material effects on companies,” wrote the SEC, which issued the guidance on January 27, 2010 at the request of leading institutional investors.

We’re already seeing tangible impacts from this issue. In the past two years, water shortages in California have shuttered new housing developments and forced farmers to abandon or leave unplanted more than 100,000 acres of agricultural land, resulting in more than \$1 billion in lost revenue. At the same time, chemical companies like Dow and DuPont see vast opportunities in providing products that can help ensure adequate freshwater supplies globally. Dow, for example, is pushing to achieve a 35 percent reduction in the cost of water reuse and desalination technologies by 2015.

This report is the first comprehensive assessment and ranking of water disclosure practices of 100 publicly-traded companies in eight key sectors exposed to water-related risks: beverage, chemicals, electric power, food, homebuilding, mining, oil and gas, and semiconductors.

With data support from Bloomberg and analytical support from UBS Limited, the report evaluates the quality, depth, and clarity of water risk disclosure in both voluntary and mandatory corporate reporting through June 30, 2009. We considered five key categories of disclosure: water accounting, risk assessment, direct operations, supply chain, and stakeholder engagement.

The report provides some basis for encouragement. It finds evidence that most companies are providing basic disclosure on overall water use and water scarcity risks, with mining and beverage companies in the forefront. We also saw various examples of strong governance, water accounting, and reduction strategies. A few specific highlights:

- Alcoa is the only mining company that disclosed a wastewater reduction goal, reporting a target of zero process water discharges by 2020.

- Danone has an incentive system for senior managers that integrates environmental and social criteria – including water objectives – into compensation.
- Pinnacle West / APS, an Arizona-based utility, is using treated sewage to cool its electric power plants in Phoenix, preserving enough potable water for approximately 75,000 homes.

Still, overall governance and disclosure by the 100 companies falls well short of what investors expect and need. For example, only six of the 100 companies reported any water risks or performance data in their financial filings. Only 17 companies report local-level water data and only a handful provide this information in the context of operations in water-stressed regions. And no companies are providing comprehensive data on their suppliers' water performance – an especially glaring omission when one considers that a vast majority of many corporations' water footprint is in the supply chain.

The disclosure to date is the tip of the iceberg of actions that are needed. The report recommends that companies:

- Include material water risk factors and performance data in financial filings.
- Provide data broken down to the facility level for operations in water-stressed regions, and disclose the percentage of facilities operating in areas of water stress.
- Outline actions and policies for assessing and managing water risks, including quantified targets for reducing wastewater and water use.
- Disclose how they are collaborating with stakeholders and suppliers on water risks, including setting performance goals for key supply chains.
- Outline strategies for developing water-related products with strong market potential in a water-constrained world.

The report recommends that investors:

- Engage the companies they own in water-intensive sectors about how they are assessing and disclosing water risks and related performance information.
- Ask their asset managers to assess and engage companies on water and other ESG risks and opportunities – and make this a stipulation in requests for proposals (RFPs) and annual performance reviews.
- Support investor and corporate initiatives, such as the Carbon Disclosure Project, and the United Nations' Principles for Responsible Investment's work with the CEO Water Mandate to achieve increased water disclosure.

Ensuring safe and adequate freshwater water supplies for future generations – and the global economy – is more important than ever. Businesses have an integral role to play in this global challenge – and will help ensure their future prosperity by doing so.

Mindy S. Lubber
 President, Ceres
 Director, Investor Network on Climate Risk

FOREWORD BY UBS

To make informed investment decisions, investors require robust corporate disclosure of the material risks and opportunities to businesses. In the view of the UBS Investment Research SRI & Sustainability team, environmental, social, and governance (ESG) issues are embedded in any firm's corporate strategy. Anything that affects a firm's business model can also affect the firm's financial performance and valuation, and ESG issues are no exception.

We believe that wasteful uses of water are likely to become increasingly frowned upon and subject to increased regulatory intervention. There appear to be growing expectations on the part of shareholders and other key stakeholders that firms should handle ESG issues proactively, and we see the profile of issues such as water availability, quality, and usage as generally on the rise.

In this report, we focus on sectors where water security concerns are likely to have a material impact on business either because water, or water-intensive commodities, are major inputs, because the sector uses water-intensive industrial processes, or because the sector depends on an adequate water supply to support the growth of its business: mining, chemicals, beverages, food, oil, electric power generators, semiconductors, and homebuilding. It is clear that any threat to water security could have a significant impact on the bottom-line of such companies. For companies with operations and/or markets in emerging economies, issues of access to water and responsible management of the resource could potentially have an impact on a company's very "license to operate" in those regions.

The fiduciary duty of institutional investors is to protect the value of its investments for its members. The increasing number of asset owners (i.e. pension funds) and institutional investors signing the Principles for Responsible Investment indicates that the integration of ESG factors is increasingly being seen as an essential part of this duty. In our view, fulfilling this duty requires companies to disclose material ESG information in the 10-K filing in the United States and in annual financial reports in the rest of the world.

Julie Hudson, CFA
Global Head of SRI and Sustainability Research
UBS Investment Bank

FOREWORD BY BLOOMBERG

Astute long-term investors understand that markets require more than financial statements to value an investment. Intangible assets such as quality of management, brand recognition, and market penetration are equally important. And while conventional financial analysis already accounts for such intangibles as goodwill – environmental, social and governance (ESG) measures are three further intangibles that can have significant effect on company valuation.

While climate change and carbon emissions have recently dominated both public and investor attention, Bloomberg sees an increasing interest in water issues and the associated risks – operational, reputational, and larger ecosystem services impacts – posed to a wide range of market participants.

The Bloomberg water data used in this report was collected from company-sourced filings such as corporate social responsibility reports, annual reports, financial filings, and company websites. None of the data is estimated or derived.

Moving beyond collecting data and comparing it, Bloomberg seeks to be a standard-setter in this area. Through relationships with leading non-governmental and not-for-profit organizations such as Ceres, we are working towards increasing the number of companies disclosing ESG data and towards improving the quantity and quality of this data.

Even though many corporations have improved their ESG reporting in recent years and asset managers integrate ESG to pitch for investment mandates, many finance practitioners have been slow in including ESG factors into their analysis and decision-making.

Bloomberg can, and should be, at the forefront of helping mainstream investors both to better understand and to incorporate ESG factors into their investment processes. By providing this data free with our standard offering and enabling users to integrate it seamlessly into their investment analysis and processes alongside financial information, the financial community can begin to gain a better understanding of how ESG metrics may affect the value of a company.

Emil Efthimides, CFA
ESG Data Product Manager
Bloomberg, LP

EXECUTIVE SUMMARY

Our global economy runs on water. Freshwater powers industrial production, is the essential ingredient in many products, and is perhaps the most important natural resource for human survival.

Pressures related to water availability are growing in the U.S. and abroad, making numerous industries vulnerable to water disruption throughout their operations and supply chains. Water demand is increasing worldwide, especially in developing countries where economic and population growth is overburdening already inadequate water and sanitation infrastructure. The effects of climate change, including drought, heat waves, and reduced water flows from melting glaciers, are creating additional pressures on scarce water supplies.

These pressures can directly threaten a company's production levels, profit margins, and even "license to operate" in water-stressed areas. In 2009, water shortages in California devastated the state's agriculture industry, leading to an estimated loss of 21,000 jobs and \$1 billion in revenues.^{1,2} For mining company Newmont, protests by thousands of local residents due to water concerns near its gold mine in Peru led the company to relinquish access to 3.9 million ounces of gold reserves in 2004.³ During the 2007-2008 drought in Georgia, electric power firm Southern Company was forced to buy \$33 million in fossil fuels to replace lost power in Atlanta when hydropower generation declined by half due to low water levels.⁴

In light of these impacts, institutional investors are increasingly seeking information from companies on how they are addressing and managing material water risks and opportunities. In August 2009, Norges Bank Investment Management (NBIM), which runs the \$415 billion Norwegian Government Pension Fund, announced that it would begin evaluating the water risk management practices of 1,100 companies it holds. In November 2009, the Carbon Disclosure Project launched a new investor-driven water disclosure initiative backed by European and U.S. investors focused on 300 of the world's largest companies.

These efforts reflect the growing appetite from investors for broader corporate environmental, social, and governance (ESG) disclosure. Through Ceres' Investor Network on Climate Risk, over 40 institutional investors have asked regulators, including the U.S. Securities and Exchange Commission (SEC), to provide better guidance to companies on disclosure of key ESG issues, including climate change and water scarcity. In January 2010, the SEC acted on these requests, issuing guidance that clarifies what publicly-traded companies need to disclose to investors in terms of material climate-related risks and opportunities, including physical risks like water.⁵ The guidance mentions water risks related to climate change that should be

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1. "California's Drought: Water Conditions & Strategies to Reduce Impacts," California Department of Water Resources, March 30, 2009. See: <http://gov.ca.gov/index.php?/fact-sheet/11951/>
 2. Lester A. Snow, "California's Drought Update 2009," California Department of Water Resources, press release, September 30, 2009. See: <http://www.water.ca.gov/drought/>
 3. Tania Mellado, "Peru farmers threaten strike over gold mine, water," *Planet Ark*, September 9, 2004.
 4. Justin Rubner, "Drought hits Hydropower," *Atlanta Business Chronicle*, November 16, 2007. See: <http://atlanta.bizjournals.com/atlanta/stories/2007/11/19/story2.html>
 5. "Commission Guidance Regarding Disclosure Related to Climate Change," Release Nos. 33-9106; 34-61469; FR-82, U.S. Securities and Exchange Commission, February 2, 2010. See: <http://www.sec.gov/rules/interp/2010/33-9106.pdf>

disclosed where material, including “decreased agricultural production capacity in areas affected by drought or other weather-related changes.”⁶ The SEC also notes that “significant physical effects of climate change, such as effects on the severity of weather (for example, floods or hurricanes), sea levels, the arability of farmland, and water availability and quality, have the potential to affect a registrant’s operations and results.”⁷

Clearing the Waters: Assessing the State of Water Disclosure

This purpose of this report is to help investors and companies understand how companies in vulnerable sectors are evaluating, managing, and disclosing water risks in their operations, supply chains, and products. With data support from financial information provider Bloomberg and analytical support from the financial services firm UBS Limited, the report evaluates and ranks the water disclosure practices of 100 publicly-traded companies in eight key sectors exposed to water-related risks: beverage, chemicals, electric power, food, homebuilding, mining, oil and gas, and semiconductors.

To be helpful for investors, company disclosure requires more than just a mention of water and its risks. Measuring and reporting water-related risks and opportunities is complex, and the methodologies and standards for doing so are still nascent. Nevertheless, there is growing consensus in business and investor circles regarding the most critical elements of water reporting. What is central to useful water reporting is its inclusion in company financial filings – annual 10-Ks (or 20-Fs or 40-Fs for non-U.S. companies) – rather than just sustainability reports. Also critical is discussion of relevant management systems and strategies, provision of water accounting data that puts performance in geographic context, and inclusion of supply chain water risks in the analysis.

Report Methodology

Companies from eight sectors were reviewed and benchmarked against their peers: beverage, chemicals, electric power, food, homebuilding, mining, oil and gas, and semiconductors.⁸ These industries are known to require significant quantities of water, or to have significant wastewater discharges, with respect to their direct operations, raw material supplies, or use of their products.

One-hundred of the largest publicly-traded companies from these eight sectors were selected on the basis of their 2008 annual revenues and market capitalization, while also considering geographic exposure. With the exception of those in the electric power and homebuilding sectors, the companies reviewed represent firms with global operations.

The report uses a systematic method for evaluating the quality, depth, and clarity of water risk disclosure in both voluntary and mandatory corporate reporting of publicly-traded companies during the 2008 fiscal year.

6. Ibid, pp. 27.

7. Ibid, pp. 26

8. For the purposes of this study, the sectors reviewed were defined using the Industry Classification Benchmark (ICB) codes, a classification structure maintained by Dow Jones Indexes and FTSE Group. For more information, see: <http://www.icbenchmark.com>

Researchers studied the companies' most recent voluntary corporate disclosures such as sustainability or CSR reports, company websites, and mandatory financial disclosures such as 10-K filings. Only company disclosures made publicly available before June 30, 2009 were included in this assessment.

For the purposes of this study, company disclosures were divided into five categories: "Water Accounting," "Risk Assessment," "Direct Operations," "Supply Chain," and "Stakeholder Engagement." Within each category, sub-elements were evaluated to produce a final scored assessment based on the depth and clarity of corporate disclosures.

For the beverage, electric power, food, oil and gas, mining, and semiconductor sectors, companies were scored on a 100-point scale. A 112-point scale was used for the chemicals and homebuilding sectors because an additional category, "Opportunities," was evaluated.

Key Findings

The study found that even for companies operating in sectors and regions of the world facing significant water risk, disclosure of risk and corporate water performance was surprisingly weak. Although the scoring scale ranged from 0-100 (or 0-112 in the case of the chemicals and homebuilding sectors), no single company surpassed 43 points (Exhibits 1 and 2).

Diageo, the UK-based alcoholic beverage company, received the highest score in the study.

- **Leading and lagging sectors.** The mining sector scored highest overall, followed by the beverage industry. Companies in the homebuilding sector received the lowest overall scores.
- **Limited disclosure in financial filings.** The majority of the companies evaluated in this report disclose exposure to water risks in their 10-Ks or annual reports – for example, 73 percent report some level of physical risk. Nevertheless, the vast majority of these disclosures consist of vague, boilerplate language. They fail to reference specific at-risk operations or supply chains, and do not attempt to quantify or monetize risk. Only six companies report any water accounting data within their financial filings.
- **Many companies face exposure to key water risks.** The majority of the companies surveyed (73 percent) report some exposure to water-related physical risks such as drought. Only nine companies report reputational risks related to water – these included companies in the beverage, mining, and oil and gas sectors. Sixty-seven percent of companies disclose some level of water-related regulatory risk, with the highest exposure in the mining, electric power, and oil and gas sectors. Nearly half (48 percent) report some level of litigation risk. Although the majority of companies disclosed key water risk factors in their financial filings or annual reports, some restricted this discussion to their sustainability reports, reflecting an ongoing lack of integration between voluntary reports and regulated financial filings.
- **Few companies provide performance data at the local-level.** Nearly two-thirds of the reviewed companies report total water use data, but only 17 percent report this data down to the site or regional level. Only a handful of

companies put their water use in context by noting the number or percent of facilities operating in water-stressed regions. These included BP, Diageo, Heineken, Nestlé, and SABMiller.

- **Water-related policies and management systems for some.** Twenty-four percent of companies detail specific policies, standards, or management systems to reduce water-related risks and costs.
- **Relatively few reduction targets.** Only 21 companies disclose quantified targets to reduce water use. Just three of these companies – Diageo, DuPont, and Xstrata – had reduction targets that were differentiated by the level of water stress facing specific facilities. Even fewer – 15 companies – had goals to reduce wastewater discharge.
- **Supply chain data scant.** No companies provided comprehensive data on their suppliers' water performance. A few – including Danone, SABMiller, and Unilever – provide estimates of the water use embedded in their supply chains. Twelve companies disclose working with their suppliers to help them reduce water use or wastewater discharge. Companies in sectors with a significant proportion of their water footprint embedded in the supply chain – food, beverage, electric power, and oil and gas – largely did not report engaging their suppliers on water management.
- **Stakeholder engagement weak.** Just under one-third of companies report collaborating in some way with local stakeholders on efforts to protect or restore watersheds and ecosystems near their operations. And despite reputational risks linked to siting water-intensive projects or facilities, only five companies – all in the mining or oil and gas sector – disclose engaging or consulting with stakeholders on the water impacts of siting or expanding operations.

Exhibit 1. Water Disclosure Scores:

Beverage, Electric Power, Food, Mining, Oil and Gas, and Semiconductors
(scored on a 1–100 point scale)

| Beverage | |
|-----------------------|----|
| Diageo | 43 |
| Anheuser-Busch InBev | 34 |
| The Coca-Cola Company | 34 |
| SABMiller | 30 |
| PepsiCo | 29 |
| Heineken | 25 |
| Pernod Ricard | 18 |
| Brown-Forman | 14 |
| Constellation Brands | 9 |
| Dr Pepper Snapple | 8 |

| Electric Power | |
|--|----|
| Pinnacle West/ Arizona Public Services (APS) | 38 |
| American Electric Power (AEP) | 36 |
| PG&E | 26 |
| Exelon | 21 |
| Southern Company | 18 |
| Dominion Resources | 17 |
| Entergy | 16 |
| Xcel Energy | 16 |
| Constellation Energy | 14 |
| Duke Energy | 14 |
| AES Corporation | 12 |
| NRG Energy | 11 |
| Florida Power & Light Group | 8 |

| Food | |
|------------------------|----|
| Unilever | 34 |
| Nestlé | 29 |
| Smithfield Foods | 25 |
| Danone | 20 |
| General Mills | 19 |
| Tyson Foods | 17 |
| Kellogg | 15 |
| Kraft Foods | 15 |
| ConAgra | 12 |
| Dean Foods | 12 |
| Sara Lee | 12 |
| Archer Daniels Midland | 9 |
| Bunge | 9 |

| Mining | |
|------------------|----|
| Xstrata | 42 |
| Barrick | 38 |
| Rio Tinto | 37 |
| Alcoa | 35 |
| Anglo American | 33 |
| Freeport-McMoRan | 31 |
| BHP Billiton | 30 |
| Teck | 27 |
| Vale | 27 |
| Newmont | 25 |
| Consol Energy | 15 |
| Massey Energy | 15 |
| Peabody Energy | 8 |

| Oil & Gas | |
|----------------------------|----|
| BP | 35 |
| Suncor Energy | 27 |
| Total | 27 |
| Nexen | 26 |
| Royal Dutch Shell | 25 |
| Exxon | 23 |
| Chevron | 16 |
| ConocoPhillips | 16 |
| Devon Energy | 16 |
| Canadian Natural Resources | 12 |
| Chesapeake Energy | 7 |
| Range Resources | 7 |
| EnCana | 4 |

| Semiconductors | |
|-------------------------|----|
| Toshiba | 35 |
| Intel | 34 |
| Samsung | 29 |
| United Microelectronics | 27 |
| Taiwan Semiconductors | 25 |
| ST Microelectronics | 22 |
| Advanced Micro Devices | 17 |
| Analog Devices | 15 |
| Texas Instruments | 15 |
| Infineon Technologies | 8 |
| Micron | 1 |

Exhibit 2. Water Disclosure Scores:

Chemicals & Homebuilders
(scored on a 1–112 point scale)

| Chemicals | |
|---------------------|----|
| Mitsui | 33 |
| Sumitomo Chemical | 32 |
| PotashCorp | 31 |
| DuPont | 23 |
| Monsanto | 23 |
| Syngenta | 22 |
| Dow | 21 |
| BASF | 20 |
| Reliance Industries | 17 |
| Mosaic | 15 |
| Praxair | 13 |
| PPG Industries | 11 |
| Air Liquide | 10 |
| Linde | 10 |
| Saudi Basic | 5 |

| Homebuilding | |
|---------------|----|
| KB Home | 15 |
| Pulte | 13 |
| Toll Brothers | 13 |
| Beazer Homes | 11 |
| Lennar | 10 |
| Centex | 6 |
| D.R. Horton | 4 |
| Hovnanian | 4 |
| NVR | 4 |
| Ryland | 4 |

Recommendations for Companies

This report highlights a number of opportunities for companies to dramatically improve the relevance, depth, and clarity of their reporting on water:

- ✓ **Inclusion in financial filings.** Financial filings are the gold standard for reporting material information to investors, including material ESG risk factors like water scarcity. As underscored by the SEC's new interpretive guidance, companies should include material water risk factors and performance data in these filings in order to communicate management oversight and awareness of key risks and opportunities.
- ✓ **More detailed risk assessment.** Boilerplate disclosure of material water risks, even within financial filings, is not enough. Companies should assess and disclose material water risks in ways that provide investors with sufficient detail to understand the scale and scope of exposure, ideally referencing specific at-risk operations or supply chains, and attempting to quantify risks wherever possible.
- ✓ **Water accounting data that puts performance in context.** Aggregate data on corporate-wide water use and discharge is insufficient to provide investors with insight on key areas of risk. Companies should provide data broken down to the facility level for operations in water-stressed regions, and put the company's risk exposure in context by disclosing the percentage of facilities operating in areas of water stress.
- ✓ **Disclosure of management strategies and systems.** Corporate reporting should provide detailed explanation of how water risks are being assessed, addressed by key policies, and integrated into governance and management systems from the boardroom to the facility-level.
- ✓ **Setting and disclosing reduction targets.** Disclosing quantified water use and wastewater reduction targets communicates commitment, and helps investors gauge a company's capacity to minimize risks and prepare itself for a more water-constrained future. Targets are more credible when articulated with respect to high-risk operations, and when backed by detailed management plans.
- ✓ **Addressing water risks in the supply chain.** For many large companies, water use embedded in the supply chain accounts for the largest portion of the total water footprint. Companies should disclose how they are collaborating with and evaluating suppliers on water risks and impacts, and should set goals to improve water performance in key supply chains.
- ✓ **Engaging critical stakeholders.** Even a company with the most responsible and efficient water management practices can face risks if communities surrounding its operations lack access to clean water, or if other water users deplete or pollute shared water resources. Given this, companies should provide investors with an understanding of how they are working to mitigate these risks by engaging critical stakeholders to preserve essential water resources, and maintain a social license to operate across varied geographies.
- ✓ **Seizing opportunities.** Increasingly companies are developing water-related product strategies that present significant market opportunities in a water-stressed world. Information on these strategies, including relevant product goals and investments, is of growing interest to investors.

Recommendations for Investors

Investors should pursue the following steps to help drive better corporate water disclosure:

- ✓ **Engage companies.** Investors should engage the companies they own in key water-intensive sectors about how they are assessing and disclosing water risks and related performance information.
- ✓ **Ask asset managers to assess and engage companies on water and other ESG risks and opportunities.** Institutional investors should stipulate this to asset managers in requests for proposals (RFPs) and in annual performance reviews to ensure that the firms managing their money are giving water, climate, and other sustainability risks the attention they deserve.
- ✓ **Support investor and corporate initiatives to achieve increased water disclosure.** Among initiatives that investors should consider supporting are the Carbon Disclosure Project's water disclosure initiative and the United Nations' Principles for Responsible Investment's efforts to encourage more companies to sign on to the CEO Water Mandate and to meet key Mandate commitments, including increased water reporting.

INTRODUCTION: WATER MATTERS

Water is the world's most critical resource.

More vital than oil, water sustains life, and thus the global food chain. Water sustains industry, and thus the global economy. Vast quantities of ultra clean water are used to make the silicon chips that help power our computers, servers, and cell phones. Electric power plants depend heavily on water, and account for a staggering 40 percent of freshwater withdrawals in the United States.

It could be said without exaggeration that our economy runs on water. And that economy is increasingly at risk.

In recent years, news stories of droughts in California, Texas, Georgia, as well as eastern Australia, India, and northern China have dominated the headlines. Economic growth in the western U.S. is slowing due to reduced water supplies from melting snowcaps and ongoing drought. Between November 2008 and July 2009, Texas suffered drought-related agricultural losses reaching over \$3.6 billion, with that number expected to mount to \$4.1 billion by year-end 2009.¹ Water shortages in California in 2009 led to an estimated 21,000 lost agricultural jobs and revenue losses of \$1 billion.^{2,3} Meanwhile, power plant production has been cut back due to more frequent and intense heat waves in California and the southeastern United States. A recent study by the U.N. Environment Program found that mountain glaciers in Asia are melting at a rate that will eventually threaten the drinking water, irrigation supplies, and hydropower of up to 25 percent of the world's population.⁴

Despite its critical role and growing scarcity, water continues to be an undervalued resource. Freshwater is thought of as free – or nearly so – in many places. It is an asset that appears on few balance sheets, yet without it most industries would grind to a halt. Nevertheless, there is some evidence that this is changing. A recent survey of global water providers found that water prices worldwide rose by 10 percent last year, well above inflation.⁵

A range of studies, including the Intergovernmental Panel on Climate Change's 2008 *Climate Change and Water* report, have concluded that climate change is likely to further exacerbate water scarcity.⁶ In fact, climate change – coupled with a swelling global population, economic development, and more water-intensive consumption patterns in emerging markets – will further affect water availability, quality, and demand in ways that present material risks for many companies and their investors (see Exhibit 1).

A recent study by the U.N. Environment Program found that mountain glaciers in Asia are melting at a rate that will eventually threaten the drinking water, irrigation supplies, and hydropower of up to 25 percent of the world's population.

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1. Blair Fannin and Dr. Carl Anderson, "Texas drought related losses reach \$3.6 billion," *AgriLife News*, Texas A&M University, press release, July 20, 2009. See: <http://agnews.tamu.edu/showstory.php?id=1311>
 2. "California's Drought: Water Conditions & Strategies to Reduce Impacts," California Department of Water Resources, March 30, 2009. See: <http://gov.ca.gov/index.php?/fact-sheet/11951/>
 3. Lester A. Snow, "California's Drought Update 2009," California Department of Water Resources, press release, September 30, 2009. See: <http://www.water.ca.gov/drought/>
 4. "Climate Change Science Compendium 2009," United Nations Environment Programme, 2009
 5. "No Let Up in Pressure on Water Tariffs," *Global Water Intelligence*, Vol 10, Issue 9, September 2009.
 6. B.C. Bates, Z.W. Kundzewicz, S. Wu and J.P. Palutikof, Eds., "Climate Change and Water," Technical Paper VI of the Intergovernmental Panel on Climate Change, IPCC Secretariat, Geneva, June 2008.

Exhibit 1. Global Water Trends and Climate Change

| Water Trends | Climate Impacts | Business Implications |
|--|---|---|
| INCREASING DEMAND | | |
| <ul style="list-style-type: none"> ● Population growth. By 2030, the earth's projected eight billion inhabitants will need 25 percent more freshwater.¹ The majority of this population growth will take place in developing countries, where demands on water resources are already high and supplies limited. ● Economic development and changing consumption patterns. The rise in the world's population and improvement in living standards will drive increased manufacturing of water-intensive goods and services, and will require significantly more food production. Already, the consumption of water-intensive red meat in large developing countries like India and China has risen 33 percent in the last decade and is expected to double globally between 2000 and 2050.² | <ul style="list-style-type: none"> ● Increased water demand by agriculture due to higher temperatures – up to a 40 percent increase in additional irrigated land by 2080.³ ● Increased hydration demand by farm animals due to higher temperatures. ● Increased quantities of water needed for industrial cooling due to higher atmospheric and water temperatures.⁴ | <ul style="list-style-type: none"> → Uncertain availability in water-stressed regions → Higher costs for water → Regulatory caps on use → Conflicts with communities and other water users → Growing demand for water-efficient products |
| INSUFFICIENT SUPPLY | | |
| <ul style="list-style-type: none"> ● Over appropriation. More than one-third of the world's population – roughly 2.4 billion people – lives in water-stressed regions. By 2025, that number is expected to rise to two-thirds.⁵ | <ul style="list-style-type: none"> ● Decreased natural water storage capacity due to glacier/snow cap melt affecting key regions including China, India, Pakistan, and the western United States. ● Drought and groundwater declines expected for many sub-tropical and mid-latitudes due to changes in precipitation patterns. ● Ecosystem damage due to temperature increases, changes in precipitation patterns, severe weather events, and prolonged droughts. | <ul style="list-style-type: none"> → Decreased amounts of water available for industrial and agricultural activities → Operational disruptions and associated financial loss → Disruptions to operations of key suppliers and critical value chain partners → Impacts on future growth and license to operate |
| DECLINING WATER QUALITY | | |
| <ul style="list-style-type: none"> ● Rapid industrialization. In China, many rivers are so badly polluted that industry cannot use the water. Nearly two-thirds of the country's largest cities have no wastewater treatment facilities.⁶ ● Millions globally lack safe drinking water. Increases in agricultural and industrial production, coupled with a lack of adequate wastewater treatment inhibit access to safe drinking water for almost 900 million people worldwide. Five million die each year from water-related illness.⁷ | <ul style="list-style-type: none"> ● Contamination of coastal surface and groundwater resources due to sea level rise and resulting saltwater intrusion. ● More algal and bacterial blooms due to increased water temperatures. ● Higher erosion rates and increased influx of soil-based pollutants into waterways due to extreme precipitation and flooding. | <ul style="list-style-type: none"> → Increased pre-treatment costs for water → Increased costs for wastewater treatment to meet regulatory standards → New regulatory restrictions on specific industrial activities and investments → Increased responsibility to implement community water infrastructure and watershed restoration projects → Productivity impacts on the workforce linked to water-related illness |

Notes:

1. Daniel Wild et al., "Water: a market of the future – Global trends open up new investment opportunities," Sustainability Asset Management (SAM) Study, Zurich, December 2007.
2. Elizabeth Rosenthal, "As More Eat Meat, Bid to Reduce Emissions," The New York Times, December 3, 2009. See: <http://www.nytimes.com/2008/12/04/science/earth/04meat.html>
3. Günther Fischer et al., "Climate change impacts on irrigation water requirements: Effects of mitigation, 1990–2080," Technological Forecasting and Social Change, 74, no. 7 (September 2007): 1083-1107.
4. B.T. Smith et al., "Climate and Thermoelectric Cooling Linkages: Potential Effects of Climate Change in Thermoelectric Cooling Systems," Oak Ridge National Laboratory, Oak Ridge, Tennessee, 2005.
5. "Making Every Drop Count," UN-FAO, press release, February 14, 2007.
6. Daniel Wild et al., "Water: a market of the future – Global trends open up new investment opportunities," Sustainability Asset Management (SAM) Study, Zurich, December 2007.
7. Ibid.

Water-Related Business Risks⁷

Current water trends translate into a set of material business risks that fall into four broad categories: physical, reputational, regulatory, and litigation risk. The significance of these water-related risks varies by sector and by company.

Physical Risks

A lack of freshwater can limit business activities, raw material supply, and product use in a variety of ways. Declines or disruptions in water supply can undermine industrial operations where water is needed for production, irrigation, material processing, cooling, and cleaning.

Clean water is critical to many industrial processes, and lack of it can present a range of costs to companies. A contaminated water supply often requires additional investment and costs for pre-treatment. When alternative source water or treatment options are not physically or financially feasible, operations may be disrupted or require relocation. Industrial expansion may also be constrained in regions where the water supply is already contaminated or at risk of contamination.

Water scarcity also directly affects power generation, putting large electricity users at risk. Hydropower yields in the Colorado River, the Great Lakes, and in China's Yangtze River are expected to decrease significantly due to climate change.^{8,9} In California, under a moderate climate change scenario, analysts project that the state could lose between 10 to 20 percent of its total hydropower at a cost of \$440-\$880 million annually.¹⁰

Many businesses fail to recognize water demands embedded across their supply chain. For example, water supply risks are often hidden in companies' raw material inputs or in the inputs of intermediate suppliers. In a recent study of its agricultural supply chain, the brewing company SABMiller found that the water footprint of its grain procurement in South Africa accounted for 98 percent of the total water used to produce a single liter of beer, or the equivalent of 152 embedded liters.¹¹

Reputational Risks

Constraints on water resources make companies more susceptible to reputational risks. Declines in water availability and quality can increase competition for clean water, giving rise to tensions between businesses and local communities, particularly in developing countries where local populations often lack access to safe and reliable drinking water. Community opposition to industrial water withdrawals and perceived or real inequities in use can emerge quickly and affect businesses profoundly. Local conflicts can damage brand image or even result in the loss of the company's license

In California, under a moderate climate change scenario, analysts project that the state could lose between 10 to 20 percent of its total hydropower at a cost of \$440-\$880 million annually.

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7. Parts of this section were excerpted from Morrison et al., "Water Scarcity and Climate Change: Growing Risks for Businesses and Investors," Ceres and the Pacific Institute, February 2009.
 8. Brent M. Lofgren et al., "Evaluation of Potential Impacts on Great Lakes Water Resources Based on Climate Scenarios of Two GCMs," *Journal of Great Lakes Research*, 28, no. 4 (2002): 537-554.
 9. Niklas S. Christiansen et al., "The Effects of Climate Change on the Hydrology and Water Resources of the Colorado River Basin," *Climatic Change*, 62, no. 1-3 (January 2004): 337-363.
 10. Guido Franco and Alan H Sanstad, "Climate Change and Electricity Demand in California. California Energy Commission," PIER Energy-Related Environmental Research (February 2006): CEC-500-2005-201-SF.
 11. "Water Footprinting: Identifying and Addressing Water Risk in the Value Chain," SABMiller, 2008. See: http://www.sabmiller.com/files/reports/water_footprinting_report.pdf

The concept of “access to clean water as a human right” is gaining more recognition globally, with multinational companies like PepsiCo adopting a company-wide policy in support of the human right to water.

The U.S. EPA has announced that it intends to widen its rules for coal-fired power plants to include limits on toxic metal discharges such as mercury and arsenic, which are released in power plant wastewater streams and can seep into waterways.

to operate. For example, after years of organized and well-publicized opposition by local residents and advocacy groups concerned about the environmental impacts of a proposed water bottling plant, Nestlé Waters announced in September 2009 that it had decided to scrap plans entirely to bottle spring water in McCloud, California.¹²

Reputational risks increase as people become more aware of their right to access water. The concept of “access to clean water as a human right” is gaining more recognition globally, with multinational companies like PepsiCo adopting a company-wide policy in support of the human right to water. The failure of governments around the world to provide water services to local communities may exacerbate scrutiny by local and international advocacy organizations towards companies with access to secure water supplies.

Regulatory Risks

Physical and reputational pressures are increasingly resulting in more stringent local and national water policies that, if unanticipated, can raise costs and limit industrial activity.

Water scarcity, coupled with increased concern among local communities about corporate water withdrawals and water pollution, puts pressure on local authorities to consider changes in water allocations or caps on water use, increase water prices, set new permit standards, reduce permit availabilities, and develop more stringent wastewater quality standards.

In the United States, regulations to protect water resources are growing stronger. In September 2009, the U.S. EPA announced that it intends to widen its rules for coal-fired power plants to include limits on toxic metal discharges such as mercury and arsenic, which are released in power plant wastewater streams and can seep into waterways.¹³ In the same month, the Obama administration announced new principles to guide Congress in updating the Toxic Substances Control Act, the law that governs environmental regulation of many of the toxic chemicals present in U.S. surface and groundwater.

Companies operating in the European Union are also facing growing pressure to reduce water pollution in response to the EU’s Water Framework Directive. Enacted in 2000, the directive takes an integrated, water basin-based approach, and commits EU member states to achieving high water quality conditions for all water bodies by 2015.

There is also evidence that Chinese authorities are increasingly willing to enforce water regulations. The November 2005 release of 100 tons of benzene into the Songhua River after an explosion at a petrochemical plant – which left nearly four million people without water for four days – triggered a revision of China’s Water Pollution Control Law.¹⁴ The new act, announced in February 2008, raised penalties,

12. Associated Press, “Nestle pulls plug on controversial bottling plant,” *MercuryNews.com*, September 10, 2009. See: http://www.mercurynews.com/news/ci_13310768

13. Taryn Luntz, “EPA to Limit Metal Discharge From Coal Plants,” *The New York Times*, September 15, 2009. See: <http://www.nytimes.com/gwire/2009/09/15/15greenwire-epa-to-limit-metal-discharges-from-coal-plants-62391.html>

14. China Business, “Northeast cleans up after chemical blast,” *Asia Times*, November 30, 2005. See: http://www.atimes.com/atimes/China_Business/GK30Cb06.html

eliminated some loopholes and introduced environmental regulation as a measure of local government performance.¹⁵

In the summer of 2009, the Beijing Development and Reform Commission, the city's economic planning agency, put 12 international and local brewers, beverage producers, and dairy companies on its "List of Major Water-Polluting Enterprises." The Commission announced that the beverage producers on the list are subject to increased supervision and required to submit plans to reduce energy use and water emissions.¹⁶

Litigation Risks

With increased attention from regulators and communities on water scarcity, companies face growing risks stemming from lawsuits or other legal actions responding to the impacts of a company's operations or products on water supplies. In the United States, the widespread leakage into groundwater supplies of methyl tertiary butyl ether (MTBE), a gasoline additive and suspected carcinogen alleged to cause numerous health impacts, has given rise to hundreds of lawsuits against oil companies. Estimates place oil companies' payments at over \$423 million over 30 years on settlements related to MTBE suits involving the contamination of 153 public U.S. water systems.¹⁷

The chemicals industry also faces significant litigation risks linked to water-related impacts from their facilities and products. For example, 43 water systems in six U.S. states – Illinois, Iowa, Indiana, Kansas, Mississippi, and Ohio – recently sued the makers of Atrazine (a weed killer banned by the EU in 2004) to force them to pay for removing the chemical from drinking water supplies.¹⁸

In the summer of 2009, the Beijing Development and Reform Commission, the city's economic planning agency, put 12 international and local brewers, beverage producers, and dairy companies on its "List of Major Water-Polluting Enterprises."

15. Nadya Ivanova, "China's Dirty Water Leads to Protests, Some Reform," *Circle of Blue Water News*, September 9, 2009. See: <http://www.circleofblue.org/waternews/2009/world/chinas-dirty-water-leads-to-protests-some-reform/>

16. "PepsiCo, Coca-Cola reject Beijing environmental watch list," *LiveMint.com*, August 20, 2009. See: <http://www.livemint.com/2009/08/20154213/PepsiCo-CocaCola-reject-Beij.html>

17. "Weitz & Luxenberg P.C. Secures \$423 Million MTBE Settlement Against Oil Giants," Weitz & Luxenberg, press release, May 8, 2008.

18. Charles Duhigg, "Debating How Much Weed Killer Is Safe in Your Water Glass," *The New York Times*, August 22, 2009. See: <http://www.nytimes.com/2009/08/23/us/23water.html>

APPROACHES TO CORPORATE WATER REPORTING

Because most water impacts and risks play out at the local level, the geographic component of water measurement and reporting is essential.

The process of measuring and reporting water-related risks and opportunities can be complex, and many of the methodologies and standards for doing so are still nascent.¹⁹ Nevertheless, there is growing consensus in business, investor, and NGO circles regarding the most critical elements of water reporting.

Because most water impacts and risks play out at the local level, the geographic component of water measurement and reporting is essential. At the moment, however, most companies still tend to disclose basic water use and wastewater discharge data in aggregated form as corporate-wide numbers – an approach that obscures local-level impacts and performance. These metrics are further limited in failing to communicate water use and discharge embedded in the supply chain, which for many companies is where the majority of their water footprint lies.

Water & the Global Reporting Initiative

The Global Reporting Initiative's (GRI) most recent sustainability reporting framework – known as the G3 Guidelines – includes five water-related indicators:

- Total water withdrawal by source (EN8)
- Water sources significantly affected by withdrawal of water (EN9)
- Percentage and total volume of water recycled and reused (EN10)
- Total water discharge by quality and destination (EN21)
- Identity, size, protected status, and biodiversity value of water bodies and related habitats significantly affected by the organization's discharge of water and runoff (EN25)

Key Aspects of Water Reporting

The impacts of corporate water use vary enormously with geography. The implications – on water supplies, ecosystems, and communities – of using 100,000 gallons of water are not the same in Boston as they are in Beijing.

The sort of indicators important to investors include a company's sources of water – drawing water from a depleted aquifer poses different physical, reputational, and regulatory risks than using water captured from recent rainfall. Similarly, disposing of effluent to a municipal treatment plant poses different impacts and risks than discharging it untreated to a nearby river or lake. The timing of water withdrawals and discharge from and into water bodies also matters greatly, as waterways face greater stress depending on the time of year.

Rather than reporting on local operations and considerations, however, companies have traditionally disclosed company-wide indicators such as total water withdrawal or consumption, and total wastewater discharge volume and contaminant load. These metrics correspond to the Global Reporting Initiative's core water-related reporting indicators.

In addition, most companies disclose their impacts on water with a focus on their direct, majority-owned operations. While this is a natural focus in the early stages of measurement and reporting, supply chain risks linked to water also require attention, especially for companies sourcing water-intensive inputs or raw materials. Without information on supply chain exposure, companies cannot fully manage or communicate associated water risks.

19. For an in-depth review of existing and emerging water accounting methodologies and tools being used by the private sector, see "Corporate Water Accounting: An Analysis of Methods and Tools for Measuring Water Use and Its Impacts – Public Draft," Jason Morrison, Peter Schulte, Rita Schenck, The CEO Water Mandate, November 16, 2009. Available at: http://www.unglobalcompact.org/docs/issues_doc/Environment/ceo_water_mandate/UNEP_Corporate_Water_Accounting_Public_Draft.pdf

Emerging Water Accounting Standards

Given these inadequacies, some companies are beginning to shift their scope of measurement from a narrow focus on metrics linked to direct operations to the wider embedded or “virtual” water impacts associated with corporate supply chains, and to indicators that communicate relevant local – rather than global – context and performance.

One effort underway to standardize water accounting is being led by the Water Footprint Network (WFN). Based in Holland, the WFN coordinates efforts by its corporate, academic, and NGO members to develop broadly shared global standards on water footprint accounting for corporations. It defines a “corporate water footprint” as the total volume of freshwater used to support and run a business – both in a company’s own operations and those of its supply chain. WFN’s water footprinting methodology captures the volume, location, and timing of water use and discharge, and measures three primary components: blue, green, and gray water footprints. The methodology is still in development, and is being tested by a number of companies.²⁰

Water Footprint Measurement

In response to growing concerns about water scarcity, corporate water footprinting has emerged as a useful tool for assessing water use and pollution.

The simple definition of a water footprint is: “the total volume of freshwater that is used to produce the goods and services produced by the business.” Water footprinting has dual benefits: in addition to determining a company’s basic water use, it can provide a standard for comparing and benchmarking water use with industry peers.

Water footprinting is geographically explicit, indicating the location of water withdrawal or discharge, and includes both direct (e.g. the company’s water withdrawals) and indirect water use (e.g. water used in the supply chain). A water footprint measures three primary components – blue, green and gray – all of which are expressed in terms of water volume. These components are defined as follows:

- Blue water: The volume of consumptive water use taken from surface waters and aquifers.
- Green water: The volume of evaporative flows used (often found in soils rather than major bodies of water).
- Gray water: The theoretical volume of water needed to dilute pollutants discharged to water bodies to the extent that they do not exceed minimum regulatory standards.

The water footprinting methodology is being continually developed, disseminated, and supported by the Water Footprint Network.

Source: “Water Footprint Network, “Water Footprint, 2008.” See: <http://www.waterfootprint.org/?page=files/DefinitionWaterFootprint>

20. For an example of how companies are applying the WFN methodology, see SABMiller’s report on the water footprint of its beer value chain in South Africa and the Czech Republic: “Water Footprinting: Identifying & Addressing Water Risk in the Value Chain,” SABMiller and WWF, August 19, 2009. Available at: http://www.sabmiller.com/files/reports/water_footprinting_report.pdf

INVESTOR DEMAND FOR WATER DISCLOSURE

Although voluntary sustainability reporting by companies is growing, financial filings will remain the gold standard for reporting material information to investors.

For institutional investors with widely diversified portfolios, water scarcity presents bottom-line risks. As a result, investors are seeking meaningful information that allows them to discern which companies are leading and which are lagging in addressing the risks and opportunities associated with water.

Investors continue to look to financial filings (the 10-K or the 20-F report) for information on material risk factors, including environmental, social, and governance (ESG) risks such as water scarcity. Although voluntary sustainability reporting by companies is growing, financial filings will remain the gold standard for reporting material information to investors. Only by inclusion in these filings, at needed levels of specificity, will water disclosures truly communicate appropriate oversight and awareness of key risks and opportunities on the part of management.

Investor Requests for Improved SEC Guidance on ESG Disclosure

Over the past six years, investors have lobbied the U.S. Securities and Exchange Commission (SEC) to improve the quality of climate risk disclosure in corporate financial filings, and more recently, disclosure of broader ESG risk. Investors have asked for enforcement of existing reporting requirements and for guidance on how these requirements apply in the context of climate change, water scarcity, and other sustainability-related risks.

- In September 2007, 22 institutional investors in the U.S. and Europe managing \$1.5 trillion in assets filed a petition with the SEC to require publicly-traded companies to assess and fully disclose their financial risks from climate change.²¹
- In October 2008, 14 of the nation's largest institutional investors – including CalPERS, CalSTRS, the Maryland, New Jersey, New York City, and New York State public pension funds or treasurers – called on the SEC to require improved disclosure of ESG risks, including water scarcity and climate change.²²
- In June 2009, 41 institutional investors and asset managers, with \$1.4 trillion under management, sent a follow up letter, calling on SEC Chairman Mary Schapiro to address the issue of insufficient ESG risk disclosure.²³

In response to these requests, on January 27, 2010 the SEC issued new interpretive guidance on climate risk disclosure that clarified what publicly-traded companies need to disclose to investors in terms of climate-related material effects on business operations. The guidance compels companies to disclose a range of material risks related to climate change, including physical risks like water scarcity. It mentions water risks related to climate change that should be disclosed where material, including “decreased agricultural production capacity in areas affected by drought or other weather-

21. “Major Investors, State Officials, Environmental Groups Petition SEC to Require Full Corporate Climate Risk Disclosure,” Ceres, press release, September 17, 2007. See: <http://www.ceres.org/Page.aspx?pid=445>

22. “Investors Call on SEC to Require Better Disclosure on Climate Change and Other Risks,” Ceres, press release, October 23, 2008. See: <http://www.ceres.org/Page.aspx?pid=951>

23. “Investors With \$1.4 Trillion in Assets Calls on the SEC to Improve Disclosure of Climate Change and Other Risks,” Ceres, press release, June 12, 2009. See: <http://www.ceres.org/Page.aspx?pid=1106>

related changes.”²⁴ The SEC also notes that “significant physical effects of climate change, such as effects on the severity of weather (for example, floods or hurricanes), sea levels, the arability of farmland, and water availability and quality, have the potential to affect a registrant’s operations and results.”²⁵

Shareholder Advocacy on Water

Some institutional investors are beginning to turn their attention to the issue of water risk, and are using shareholder advocacy to advance greater corporate disclosure.

Norges Bank Investment Management

In August 2009, Norges Bank Investment Management (NBIM), which runs the \$415 billion Norwegian Government Pension Fund, announced that it would begin evaluating the water risk management practices of 1100 companies it holds in the agriculture, food, manufacturing, power, mining, pharmaceuticals, pulp and paper, and water supply sectors. NBIM manages the third-largest sovereign wealth fund in the world, which at the time of the announcement represented approximately one percent of the global equity market.²⁶

NBIM cited poor disclosure and growing water-related risks as the driver for this policy shift. “Many companies in risk sectors and regions do not have a proper water policy with risk assessments and performance reporting. Shortcomings in companies’ water management reporting makes it difficult to assess the degree of risk exposure resulting from their own operations or their supply chains,” said NBIM’s Head of Governance, Anne Kvam²⁷

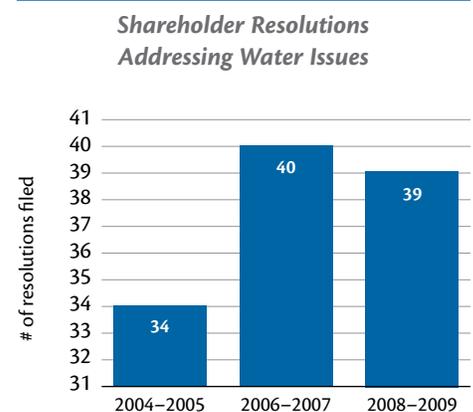
Shareholder Resolutions

Recognizing the plethora of risks associated with water, investors are now filing shareholder resolutions asking publicly-held companies for more disclosure on water practices and performance, including information on water policies, environmental and social impacts of water use, and water usage throughout the supply chain.

The number of shareholder resolutions focusing on water issues has grown in recent years. Sectors particularly targeted by shareholder advocates include food, beverage, oil and gas, and chemicals.

“Shortcomings in companies’ water management reporting makes it difficult to assess the degree of risk exposure resulting from their own operations or their supply chains,”

— Anne Kvam, Head of Governance, Norges Bank Investment Management



24. Ibid, pp. 27.

25. Ibid, pp. 26

26. “Record-high return in the second quarter,” Norges Bank Investment Management, press release, August 14, 2009.

27. Hugh Wheelan, “Giant Norway fund launches campaign to pressure 1100 companies on water risks, Report during third quarter will outline fund’s reporting ‘expectations’ from portfolio companies,” Responsible Investor, August 20, 2009. See: http://www.climateactionprogramme.org/news/article/giant_norway_fund_launches_campaign_to_pressure_1100_companies_on_water_ris/

“Water can not be treated as merely a casualty of climate change, but rather its rival in its potential to both pose risks and create opportunities for the companies in which our funds invest.”

— Denise Nappier, Connecticut State Treasurer

The CEO Water Mandate & Transparency

Established in 2007 as an initiative of the UN Global Compact, the CEO Water Mandate is designed to assist companies in the development, implementation, and disclosure of water sustainability policies and practices. Endorsement of the Mandate represents a voluntary commitment to action, built around six key pillars: Direct Operations, Supply Chain and Watershed Management, Collective Action, Public Policy, Community Engagement, and Transparency.

Under the Transparency pillar, the Mandate provides loose guidelines for endorsing companies, calling on them to report annually on policies and actions undertaken to implement the Mandate elements. Companies are also asked to report water-related outcomes, using broadly accepted indicators such as those in the Global Reporting Initiative’s G3 Guidelines.

Source: CEO Water Mandate, “The CEO Water Mandate.” See: http://www.unglobalcompact.org/Issues/Environment/CEO_Water_Mandate/

The Carbon Disclosure Project’s Water Initiative

In November 2009, the Carbon Disclosure Project (CDP), a UK-based non-profit, announced the launch of a new investor-driven water disclosure initiative.²⁸ In 2010, the organization will send a questionnaire to approximately 300 of the world’s largest companies in water-intensive sectors, including consumer goods, forestry and paper products, food, beverage, mining, pharmaceuticals, power generation, and semiconductor manufacturing. The survey will ask companies to disclose key metrics on water use and wastewater discharge, and to characterize their exposure to water risks with regard to their direct operations and supply chain. CDP aims to distribute the questionnaire in future years to an increasing number of companies in water-intensive sectors and in regions facing water stress. Several European financial institutions, including NBIM, Schroders, APG Asset Management, and Dexia Asset Management are supporting this effort.

As with the CDP’s carbon survey, the water disclosure survey is expected to shed significant light on the collective and sector-specific water impacts, risks, opportunities, and management performance of some of the world’s largest companies.

United Nations’ Principles for Responsible Investment

Sixteen members of the Principles for Responsible Investment, an international alliance of institutional investors, issued a letter in December 2008 urging 100 large publicly-traded companies to join the United Nations’ CEO Water Mandate as a way to improve their policies and practices around water use.²⁹

Connecticut State Treasurer Denise Nappier, principal fiduciary of the Connecticut Retirement Plans and Trust Funds, explained the impetus behind this effort, which was supported by investors collectively managing \$1.5 trillion: “Water can not be treated as merely a casualty of climate change, but rather its rival in its potential to both pose risks and create opportunities for the companies in which our funds invest.”³⁰

28. “CDP Launches a Global Water Disclosure Project to Raise Business Awareness of Water-Related Risk,” Carbon Disclosure Project, press release, November 19, 2009.

29. Giovanni Legorano, “Funds call for water sustainability action,” Global Pensions, December 10, 2008. See: <http://www.globalpensions.com/global-pensions/news/1461118/funds-water-sustainability-action>

30. Ibid.

REPORT METHODOLOGY

The purpose of this report is to assess the current state of water risk disclosure by companies exposed to key water-related physical, regulatory, reputational, and litigation risks. It seeks to identify gaps in disclosure, highlight best practices, and provide recommendations to companies and investors for improving corporate water reporting.

The report uses a systematic method for evaluating the quality, depth, and clarity of water risk disclosure in both voluntary and mandatory corporate reporting of publicly-traded companies during the 2008 fiscal year.

How Companies Were Selected

Companies were included based on their involvement in industries known to require significant quantities of water for direct operations, raw material supplies, for use with their products, and/or for their operations' impacts on water quality in regard to the size and significance of wastewater discharges. Eight sectors were reviewed: beverage, chemicals, electric power, food, homebuilding, mining, oil and gas, and semiconductors.³¹

One-hundred of the largest publicly-traded companies from these eight sectors were selected on the basis of their 2008 annual revenues and market capitalization, while also considering geographic exposure. With the exception of those in the electric power and homebuilding sectors, the companies reviewed represent firms with global operations.

Documents Reviewed

For each company, the following documents were reviewed as part of this assessment:

- Mandatory financial disclosures such as 10-K filings (or 20-F or 40-F filings in the case of non-U.S. companies). In cases where there was no 20-F or 40-F filing for a non-U.S. company, the company's annual report was reviewed.
- Voluntary corporate disclosures such as sustainability or corporate social responsibility (CSR) reports, and company websites.
- Documents reviewed corresponded to the most recent year available, which was fiscal year 2008 for most companies. In cases where companies had issued water-specific reports or documents before 2008, these materials were also included in the review.
- Any company disclosures made publicly available after June 30, 2009 were not included in this assessment.

The purpose of this report is to assess the current state of water risk disclosure by companies exposed to key water-related physical, regulatory, reputational, and litigation risks.

31. For the purposes of this study, the sectors reviewed were defined using the Industry Classification Benchmark (ICB) codes, a classification structure maintained by Dow Jones Indexes and FTSE Group. For more information, see: <http://www.icbenchmark.com>

The water disclosure framework was designed to be flexible so as to be applied to a broad range of industries, with an understanding that companies in different sectors have different water-related impacts and face different kinds of water-related risks.

How Companies Were Scored

Analysis of the companies' disclosure involved extracting information related to water and water risk within filings, sustainability reports, and on company websites using Bloomberg's Environmental, Social and Governance (ESG) Data Service, as well as keyword searches and manual reviews of each document. This disclosure was then scored by UBS according to an evaluation framework developed by Ceres in consultation with members of the Investor Network on Climate Risk, and based on a review of relevant Global Reporting Initiative indicators.

It should be noted that the scoring framework was developed to reflect investor expectations about best practice in water disclosure. Rather than creating a normal distribution or "bell curve" based on small differences among the companies, the scoring framework was designed to stretch beyond current practices with an understanding that corporate water reporting, while still a relatively nascent activity, is quickly evolving.

The water disclosure framework was designed to be flexible so as to be applied to a broad range of industries, with an understanding that companies in different sectors have different water-related impacts and face different kinds of water-related risks.

Therefore the scores provided in this report provide meaningful comparison only within sectors, and not across all 100 companies.

For the purposes of this study, company disclosures were assessed with respect to five categories: "Water Accounting," "Risk Assessment," "Direct Operations," "Supply Chain," and "Stakeholder Engagement." Within each category, sub-elements were evaluated to produce a final scored assessment based on the depth and clarity of corporate disclosures.

For the beverage, electric power, food, mining, oil and gas, and semiconductor sectors, companies were scored on a 100-point scale (Exhibit 2). A 112-point scale was used for the chemicals and homebuilding sectors because an additional category, "Opportunities," was evaluated. This category assessed reporting related to investments in and research and development (R&D) for water-efficient products (Exhibit 3).

Assessment Criteria

- 1. Water accounting.** Data on corporate water performance – including metrics on direct water use and wastewater discharge volume and contaminant load – is critical to assessing water risk. In this category, more points were given for:
 - Multi-year data
 - Site- or regional-level data
 - Both absolute and normalized data (e.g. total water use and water use per product made or revenues earned)
 - Source and destination data for water withdrawal and wastewater discharge
 - Data on the water use and wastewater discharge embedded in the supply chain

2. Risk assessment. Companies were assessed on their self-reported exposures to water-related physical, reputational, regulatory, and litigation risks. More points were given for:

- Specific references to at-risk operations or supply chains
- Disclosure that quantified or monetized water-related risks

3. Direct operations. Points were given for disclosure of:

- Water-related management systems, policies, and standards
- Data on compliance with water-related regulations
- Qualitative discussion of efforts to improve water efficiency and wastewater discharge at water-stressed operations
- Quantified water use or wastewater discharge reduction targets, with more points going to companies that disclosed absolute reduction targets and targets with respect to water-stressed operations

4. Supply chain. Companies were assessed on the degree to which they disclosed engaging their suppliers on water management. Points were given for disclosing:

- Collection of water-related data from suppliers
- Assessment or evaluation of suppliers on water management
- Collaboration with or training of suppliers on water management
- Reduction targets for supply chain water use or wastewater discharge

5. Stakeholder engagement. Stakeholder engagement is a critical risk mitigation strategy for companies with water-intensive operations. Points were given for:

- Engaging with local and national governments, businesses, and communities to address watershed management or restoration, as well as drinking water and sanitation issues
- Collaborating with international institutions on issues related to drinking water, sanitation, or watershed protection
- Describing how the company consults with local communities and civil society groups on water impacts in the context of siting or expanding operations

6. Opportunities. Water-related product strategies present significant market opportunities in an increasingly water-stressed world, and include investment in products that improve water quality or reduce water use by consumers. For the purposes of this study, only homebuilding and chemical companies were evaluated on this aspect of disclosure. Points were given for disclosure of:

- Investments and R&D expenditures in water-efficient products and technologies
- Efforts to improve the water efficiency of existing products
- Quantitative targets to improve the water efficiency of products

Exhibit 2. Assessment Methodology for Corporate Water Disclosure:
Beverage, electric power, food, mining, oil and gas, and semiconductor sectors

| Assessment Criteria | Total Points per Category |
|---|----------------------------------|
| 1. Water Accounting | |
| Data on water withdrawal/consumption, at both the corporate and site-level | 36 |
| Data on wastewater discharge, at both the corporate and site-level | |
| Data on the water footprint of suppliers | |
| 2. Risk Assessment | |
| Disclosure of physical risks | 24 |
| Disclosure of reputational risks | |
| Disclosure of regulatory risks | |
| Disclosure of litigation risks | |
| 3. Direct Operations | |
| Description of water-related policies and management systems | 27 |
| Information on non-compliance, violations, or penalties associated with water use or wastewater discharge | |
| Qualitative description of company efforts to reduce water use at the corporate level and with respect to operations in water-stressed regions | |
| Qualitative description of company efforts to reduce wastewater discharge at the corporate level and with respect to operations in water-stressed regions | |
| Quantitative targets to improve corporate or site-level water withdrawal or consumption | |
| Quantitative targets to improve corporate or site-level wastewater discharge | |
| 4. Supply Chain | |
| Description of efforts to assess, evaluate, or train suppliers on water management | 7 |
| Description of efforts to gather and track data on suppliers' water impacts | |
| Quantitative targets to reduce water impacts in the supply chain | |
| 5. Stakeholder Engagement | |
| Collaboration with local and national governments, communities, and international institutions on issues related to drinking water and sanitation | 6 |
| Collaboration with local and national governments, businesses, NGOs, and communities on watershed management or restoration | |
| Consultation with local communities and NGOs on water impacts when siting or expanding operations | |
| Total Possible Points | 100 |

**Exhibit 3. Assessment Methodology for Corporate Water Disclosure:
Chemicals and homebuilding sectors**

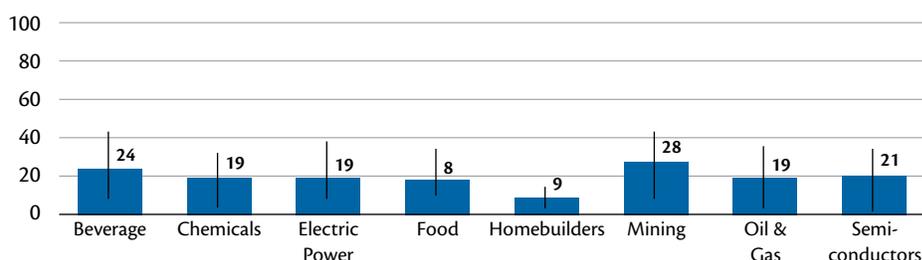
| Assessment Criteria | Total Points per Category |
|---|--------------------------------------|
| 1. Water Accounting | |
| Data on water withdrawal/consumption, at both the corporate and site-level | 36 |
| Data on wastewater discharge, at both the corporate and site-level | |
| Data on the water footprint of suppliers | |
| 2. Risk Assessment | |
| Disclosure of physical risks | 24 |
| Disclosure of reputational risks | |
| Disclosure of regulatory risks | |
| Disclosure of litigation risks | |
| 3. Direct Operations | |
| Description of water-related policies and management systems | 27 |
| Information on non-compliance, violations, or penalties associated with water use or wastewater discharge | |
| Qualitative description of company efforts to reduce water use at the corporate level and with respect to operations in water-stressed regions | |
| Qualitative description of company efforts to reduce wastewater discharge at the corporate level and with respect to operations in water-stressed regions | |
| Quantitative targets to improve corporate or site-level water withdrawal or consumption | |
| Quantitative targets to improve corporate or site-level wastewater discharge | |
| 4. Supply Chain | |
| Description of efforts to assess, evaluate, or train suppliers on water management | 7 |
| Description of efforts to gather and track data on suppliers' water impacts | |
| Quantitative targets to reduce water impacts in the supply chain | |
| 5. Stakeholder Engagement | |
| Collaboration with local and national governments, communities, and international institutions on issues related to drinking water and sanitation | 6 |
| Collaboration with local and national governments, businesses, NGOs, and communities on watershed management or restoration | |
| Consultation with local communities and NGOs on water impacts when siting or expanding operations | |
| 6. Opportunities | |
| New investments/R&D in water-efficient products and technologies | 12 |
| Descriptions of efforts to improve water efficiency and impacts of existing products | |
| Quantitative targets to improve water efficiency of products | |
| Total Possible Points | 112 |

KEY FINDINGS & RECOMMENDATIONS

| Top Scoring Companies by Sector | |
|---------------------------------|-------------------|
| Beverage | Diageo |
| Chemicals | Mitsui |
| Electric Power | Pinnacle West/APS |
| Food | Unilever |
| Homebuilding | KB Home |
| Mining | Xstrata |
| Oil & Gas | BP |
| Semiconductors | Toshiba |

The study found that even for companies operating in sectors and regions of the world facing significant water risk, disclosure of risk and corporate water performance was surprisingly weak. Although the scoring scale ranged from 0–100 (or 0–112 in the case of the chemicals and homebuilding sectors), no single company surpassed 43 points. The mining sector scored highest overall, followed by the beverage industry. Companies in the homebuilding sector received the lowest scores. Diageo, the UK-based alcoholic beverage company, received the highest score in the study.

Average Scores & Ranges by Sector



Water Risk Disclosure in Financial Filings

The majority of the companies evaluated in this report disclose exposure to water risks in their 10-Ks or annual reports – for example, 73 percent report some level of physical risk. Nevertheless, the vast majority of these disclosures consist of vague, boilerplate language. They fail to reference specific at-risk operations or supply chains, and lack any attempt to quantify or monetize risk.

Some companies were found to disclose water-related risk factors in their sustainability reports, but did not make corresponding mentions in their 10-K or annual report, a finding that indicates an ongoing lack of integration between voluntary reports and regulated financial filings.

Critical performance data on water was also missing from financial filings, with only six companies disclosing water accounting data in their 10-Ks or annual reports. The vast majority of water accounting and other performance information was found in voluntary reports – sustainability and CSR reports – rather than in financial filings.

Findings by Disclosure Category

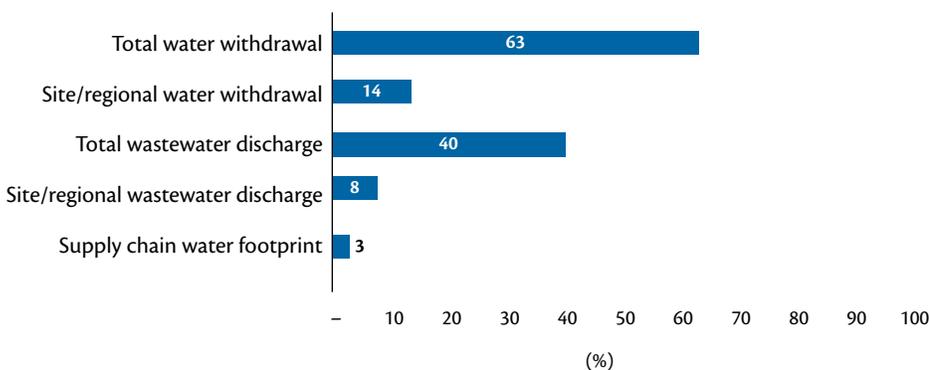
Water Accounting

Data on corporate water performance – including metrics on water use, and wastewater discharge volume and contaminant load – is critical to assessing water risk.

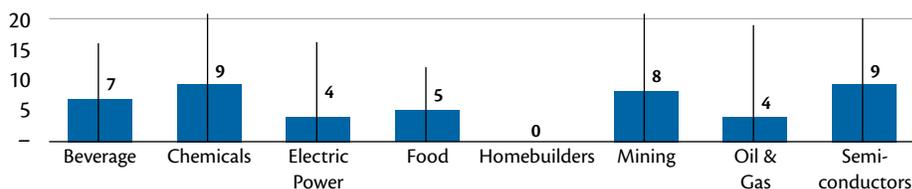
- **Basic water data missing for some companies.** Sixty-three percent of the companies reviewed disclose corporate-wide data on direct water use; 40 percent report data on total wastewater discharge. The best water accounting disclosures came from the semiconductor, chemicals, and mining sectors.
- **Few provide local-level data.** Only 14 companies provide data on water withdrawals broken down to the site or regional levels. Because water risk is geographically dependent, this absence of context makes it nearly impossible for investors and analysts to assess corporate exposure to water scarcity, or to understand if corporate actions to mitigate risk are either appropriate or effective.
- **Little geographic context.** Only a handful of companies contextualize their water use by noting the percent or number of facilities operating in water-stressed regions. These included BP, Diageo, Heineken, Nestlé, and SABMiller.
- **Supply chain data scant.** No companies provide comprehensive data on their suppliers' water performance, although a few – including Danone, SABMiller, and Unilever – provide estimates of the water use embedded in their supply chains. For example, Danone reports the water footprint for its Milk and Water divisions at each stage of the product lifecycle, including raw material production, processing, packaging, and logistics.

| Top Scores: Water Accounting |
|------------------------------|
| American Electric Power |
| Barrick |
| BP |
| Diageo |
| Mitsui |
| Samsung |
| Unilever |

Water Accounting Data: Percentage of Companies Reporting



Water Accounting: Average Scores and Ranges by Sector*



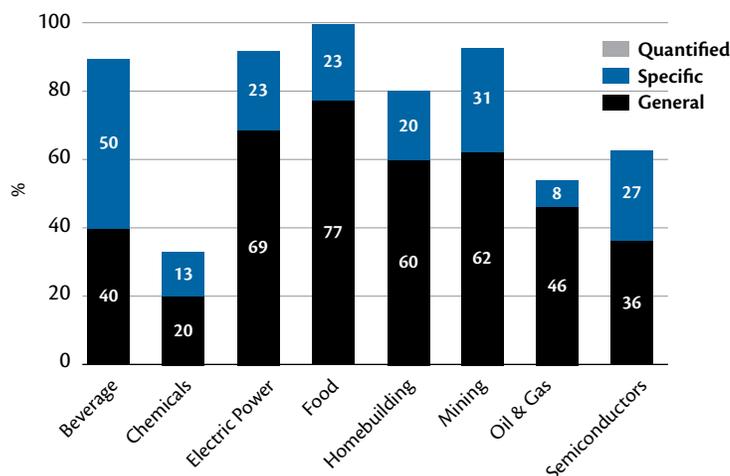
*Out of 36 possible points

Risk Assessment

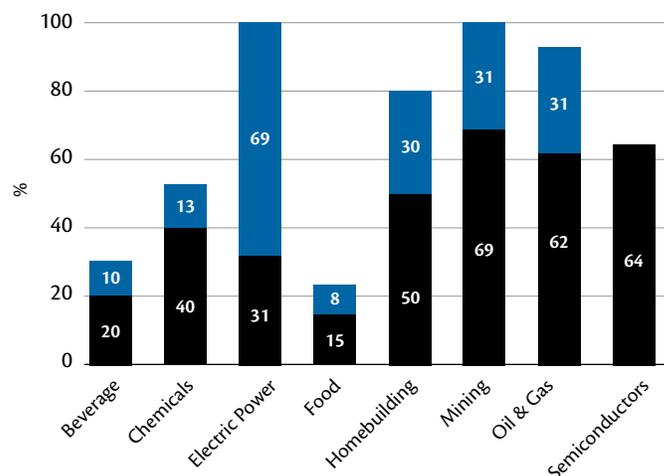
Companies reported their exposure to water-related risks in four broad categories: physical, reputational, regulatory, and litigation.

- **Physical.** The majority of the companies surveyed (73 percent) report some exposure to water-related physical risks such as drought.
- **Reputational.** Only nine companies report reputational risks related to water – these included companies in the beverage, mining, and oil and gas sectors.
- **Regulatory.** Sixty-seven percent of companies disclose some level of water-related regulatory risk. Companies in the mining, electric power, and oil and gas sectors report the highest level of regulatory risk.
- **Litigation.** Nearly half (48 percent) report some level of litigation risk – the electric power, homebuilding, and mining sectors report the most exposure to litigation risks.

Self-Reported Exposure to Water-Related Physical Risks



Self-Reported Exposure to Water-Related Regulatory Risks



Direct Operations

Water efficiency and wastewater management are critical to mitigating water risk, especially for the water-intensive industries evaluated in this report. For most companies this begins with direct operations, where they have full control and can reap the benefits of reduced water (and energy) bills and lower operating costs.

- **Limited information on water policies and management systems.** Although most companies disclose having environmental policies or management systems, only 24 companies detail water-specific policies, standards, plans, or management systems. The mining sector stood out for having the best disclosure on this topic.
- **Relatively few report water use reduction targets.** Targets were scant, with only one-fifth (21) of companies disclosing quantified goals to reduce water use. Of these, only three companies – Diageo, DuPont, and Xstrata – set reduction targets that were differentiated by the level of water stress facing specific facilities.
- **Even fewer wastewater targets.** Just 15 companies disclose goals to reduce wastewater discharge.

Supply Chain

For many large companies, water use embedded in the supply chain accounts for the largest portion of their total water footprint. As investors increasingly seek to understand a company's full life-cycle exposure to water risk, information on supply chain management is becoming essential.

- **Supplier engagement is weak.** Very few companies (12) disclose working with their suppliers to help them reduce water use or wastewater discharge. Of these, many anecdotally disclose examples of partnerships or capacity building with specific suppliers, but only a few evidence comprehensive programs to systematically improve the water performance of their supply chains.
- **Limited disclosure by exposed sectors.** For sectors where a significant portion of the corporate water footprint is found in the supply chain – food, beverage, electric power, and oil and gas – there was very little discussion of working with suppliers to manage water risk.

Stakeholder Engagement

Even a company with the most responsible and efficient water management practices can face risks if the communities surrounding its operations lack access to clean water, or if other industrial or agricultural users deplete or pollute shared water resources. Given the interdependence between companies and their neighbors at the watershed or basin level, disclosure of efforts to engage stakeholders on watershed protection or restoration, as well as on drinking water and sanitation, provides investors with an understanding of how a company is working to mitigate risk, preserve essential water resources, and maintain its social license to operate across varied geographies.

- **Beverage and mining companies lead on stakeholder engagement.** Companies in the beverage and mining sectors disclose the most about how

Top Scores: Direct Operations

Diageo

DuPont

Intel

Nestlé

Pinnacle West / APS

Suncor

Xstrata

Top Scores: Supply Chain

General Mills

Intel

SABMiller

Unilever

Top Scores: Stakeholder Engagement

Exxon

Rio Tinto

The Coca-Cola Company

Unilever

they are engaging with stakeholders on water-related issues. Homebuilders and semiconductors had the least to say on this issue.

- **Comprehensiveness of stakeholder engagement.** For most companies, it was unclear whether the stakeholder engagement activities disclosed were merely anecdotal or reflected comprehensive risk management systems.
- **Watershed management.** Thirty-two percent of companies surveyed report collaborating in some way with local stakeholders on efforts to protect or restore watersheds and ecosystems near their operations.
- **Siting or expanding operations.** Despite reputational risks linked to siting water-intensive projects or facilities, only five companies – all of which were in the mining or oil and gas sector – disclose engaging or consulting with stakeholders on the water impacts of siting or expanding operations.

Opportunities: Products & Services

Water-related product strategies present significant market opportunities in an increasingly water-stressed world, and include investment in products that improve water quality or reduce water use by customers. Only homebuilding and chemical companies were evaluated on this aspect of disclosure due to the fact that their products, when used, consume water or affect water quality. Both sectors included some discussion of potential market opportunities stemming from water availability and quality issues.

- **Chemicals.** Two-thirds of the chemical companies reviewed disclose investment opportunities related to products that save water or improve water quality. For example, Dow reports investment in a new Water Technology Development Center in Tarragona, Spain to support the company's goal of driving a 35 percent reduction in the cost of water reuse and desalination technologies by 2015. Agricultural chemical makers Syngenta and Monsanto both discuss new product lines aimed at helping farmers produce more crops with less water.
- **Homebuilding.** Five homebuilding firms – Beazer, Centex, KB Home, Pulte, and Toll Brothers – report information on water-saving features for new homes, including WaterSense appliances, xeriscaping and moisture sensor irrigation systems.

Key Findings by Sector

| Sector | Key Water Risks | Sector Findings | Company Highlights |
|---|---|---|--|
| <p>Beverage</p> <p>Average score: 24 out of 100</p> <p>Top score: Diageo</p> | <p>Beverage makers face risks of agricultural commodity shortages and higher prices due to drought. In 2009, global sugar prices reached a 28-year high, due in large part to lower production in drought-stricken India, the world's second-largest sugar producer.</p> <p>Beverage manufacturers can lose their license to operate when their water use comes into direct conflict with the priorities of local communities. After years of organized opposition by local residents and NGOs, Nestlé Waters announced in September 2009 that it had decided to scrap plans entirely to build the country's largest water bottling plant in McCloud, California.¹</p> | <p>Risk assessment. Nearly all beverage companies report exposure to physical water risk, particularly with regard to their supply chains.</p> <p>Supply chain. Despite this, only three companies disclose collaborating with suppliers to reduce water risks.</p> <p>Stakeholder engagement. Eighty percent of beverage makers report engaging with local stakeholders on watershed management, and drinking water and sanitation issues.</p> | <p>Diageo was also the only beverage company to report differentiated water use reduction targets for facilities in water-stressed versus non-stressed regions of the world.</p> <p>PepsiCo discloses adopting a policy in support of the human right to water – a first among publicly traded global corporations.</p> <p>SABMiller reports that its South African supply chain uses 155 liters of water to produce one liter of beer.</p> |
| <p>Chemicals</p> <p>Average score: 19 out of 112</p> <p>Top score: Mitsui</p> | <p>The chemicals sector's reliance on high volumes of water makes it vulnerable to water scarcity. Increasingly, the industry is expanding from its historical base in North America, Europe, and Japan to more water-stressed India, China and the Middle East.²</p> <p>Chemical companies operating in the EU face growing regulatory pressure to phase out chemicals that significantly affect water resources and human health.³</p> <p>The U.S. EPA has announced a sweeping set of changes to its enforcement of existing chemicals regulation, including beginning a process that could lead to further regulation of chemicals that pose high risk to the environment and human health.</p> | <p>Risk assessment. One-third of chemical companies report exposure to water-related physical risks. Fifty-three percent and forty-seven percent report regulatory and litigation risks respectively.</p> <p>Targets. Only three chemical companies – BASF, DuPont and Sumitomo – report targets to reduce water use or wastewater discharge.</p> <p>Opportunities. Two-thirds of the chemical companies disclose market opportunities related to products that save water or improve water quality.</p> | <p>DuPont is one of the only companies in the study to disclose an absolute reduction target for water use – a 10-year goal to reduce water consumption by 30 percent at facilities in water-stressed regions. Dupont also has a goal to double investment in water-related R&D to \$640 million by 2015.</p> <p>Mitsui Chemicals provides four years of information on water use and wastewater discharge, which is further broken down to the site level.</p> |
| <p>Electric Power</p> <p>Average score: 19 out of 100</p> <p>Top score: Pinnacle West/ APS</p> | <p>Water scarcity and unpredictability of supply may pose significant risks to electric power operations. Severe drought in the southeastern United States in 2007–2008 brought several power plants within days of a forced shut down due to lack of water for cooling.^{4,5}</p> <p>Hydropower will be most directly affected by climate change because of its vulnerability to the amount and timing of natural water flows.⁶ In the Atlanta area, hydroelectric power generation declined 51 percent in 2007 due to drought, forcing Southern Company to buy \$33 million in fossil fuels to replace the lost power.⁷</p> <p>Water scarcity may also constrain deployment of carbon capture and storage (CCS) technologies by the electric power sector. CCS technology significantly increases overall cooling requirements and can therefore increase water use by up to 90 percent.⁸</p> <p>Wastewater discharges from coal plants will face stricter regulation in the United States. In September 2009, the EPA announced its intention to revise existing rules for water discharges from coal-fired power plants.⁹</p> | <p>Risk assessment. Nearly all the electric power companies disclose physical risks related to water scarcity, and all report exposure to regulatory risk.</p> <p>Water accounting. Fewer than half of the electric power companies provide data on total water withdrawals. Less than one-third report data on wastewater discharge.</p> <p>Wastewater reduction targets. None of the companies disclose targets to reduce contaminants in wastewater discharges from power plants, such as arsenic and lead, in advance of expected EPA regulation.</p> <p>Supplier engagement. Although the sector purchases large quantities of oil, coal, and natural gas, none of the companies disclose efforts to engage fuel suppliers on water impacts and risks.</p> | <p>American Electric Power was the only electric power company to provide detailed site-level water withdrawal data.</p> <p>PG&E discloses that during the 2007 Californian drought, the company's hydroelectric generation dropped from 22 to 13 percent of its delivery mix, resulting in a 39 percent rise in greenhouse gas emissions.</p> <p>Pinnacle West / APS reports using treated sewage to cool its power plants in Arizona, preserving enough potable water for approximately 75,000 homes.</p> |

Key Findings by Sector

| Sector | Key Water Risks | Sector Findings | Company Highlights |
|---|---|---|---|
| <p>Food</p> <p>Average score: 18 out of 100</p> <p>Top score: Unilever</p> | <p>Food commodity shortages due to drought or changing weather patterns can lead to significant price volatility, as seen by recent spikes in global rice prices due to drought-induced production collapses in Australia.</p> <p>There is growing scrutiny by U.S. regulators of the agricultural sector's water impacts. For example, the EPA announced in October 2009 that it would reevaluate the environmental safety of the widely used pesticide Atrazine.¹⁰</p> <p>Meat producers are particularly vulnerable to lawsuits tied to the environmental impacts of confined animal operations. In 2006, a lawsuit by an environmental advocacy group, alleging violations of the Clean Water Act against Smithfield Foods, resulted in a settlement in which the company agreed to implement millions of dollars in environmental safeguards.¹¹</p> | <p>Risk disclosure. Nearly all the food companies disclose some level of physical risk related to water scarcity, particularly with respect to their supply chains.</p> <p>Supply chain. Despite the sector's physical risk exposure, less than one-third of food companies report addressing water risk in their agricultural supply chains.</p> <p>Reduction targets. Fewer than half report setting water use reduction targets. Only one company – Unilever – discloses a quantified target for reducing wastewater discharges.</p> <p>Stakeholder engagement. Nearly half the companies disclose efforts to engage stakeholders on watershed preservation and drinking water and sanitation issues.</p> | <p>Danone highlights an incentive system for senior managers that integrates environmental and social criteria – including water objectives – into compensation.</p> <p>General Mills' Green Giant division works with growers to reduce water consumption and minimize use of agrochemicals for key crops. The company reports a 50 percent water use reduction goal for its broccoli growers, and discusses efforts to help convert their operations from furrow to drip irrigation.</p> <p>Unilever's Sustainable Agriculture Program works with agricultural suppliers to implement water reduction efforts, and in Brazil has worked with tomato suppliers to reduce water use by up to 30 percent.</p> |
| <p>Homebuilding</p> <p>Average score: 9 out of 112</p> <p>Top score: KB Home</p> | <p>Development opportunities for homebuilders may be limited by water availability in several high-growth regions of the United States. Ten of the 15 fastest-growing metropolitan areas are in arid western U.S. states.¹²</p> <p>Existing or anticipated water shortages may lead regulators to restrict or prohibit housing development in certain regions. In California, state laws require water agencies to withhold approvals until determining that sufficient water resources exist to serve large new developments for at least 20 years.¹³</p> <p>Homebuilders are increasingly subject to wastewater discharge regulation. In November 2009, the EPA released new guidelines that limit effluent discharge for the construction and development industry.¹⁴ Compliance with the new rule is estimated to cost the industry \$1 billion.¹⁵</p> | <p>Risk assessment. Eighty percent of the homebuilders reviewed cite drought or floods as physical risks to their business and cite regulatory risks linked to storm and surface water management. Seventy percent report water-related litigation risks.</p> <p>Water-related opportunities. Five companies – Beazer, Centex, KB Home, Pulte, and Toll Brothers – disclose investment in and sales of more water-efficient homes.</p> | <p>KB Home describes how it is integrating water-efficient features into its building lines, including WaterSense-labeled toilets and bathroom sink faucets. The company is also partnering with the Southern Nevada Water Authority and the Southern Nevada Home Builders Association to create the first "Water Smart" home, which saves up to 75,000 gallons of water per year compared to homes built in the 1990s.</p> |
| <p>Mining</p> <p>Average score: 28 out of 100</p> <p>Top score: Xstrata</p> | <p>Mining operations cannot be relocated, making the sector susceptible to changing local water availability, as well as to pressure from local communities to reduce water use.</p> <p>Unaddressed community concerns about the water impacts of mining can lead to loss of social license to operate. In 2004, Newmont relinquished access to 3.9 million ounces of gold reserves when thousands of local residents in Cajamarca, Peru staged protests against the expansion of the company's operations over water concerns.¹⁶</p> <p>The Obama administration seeks to curtail mountain top removal by coal miners because of water quality concerns. In October 2009, the EPA vetoed a water permit for the country's largest-ever proposed mountain top coal mine in West Virginia – the first time the agency has taken such action since the enactment of the Clean Water Act in 1972.¹⁷</p> | <p>Water accounting. Data reporting in this sector was relatively strong, with 77 percent reporting water use data and four mining companies providing site-level data.</p> <p>Risk disclosure. All the mining companies report exposure to physical and regulatory risks, while nearly two-thirds report litigation risks, and more than one-quarter report reputational risks.</p> <p>Direct operations. The mining sector had strong disclosure on water management efforts in direct operations, with eight companies providing information on water-specific management systems, strategies, or policies.</p> <p>Stakeholder engagement. Seventy-seven percent disclose collaborating with local governments and communities to solve water-related conflicts and to manage local water resources.</p> | <p>Alcoa was the only mining firm to disclose a wastewater reduction goal – achieving zero process water discharge by 2020.</p> <p>Barrick provides the most comprehensive water accounting of all the companies reviewed in this study.</p> <p>Xstrata discusses the company's three-year consultation with communities surrounding its El Morro project in northern Chile, an engagement which influenced the mine's final design and the decision to build a desalination plant to supply the site's entire water needs.</p> |

Key Findings by Sector

| Sector | Key Water Risks | Sector Findings | Company Highlights |
|--|---|---|--|
| <p>Oil & Gas</p> <p>Average score: 19 out of 100</p> <p>Top score: BP</p> | <p>Oil refiners face risks of higher shipping costs, non-availability of feedstock, and constraints on production when drought decreases river flows or limits water availability. In summer 2009, the Rhine River experienced unusually low water levels, leading to a 21 percent increase in the costs of transporting gasoline by barge.¹⁸</p> <p>Water availability is a significant constraint for operators in the Albertan oil sands. The water intensity of oil sands extraction and upgrading is high, yet many of the active oil sands projects in the region depend on the declining flows of the Athabasca River as their primary source of water.</p> <p>In the United States, federal and state governments will likely increase their oversight of potentially water-contaminating chemicals used for deep shale natural gas drilling. Federal legislation to regulate fracturing is currently being considered in the U.S. House of Representatives and the Senate.</p> | <p>Risk disclosure. Slightly more than half the oil companies report some exposure to physical risk, and all but one disclose some regulatory risk. Disclosure of litigation and reputational risk was limited to three and four companies, respectively.</p> <p>Reduction targets. Only two companies – both oil sands operators – disclose water use reduction targets. Total was the only oil company to report a wastewater reduction target.</p> <p>Supply chain engagement. No companies disclose engaging with suppliers on water management or risks, despite the sector’s significant reliance on contracted companies to perform drilling and shipping activities.</p> | <p>BP provides an interactive world map that allows readers to identify facilities operating in water-stressed regions and access short profiles of those sites.</p> <p>ConocoPhillips recently established a Qatar-based Global Water Sustainability Center focused on examining methods to treat and reuse byproduct water from oil production and refining operations.</p> <p>Suncor recently adopted a 10-year water management plan designed to recycle and reuse larger amounts of wastewater and tailings water. As part of this plan, Suncor set a target to reduce total water intake by 12 percent by 2015.</p> |
| <p>Semiconductors</p> <p>Average score: 21 out of 100</p> <p>Top score: Toshiba</p> | <p>Semiconductor manufacturing is highly water-intensive, requiring large volumes of water of the highest industrial quality. At the same time, a large number of semiconductor factories are located in arid or semi-arid regions of the world, such as the American southwest.</p> <p>Offshore production, in particular, heightens vulnerability to physical water risk. Semiconductor firms face increased physical risk in Asian and Pacific Rim countries. Currently, 11 of the top 14 integrated circuit foundries in the world are located in the Asia-Pacific region, accounting for over 75 percent of the industry’s sales.¹⁹</p> <p>Semiconductor firms face regulatory and litigation risks associated with groundwater contamination. Semiconductor operations in the United States have been subject to regulation and litigation linked to groundwater contamination.</p> | <p>Risk disclosure. Nearly two-thirds of the reviewed companies disclose water-related physical risks and regulatory risks, and more than one-third report on litigation risks.</p> <p>Supply chain disclosure. Although many semiconductor companies outsource a significant amount of chip production to other firms, only two companies provide information on actions taken with suppliers to improve environmental impacts.</p> <p>Stakeholder engagement. Intel was the only semiconductor company to report collaborating with stakeholders on water resource management.</p> | <p>Intel reports working with the city of Chandler, Arizona to implement a water management system that has lowered Intel Arizona’s daily water demand by up to 75 percent. The company uses a combination of reclaimed wastewater and water recycling to meet its needs.</p> <p>ST Microelectronics discloses the financial savings achieved from its water reduction efforts, totaling \$119 million over a five-year period.</p> <p>Texas Instruments notes that when siting new facilities it considers local water supplies and consults with local water authorities to assess the long-term water needs.</p> |

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13. CA DWR, “Senate Bill (SB) 610/ Senate Bill (SB) 221 Guidebook FAQs,” California Department of Water Resources, Division of Statewide Integrated Water Management: Water Use and Efficiency, 2009.
14. “EPA Issues Rule to Reduce Water Pollution from Construction Sites,” U.S. Environmental Protection Agency, press release, November 23, 2009.
15. Susan Charles and Shantell Feaser, “United States: Construction and Development Industry Receives New and Costly Pollutant Control, Monitoring and Reporting Requirements,” Mondaq, December 22, 2009. See: <http://www.mondaq.com/unitedstates/article.asp?articleid=91556>
16. Tania Mellado, “Peru farmers threaten strike over gold mine, water,” Planet Ark, September 9, 2004.
17. Erica Peterson, “EPA plans to veto Spruce Mine permit,” West Virginia Public Broadcasting, October 16, 2009. See: <http://www.wvpubcast.org/newsarticle.aspx?id=11690>
18. Rachel Graham and Nidaa Bakhsh, “Rhine Barge Rates for Oil Products Advance on Low Water Levels,” Bloomberg News, September 25, 2009. See: <http://www.bloomberg.com/apps/news?pid=20601100&sid=apg55vof0NcM>
19. Marc Levinson et al., “Watching water: A guide to evaluating corporate risks in a thirsty world,” JPMorgan Global Equity Research, March 31, 2008.

Recommendations for Companies

These findings highlight a number of opportunities for companies to significantly improve the relevance, depth, and clarity of their reporting on water:

- ✓ **Inclusion in financial filings.** Financial filings are the gold standard for reporting material information to investors, including material ESG risk factors like water scarcity. As underscored by the SEC's new interpretive guidance, companies should include material water risk factors and performance data in these filings in order to communicate management oversight and awareness of key risks and opportunities.
- ✓ **More detailed risk assessment.** Boilerplate disclosure of material water risks, even within financial filings, is not enough. Companies should assess and disclose material water risks in ways that provide investors with sufficient detail to understand the scale and scope of exposure, ideally referencing specific at-risk operations or supply chains, and attempting to quantify risks wherever possible.
- ✓ **Water accounting data that puts performance in context.** Aggregate data on corporate-wide water use and discharge is insufficient to provide investors with insight on key areas of risk. Companies should provide data broken down to the facility level for operations in water-stressed regions, and put the company's risk exposure in context by disclosing the percentage of facilities operating in areas of water stress.
- ✓ **Disclosure of management strategies and systems.** Corporate reporting should provide detailed explanation of how water risks are being assessed, addressed by key policies, and integrated into governance and management systems from the boardroom to the facility-level.
- ✓ **Setting and disclosing reduction targets.** Disclosing quantified water use and wastewater reduction targets communicates commitment, and helps investors gauge a company's capacity to minimize risks and prepare itself for a more water-constrained future. Targets are more credible when articulated with respect to high-risk operations, and when backed by detailed management plans.
- ✓ **Addressing water risks in the supply chain.** Where water use embedded in the supply chain accounts for a significant portion of the total water footprint, companies should disclose how they are collaborating with and evaluating suppliers on water risks and impacts, and should set goals to improve water performance in key supply chains.
- ✓ **Engaging critical stakeholders.** Companies should provide investors with an understanding of how they are working to mitigate significant water risks by engaging critical stakeholders on watershed management and protection, drinking water and sanitation issues, and on the water impacts of siting and expanding operations.
- ✓ **Seizing opportunities.** More companies are developing water-related product strategies that present significant market opportunities in an increasingly water-stressed world. Information on these strategies, including relevant product goals and investments is of growing interest to investors.

Recommendations for Investors

Investors should pursue the following steps to help drive better corporate water disclosure:

- ✓ **Engage companies.** Investors should engage the companies they own in key water-intensive sectors about how they are assessing and disclosing water risks and related performance information.
- ✓ **Ask asset managers to assess and engage companies on water and other ESG risks and opportunities.** Institutional investors should stipulate this to asset managers in requests for proposals (RFPs) and in annual performance reviews to ensure that the firms managing their money are giving water, climate, and other sustainability risks the attention they deserve.
- ✓ **Support investor and corporate initiatives to achieve increased water disclosure.** Among initiatives that investors should consider supporting are the Carbon Disclosure Project's water disclosure initiative and the United Nations' Principles for Responsible Investment's efforts to encourage more companies to sign on to the CEO Water Mandate and to meet key Mandate commitments, including increased water reporting.

Detailed Findings by Sector

BEVERAGE SECTOR

Freshwater is the primary and most important ingredient for the beverage sector, making beverage companies' operations especially vulnerable to climate-related risks affecting water availability and quality. In addition, for makers of soda, juice, and alcoholic beverages, the production of key raw material inputs – sugar, wheat, hops, corn, grapes, and various fruits – is in many cases water-intensive.

Overview: Water-Related Risks for the Beverage Sector

The beverage sector's operations are especially vulnerable to water-related physical, reputational, and regulatory risks – as reflected in many of the firms' disclosures.

Physical Risks

For beverage makers that rely on large, global networks of bottling plants, access to high quality freshwater is essential to maintaining the quality and safety of products. Multinational beverage companies like PepsiCo and The Coca-Cola Company are expanding their operations more broadly within emerging markets such as China and India, where surface and groundwater supplies are often polluted – or increasingly stressed due to a changing climate and competing water demands by communities, agriculture, and industry.

Beverage firms face risks related to the availability and price of agricultural inputs to the degree that changing weather conditions and drought affect the size or quality of agricultural production, particularly if crop production cannot be easily shifted. Global sugar prices have reached a 28-year high, in part due to lower production in India, which is the world's second-largest sugar producer. Drought in India led to a 2008 sugar crop yield 45 percent lower than the previous year, and the 2009-2010 harvest is expected to yield similarly low levels.²

Makers of alcoholic beverages face particular water-related challenges due to the regional nature of grape- and hop-growing. The Australian beverage industry was exceptionally hard hit by the country's 2006–2007 drought. Winemakers saw production losses of 28 percent and in order to meet irrigation demand, several Australian wine and beer companies purchased water on the open market for the first time.³ In the United States, a 2006 study by the National Academy of Sciences predicted that increases in the frequency of days of extreme heat could shrink the premium wine-grape production area by up to 81 percent by the late 21st century.⁴ A 2009 study found that production of Saaz hops — the delicate variety grown in Europe to make pilsner lager – has decreased in recent years due to rising temperatures.⁵

“We're focusing on water because it's the main ingredient in nearly every product we make... because all of our products are made by local people in local communities, which means the success of our business depends on the availability of local water resources.”

— E. Neville Isdell, former Chairman and CEO, The Coca-Cola Company¹

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1. E. Neville Isdell, Former Chairman and CEO, The Coca-Cola Company, “Remarks at the Business for Social Responsibility Conference,” New York, NY, November 8, 2006. See: http://www.thecoca-colacompany.com/presscenter/viewpoints_isdell_BSR2006.html
 2. Dana Krechowicz, “Environmental Challenges for the Food and Beverage Industry,” World Resources Institute, August 27, 2009. See: <http://www.wri.org/stories/2009/08/environmental-challenges-food-and-beverage-industry>
 3. “Growing Grapes, Not Rice,” *The New York Times*, April 16, 2008. See: http://www.nytimes.com/imagepages/2008/04/16/business/20080416_WARM2_GRAPHIC.gif.html
 4. M.A. White et al., “Extreme heat reduces and shifts United States premium wine production in the 21st century,” *Proc. Natl. Acad. Sci. USA*, July 25, 2006 vol. 103 no. 30 11217-11222
 5. “Climate change depresses beer drinkers,” *New Scientist*, September 13, 2009. See: <http://www.newscientist.com/article/mg20327253.400-climate-change-depresses-beer-drinkers.html>

Reputational Risks

Beverage manufacturing requires high quality source water, which can put the industry's water use in direct competition with local populations' water needs for drinking, food production, and other vital uses. Large water withdrawals – real or perceived – can result in controversies in regions where water is scarce and local populations lack access to affordable drinking water. Conflict can also erupt when community awareness of the ecological value of regional water sources prompts opposition to the introduction or expansion of beverage or bottling plants. For example, after years of organized opposition by local residents and environmental NGOs, Nestlé Waters announced in September 2009 that it had decided to scrap plans entirely to bottle spring water in McCloud, California.⁶

Consumer campaigns calling for boycotts against bottled water in certain markets also present a risk. Consumer demand for bottled water is growing rapidly in many countries, but flagging in the United States, as a result of both the recession and growing consumer concern – prompted by aggressive activist campaigns – about the environmental impacts of the product. In August 2009, *The Wall Street Journal* reported that U.S. sales of bottled water dropped six percent, or \$7.6 billion, from July 2008 to July 2009.⁷ In addition, city governments including Seattle, New York, and San Francisco, responding to activist and citizen pressure, have recently cut contracts with bottled water companies.^{8,9}

Regulatory Risks

Beverage companies must meet wastewater discharge standards in many regions of the world, including North America and the European Union. Regulatory pressure on beverage companies is growing elsewhere, including China. In August 2009, for example, the Beijing Development and Reform Commission, the city's economic planning agency, put 12 international and local brewers, beverage producers, and dairy companies on its "List of Major Water-Polluting Enterprises." The Commission announced that the beverage producers on the list would be subject to increased supervision and asked to submit plans to reduce wastewater discharge and energy use.¹⁰

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6. Associated Press, "Nestle pulls plug on controversial bottling plant," *MercuryNews.com*, September 10, 2009. See: http://www.mercurynews.com/news/ci_13310768
 7. Valerie Bauerlein, "Bottled-Water Price War Heats Up as Demand Falls," *The Wall Street Journal*, August 31, 2009. See: <http://online.wsj.com/article/SB125167502443470973.html>
 8. Jennifer Lee, "City Council Shuns Bottle in Favor of Water From Tap," *The New York Times*, June, 17, 2008.
 9. Sandy Bauers, "The newest public enemy: bottled water," *The Seattle Times*, November 12, 2007.
 10. "PepsiCo, Coca-Cola reject Beijing environmental watch list," *LiveMint.com*, August 20, 2009. See: <http://www.livemint.com/2009/08/20154213/PepsiCo-Coca-Cola-reject-Beij.html>

Findings: Water Risk Disclosure in the Beverage Sector

Key Findings

The beverage sector demonstrated the second-best water risk disclosure of all the sectors reviewed, with an average score of 24 out of 100. UK-based Diageo achieved the highest level of water risk disclosure in the sector, scoring 43 points; Dr Pepper Snapple demonstrated the weakest disclosure, with a score of eight.

- **Water accounting.** Seventy percent of the beverage companies reviewed disclose water use data, but only forty percent report data on wastewater discharge.
- **Water use reduction targets.** Sixty percent of beverage companies report water use reduction targets, while only one company – Diageo – provides a quantified wastewater discharge goal.
- **Differentiation by region.** Diageo was also the only company to report differentiated water use reduction targets for facilities in water-stressed versus non-stressed regions of the world.
- **Physical risk from scarcity.** Nearly all the beverage companies surveyed disclose some level of physical risk related to water scarcity, particularly in regard to their supply chains.
- **Supply chain.** Despite disclosing physical risk in their supply chains, only three companies report collaborating with suppliers to reduce water risks and impacts.
- **Stakeholder engagement.** The beverage sector reports significant engagement and collaboration with local stakeholders on watershed management, safe drinking water, and sanitation.

Company Highlights

PepsiCo discloses adopting a policy in support of the human right to water – a first among publicly traded global corporations.

SABMiller profiles its efforts to measure the water footprint of its agricultural supply chain in South Africa, reporting that an average of 155 liters of water is used to produce one liter of beer.

Beverage: Quality of Water Risk Disclosure*

| | Water accounting | Risk assessment | Direct operations | Supply chain | Stakeholder engagement | Totals** |
|--------------------------------------|------------------|-----------------|-------------------|--------------|------------------------|------------|
| Potential points per category | 36 | 24 | 27 | 7 | 6 | 100 |
| Diageo | 16 | 4 | 21 | 0 | 2 | 43 |
| Anheuser-Busch InBev | 12 | 2 | 17 | 0 | 3 | 34 |
| The Coca-Cola Company | 4 | 6 | 16 | 4 | 4 | 34 |
| SABMiller | 9 | 4 | 11 | 2 | 4 | 30 |
| PepsiCo | 1 | 10 | 11 | 3 | 4 | 29 |
| Heineken | 10 | 4 | 10 | 0 | 1 | 25 |
| Pernod Ricard | 10 | 0 | 7 | 0 | 1 | 18 |
| Brown-Forman | 4 | 4 | 3 | 0 | 3 | 14 |
| Constellation Brands | 0 | 8 | 1 | 0 | 0 | 9 |
| Dr Pepper Snapple | 0 | 4 | 4 | 0 | 0 | 8 |

Evaluation key

Water accounting: Data on water use, wastewater discharge, and supplier water use.

Risk assessment: Disclosure of water-related physical, regulatory, reputational and litigation risks.

Direct operations: Disclosure of water-related policies, management systems, non-compliance, conservation activities and reduction targets.

Supply chain: Disclosure of supplier collaboration, assessment, and target-setting related to water risk.

Stakeholder engagement: Disclosure of engagement with local, national and international stakeholders to preserve watersheds and improve access to safe drinking water and sanitation.

*Based on most recent annual financial filings and sustainability reports available as of 6/30/09.

**Companies were scored on an overall scale of 0–100 possible points.

SABMiller: Measuring Water Use in the Supply Chain

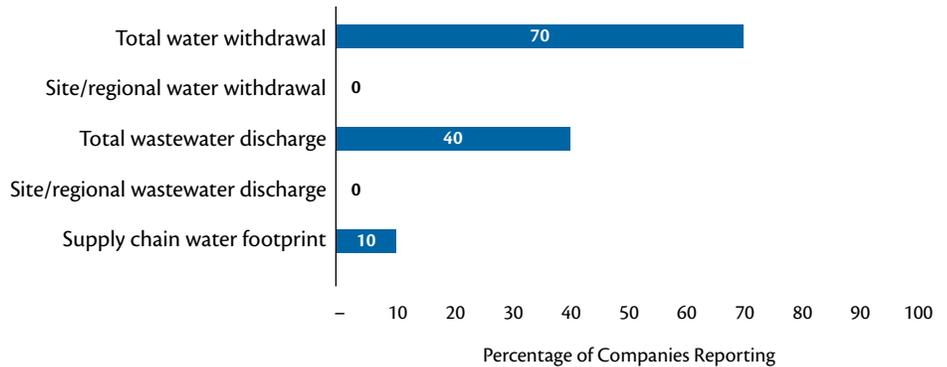
SABMiller describes its effort to measure the water footprint of its South African supply chain:

“Undertaken with strategic advice from WWF, the work identified not only how much water is used at each stage of the value chain, but also the proportion of available local water resources that this represents... [it was] determined that a net total of 155 liters of water is used to produce one liter of beer in South Africa and that more than 95 percent of this amount is used in the agricultural phase.”

Source: SABMiller, “SABMiller Sustainable Development Report 2009.”

See: http://www.sabmiller.com/files/reports/2009_SD_report.pdf

Beverage Sector: Water Accounting Disclosure



Findings by Indicator

1. Disclosure of Water Accounting

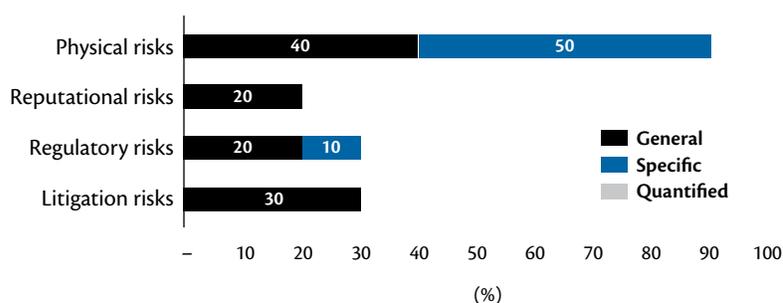
Seven of the 10 surveyed beverage companies report data on their total water usage for owned and operated facilities. Anheuser-Busch provides a comprehensive breakdown of water use by product line, as well as by source. Diageo and SABMiller also break down water use data by the source of withdrawals (municipal, ground or surface water) and average use by region of the world. The Coca-Cola Company’s water use data extends beyond the typical scope to include data on the water performance of the company’s bottlers – the majority of which the company does not control or own.

None of the beverage companies present water use data broken down by the site or facility level. Diageo stood out, however, for presenting total water use by facilities in water-stressed versus unstressed regions of the world.

Only four beverage companies report data on wastewater discharge. Of these, Anheuser-Busch and Diageo also provide data on destination of discharge. None of the beverage companies reviewed disclose local-level data on wastewater discharge.

SABMiller was the only beverage company to report an estimate of the water use embedded in the company’s supply chain.

Percentage of Beverage Companies Reporting Water-Related Risks



2. Disclosure of Risk Assessment

All beverage companies reviewed – with the exception of Pernod Ricard – report some level of physical risk related to water scarcity. SABMiller, for example, mentions that scientists anticipate that climatic changes will bring about challenges in both the sourcing of water as a raw material and the handling of wastewater at the end of the brewing process.

Only PepsiCo and Heineken report reputational risks specific to water and the environment. PepsiCo, for instance, notes these risks in its 2008 10-K filing, stating that “...water is a limited resource in many parts of the world. Our reputation could be damaged if we do not act responsibly with respect to water use.”

Three companies disclose regulatory risks related to water or wastewater discharge: Constellation Brands, PepsiCo, and The Coca-Cola Company.

Likewise, only three companies disclose litigation risks: Brown-Forman, Dr Pepper Snapple, and PepsiCo.

PepsiCo: Respecting the Human Right to Water

PepsiCo discloses adopting a policy in support of the human right to water—a first among publicly traded global corporations.

The company notes that “[w]e at PepsiCo respect the human rights recognized by the countries in which we operate, and will not take any action that would undermine a state’s obligation to its citizens to protect and fulfill the Human Right to Water and, absent of a country’s Human Right to Water Policy, we commit to operate within the principles of the Human Right to Water Policy as defined by the United Nations.”

PepsiCo’s policy includes commitments to ensure that its activities preserve the quality, availability, and affordability of water resources for local communities. PepsiCo also agrees to involve communities in its plans to develop water resources.

Source: PepsiCo, “Performance with a Purpose: Water.” See: <http://www.pepsico.com/Purpose/Environment/Water.html>

Anheuser-Busch and Coca-Cola on Water Management

Anheuser-Busch describes its in-house Water Council: “Anheuser-Busch works to protect watersheds within the communities where we do business through restoration activities, education and awareness, water-use reduction measures and innovative water management techniques. Formed in 2002, the Anheuser-Busch Water Council is composed of representatives throughout the company with expertise in water policy who focus on water supply and quality. The Water Council tracks information regarding water and watershed quality, water supply, and climate change in order to identify trends and potential future impact. Teams throughout the company then set targets for their areas to implement programs and align their policies to achieve the company’s overall water objectives.”

Coca-Cola reports revising the company’s Standard for Source Water Protection, which includes water source mapping, source vulnerability assessments, and development and implementation of source water protection plans. It expects each plant in its global system to have a Source Water Protection Plan in place by 2013. The company notes that “[it] will continue to consider water resources when planning new manufacturing sites, deciding on plant closings, making acquisitions or expanding production at existing plants.”

Sources: Anheuser-Busch Company, “Anheuser-Busch Water Council.” See: <http://www.ourpledge.com/Environment/ABWaterCouncil.html>;

The Coca-Cola Company, “2007/2008 Sustainability Review.” See: http://www.theCoca-ColaCompany.com/citizenship/pdf/2007-2008_sustainability_review.pdf

Stakeholder Engagement for Water Resource Management

Coca-Cola reports partnering with the Environmental Law Institute to build the capacity of its staff and bottling partners to more effectively engage with community stakeholders in their water resource management activities. The project partners are conducting a series of capacity-building workshops to provide staff training on stakeholder engagement in water resources management. Recognizing the need for collective action in communities, the company plans to roll out the workshops globally in coming years.

PepsiCo reports that its Indian operations reduced water use in manufacturing by more than 55 percent over the past five years. In addition, it discloses that it is working with rice farmers near its facilities to reduce water intensity in paddy cultivation by around 30 percent. In 2007, PepsiCo piloted this program on 100 acres; it was scaled up to cover 1,000 acres in 2008. The company notes that “[t]he significant impact of this change can be gauged from the fact that if only 6,000 acres of paddy cultivation were shifted to direct seeding, it would offset the entire water used in PepsiCo India’s beverage plants.”

Sources: The Coca-Cola Company, “2007/2008 Sustainability Review.” See: http://www.theCoca-ColaCompany.com/citizenship/pdf/2007-2008_sustainability_review.pdf; PepsiCo, “2007 Sustainability Report.” See: http://www.pepsico.com/Download/PEPSICO_2007_Sustainability_Report.pdf

3. Disclosure of Direct Operations

Only four of the 10 beverage companies surveyed report information on their water management systems and policies. Of these, The Coca-Cola Company and Anheuser-Busch provide the most comprehensive descriptions.

Six of the 10 beverage companies reviewed disclose water use reduction targets. Of these, all provide time-bound, efficiency-based reduction targets on a per-product basis. None provide absolute reduction targets. Diageo stood out for providing differentiated reduction targets for facilities in water-stressed versus non-stressed regions of the world. Diageo was also the only beverage company to provide a quantified wastewater discharge goal: to reduce the “polluting power of effluent from our plants by 60 percent between 2007 and 2015.”¹¹

4. Disclosure of Supply Chain

Disclosure on water-related supplier engagement is low with only The Coca-Cola Company, PepsiCo, and SABMiller providing some level of reporting. Coca-Cola and PepsiCo, for example, both describe how they are working with their bottlers to improve water efficiencies in bottling operations. Coke also discusses that it is working with the World Wildlife Fund to assess the water footprint of its supply chain for sugar, a crop that requires approximately 180 liters of water to produce the amount of sugar needed for one liter of Coca-Cola.¹²

Coca-Cola was the only beverage company to disclose an effluent target that extends to its suppliers (bottling partners), as well as to its own plants. The company states a goal “to have 100 percent of our facilities aligned with our stringent internal wastewater standards by the end of 2010.”¹³ The specifics of the wastewater standard, however, are not reported.

5. Disclosure of Stakeholder Engagement

Seven of the 10 beverage companies reviewed report some level of water-related stakeholder engagement. A number of companies discuss their involvement with relevant international multi-stakeholder initiatives, such as the CEO Water Mandate, as well as their support of drinking water and sanitation projects around the world. Diageo, for example, highlights its contributions to the UN Millennium Development Goal to halve the proportion of people without sustainable access to safe drinking water. The company reports that, as of June 2008, it had begun or completed 40 water projects in 10 countries, supporting technologies ranging from rainwater harvesting to water filters to boreholes. An independent evaluation confirmed that the projects provided water to an additional 1.18 million people around the world.¹⁴

Several beverage companies, including Brown-Forman, SABMiller, Coca-Cola and PepsiCo discuss specific strategies related to preserving or restoring watersheds in which they operate.

11. Diageo, “Corporate Citizenship Report 2008.”

12. The Coca-Cola Company, “2007–2008 Sustainability Review.”

13. Ibid.

14. Diageo, “Corporate Citizenship Report 2008.”

CHEMICALS SECTOR

The chemicals sector uses a significant quantity of water for core production processes such as cooling, cleaning, dissolving, and diluting, as well as generating steam. The industry also has significant impacts on water quality through wastewater discharges and potential spills associated with the manufacture and storage of chemicals.

It is the industry's products, however – the thousands of chemical compounds and applications sold for use by downstream industries and consumers – that affect water resources the most. Many chemical compounds pose significant risks of contaminating surface or groundwater and thereby damaging aquatic life and human health. Chemical firms also play a significant role in the global water industry itself, supplying products that sterilize, purify and desalinate water for residential and industrial use. In addition, a number of life sciences-based chemical companies are developing drought-resistant seeds and other agricultural inputs designed for an increasingly water-stressed world.

“Water is today’s issue. It is the oil of this century — not a question.”

—Andrew Liveris, Chairman and CEO,
Dow Chemical Co.¹⁵

Overview: Water-Related Risks for the Chemicals Sector

The chemicals sector's operations are vulnerable to all four water-related risks: physical, reputational, regulatory, and litigation.

Physical Risks

The chemicals sector's reliance on high volumes of water and growing global presence makes it vulnerable to water scarcity. Increasingly, the industry's manufacturing footprint is expanding from its historical base in North America, Europe and Japan to more water-stressed regions of the world including the Middle East, India, and China.¹⁶

Reputational Risks

Chemical companies face reputational risks related to accidents, spills, or product impacts on water resources and the environment. For example, even eight years after acquiring the assets of Union Carbide, Dow Chemical continues to be under fire for failing to remediate water and soil contamination and to provide compensation to the 150,000 residents of Bhopal, India suffering from the effects of a massive explosion at a Union Carbide factory over twenty years ago. As recently as February 2009, the state of Maharashtra, India ordered Dow to relocate a proposed research center after local villagers attacked the construction site and set fire to an office and company vehicles over concerns the facility would pollute the area as it had in Bhopal.¹⁷

15. “UN chief urges world to put looming water crisis at top of global agenda,” *U.S. Water News Online*, February 2008. See: <http://www.uswaternews.com/archives/arcglobal/8unxxchie2.html>

16. Patricia Costa, “China and India: A Comparative Study of the Manufacturing and Services Industries,” International Economic Development Program, Ford School of Public Policy, University of Michigan, April, 2004.

17. Rina Chandran and Kritivas Mukherjee, “India State to Shift Dow Site After Protests: Report,” *Reuters*, February 2, 2009. See: <http://www.reuters.com/article/idUSTRE5111D020090202>

Reputational risks also exist for new or emerging technologies like nanotechnology, which may have the potential to affect water and aquatic ecosystems. Nanosilver, known for its antimicrobial properties, can be added to plastics – such as food containers, water bottles, countertops, shower curtains, and floor coverings – as well as to textiles and building materials. In the United States, numerous consumer, health, and environmental groups have petitioned the EPA for tighter regulation of nanosilver, claiming that nanosilver products have novel properties that can leach into water and may pose unknown risks to human health and the environment.¹⁸

Regulatory Risks

Chemical companies operating in the European Union face growing pressure to phase out the production of chemicals that significantly affect water resources and human health. The EU's Water Framework Directive, enacted in 2000, is driving the phase out of 33 priority chemicals with the goal of improving water quality in key river basins. By June 2011, REACH – the EU regulation that addresses the production and use of chemicals with potential impacts on human health and the environment – will require users of “substances of very high concern” to develop plans to replace these chemicals with safer alternatives.¹⁹

In September 2009, the Obama administration announced new principles to guide Congress in updating the 33-year-old law that governs how the EPA controls toxic chemicals, saying the current law is inadequate to protect against risks.²⁰ The proposed changes would require manufacturers to supply enough information to conclude that new and existing chemicals are safe and don't endanger public health or the environment.

The EPA simultaneously announced a sweeping set of changes to its enforcement of existing chemicals regulation, noting that it intends to utilize the full array of regulatory tools under the Toxic Substances Control Act to address risks, including authority to label, restrict, or ban chemicals.²¹ In December 2009, for the first time, the agency used its authority to list four categories of high-risk chemicals, beginning a process that could lead to further regulation of these chemicals.²²

New legislation on chemical plant security is also working its way through the U.S. Congress. In November 2009, the U.S. House of Representatives passed the Chemical and Water Security Act of 2009 (H.R. 2868).²³ This legislation requires high-risk chemical plants in the United States to switch to “safer processes” such as reducing production, processing, storage, and use of dangerous chemicals, or changing the characteristics of chemicals to make them less dangerous.

18. Andrew Schneider, “Experts Explore Risks of Nanotechnology in Clothes,” *Sphere*, December 4, 2009.

19. “Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals,” *Official Journal of the European Union*, December 30, 2006. See: <http://eur-lex.europa.eu/JOHtml.do?uri=OJ:L:2006:396:SOM:en:HTML>

20. Sara Goodman, “Experts Debate Ways to Reform 1976 Toxics Law,” *The New York Times*, October 7, 2009. See: www.nytimes.com/.../07greenwire-experts-debate-ways-to-reform-1976-toxics-law-83495.html

21. Lisa P. Jackson, “Enhancing EPA's Chemical Management Program,” U.S. Environmental Protection Agency. See: <http://www.epa.gov/oppt/existingchemicals/pubs/enhanchems.html>

22. “U.S. EPA Will List, Possibly Regulate, Chemicals of Concern,” *Environmental News Service*, December 31, 2009. See: http://www.local15tv.com/news/environmental/story/U-S-EPA-Will-List-Possibly-Regulate-Chemicals-of-wey_UnhN9UmcaffQg9oocA.csp

23. 11th Congress, 2009-2010, H.R. 2868. See: <http://www.govtrack.us/congress/bill.xpd?bill=h111-2868>

In China, regulation of the chemicals sector's water impacts is still weak, but the country's environmental regulatory agency, SEPA, faces mounting pressure to improve oversight of the country's waterways. A recent government survey of the Chinese chemicals industry revealed that nearly half of the country's 21,000 chemical plants are sited near drinking water supplies along the Yangtze and Yellow Rivers.²⁴ In November 2005, 100 tons of carcinogenic benzene were released into the Songhua River after an explosion at a petrochemical plant – leaving nearly four million people without water for four days.²⁵ The incident, the largest and most publicized chemical spill in Chinese history, triggered a revision of the country's Water Pollution Control Law. The new act, announced in February 2008, raised penalties, eliminated some loopholes and introduced environmental regulation as a measure of local government performance.²⁶

Litigation Risks

Chemical companies face significant litigation risks linked to water-related impacts from their facilities and products. For example, 43 water systems in six U.S. states – Illinois, Indiana, Iowa, Kansas, Mississippi and Ohio – are in litigation with the makers of Atrazine (a popular weed killer that the EU banned in 2004) to force the company to pay to remove the chemical from drinking water.²⁷

24. Jennifer L. Turner, "In Deep Water: Ecological Destruction of China's Water Resources," Wilson Center, 2007. Ch. 5. See: http://wilsoncenter.org/index.cfm?topic_id=1421&fuseaction=topics.documents&group_id=396236

25. "Northeast cleans up after chemical blast," *Asia Times*, November 30, 2005.

26. Nadya Ivanova, "China's Dirty Water Leads to Protests, Some Reform," *Circle of Blue News*, September 9, 2009. See: <http://www.circleofblue.org/waternews/2009/world/chinas-dirty-water-leads-to-protests-some-reform/>

27. Charles Duhigg, "Debating How Much Weed Killer Is Safe in Your Water Glass," *The New York Times*, August 22, 2009. See: http://www.nytimes.com/2009/08/23/us/23water.html?_r=2

Company Highlights

Dow reports construction of a new Water Technology Development Center to support the company's goal of driving a 35 percent reduction in the cost of water reuse and desalination technologies by 2015.

DuPont is one of the only companies in the study to disclose an absolute reduction target for water use. The company has a 10-year goal to reduce water consumption by at least 30 percent at company facilities located in water-scarce or stressed regions.

Findings: Water Risk Disclosure in the Chemicals Sector

Key Findings

The chemicals sector showed weak water risk disclosure overall, with an average score of 19 out of 112. The Japanese firm Mitsui achieved the highest score in the sector with 33 points; Saudi Basic provided the weakest disclosure, coming in at five points.

- **Water accounting.** The sector showed strong disclosure of water accounting data. Eighty percent of the companies reviewed report data on water usage and wastewater discharge, and three companies provide site-level breakdowns of their water use.
- **Reduction targets.** Only three chemical companies – BASF, DuPont, and Sumitomo – report targets to reduce water use or wastewater discharge.
- **Risk disclosure.** Only one-third of chemical companies disclose water-related physical risks, but half disclose some form of regulatory risk.
- **Market opportunities.** Two-thirds of the chemical companies disclose market opportunities related to products that save water or improve water quality.

Chemicals: Quality of Water Risk Disclosure*

| | Water accounting | Risk assessment | Direct operations | Supply chain | Stakeholder engagement | Opportunities | Totals** |
|--------------------------------------|------------------|-----------------|-------------------|--------------|------------------------|---------------|------------|
| Potential points per category | 36 | 24 | 27 | 7 | 6 | 12 | 112 |
| Mitsui | 22 | 4 | 5 | 0 | 2 | 0 | 33 |
| Sumitomo Chemical | 20 | 2 | 6 | 0 | 1 | 3 | 32 |
| PotashCorp | 21 | 6 | 0 | 0 | 2 | 2 | 31 |
| DuPont | 3 | 8 | 8 | 0 | 2 | 2 | 23 |
| Monsanto | 11 | 4 | 2 | 0 | 3 | 3 | 23 |
| Syngenta | 9 | 4 | 3 | 0 | 2 | 4 | 22 |
| Dow | 6 | 6 | 4 | 0 | 0 | 5 | 21 |
| BASF | 10 | 2 | 4 | 0 | 1 | 3 | 20 |
| Reliance Industries | 10 | 0 | 6 | 0 | 1 | 0 | 17 |
| Mosaic | 0 | 12 | 3 | 0 | 0 | 0 | 15 |
| Praxair | 6 | 4 | 3 | 0 | 0 | 0 | 13 |
| PPG Industries | 0 | 4 | 6 | 0 | 0 | 1 | 11 |
| Air Liquide | 10 | 0 | 0 | 0 | 0 | 0 | 10 |
| Linde | 7 | 0 | 0 | 0 | 0 | 3 | 10 |
| Saudi Basic | 0 | 0 | 3 | 0 | 1 | 1 | 5 |

Evaluation key

Water accounting: Data on water use, wastewater discharge, and supplier water use.

Risk assessment: Disclosure of water-related physical, regulatory, reputational and litigation risks.

Direct operations: Disclosure of water-related policies, management systems, regulatory compliance, conservation activities and reduction targets.

Supply chain: Disclosure of supplier collaboration, assessment, and target-setting related to water risk.

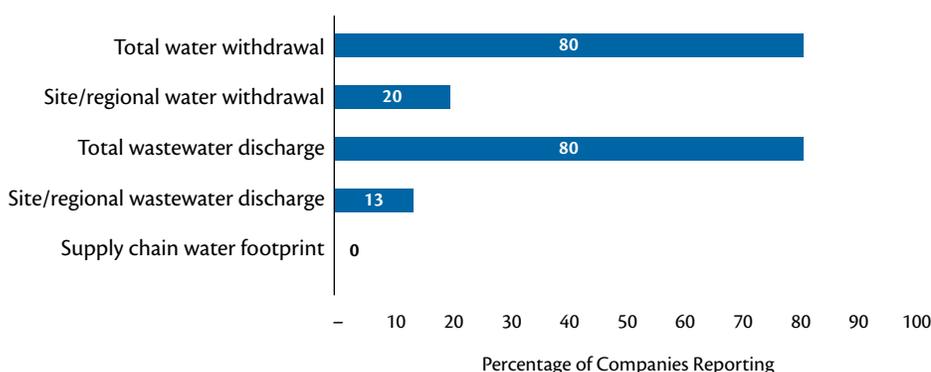
Stakeholder engagement: Disclosure of engagement with local, national and international stakeholders to preserve watersheds and improve access to safe drinking water and sanitation.

Opportunities: Disclosure of investment in and sales of water-efficient products.

*Based on most recent annual financial filings and sustainability reports available as of 6/30/09.

**Companies were scored on an overall scale of 0-112 possible points.

Chemicals Sector: Water Accounting Disclosure



Findings by Indicator

1. Disclosure of Water Accounting

The majority (12 of 15) of the chemical companies surveyed report some data on water usage. Only Mosaic, PPG Industries, and Saudi Basic failed to provide information on this indicator. Three companies – Mitsui, PotashCorp, and Sumitomo Chemical – disclose site-level water use data. All 12 companies that report water usage also report information on wastewater discharge. Only Sumitomo and Mitsui disclose site-level wastewater discharge data.

2. Disclosure of Risk Assessment

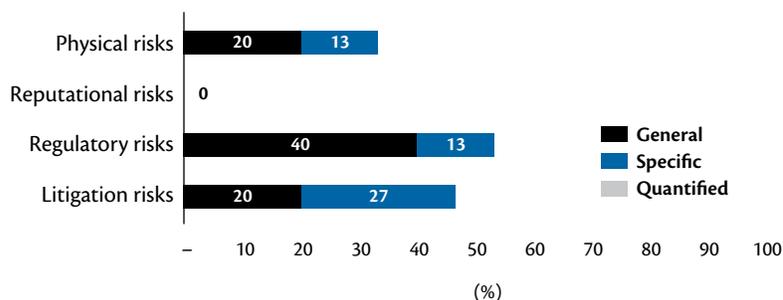
Only one-third (5 of 15) of chemical companies report water-related physical risks. Their disclosures highlight water scarcity, adverse weather conditions, excessive rainfall and hurricanes as potential water-related risks.

Fifty-three percent of companies disclose some form of regulatory risk, particularly with respect to changing government legislation related to groundwater contamination and remediation technologies.

Forty-seven percent present information on litigation risks.

None of the companies disclose any water-related reputational risks.

Percentage of Chemical Companies Reporting Water-Related Risks



Mitsui & PotashCorp: Detailed Water Accounting

Both Mitsui Chemicals and PotashCorp disclose comprehensive water performance data. Mitsui's 2008 CSR report provides four years of data on total water consumption. The data is further broken down to the site level, allowing the reader to compare performance across all the company's Japanese facilities. Similarly, Mitsui reports four years of contaminant discharges to water from each of its sites, including COD, nitrogen, and phosphorous. PotashCorp provides a similar level of detail across its operating sites, and also breaks down water use by business segment.

Sources: Mitsui, "CSR Report 2008." See: http://www.mitsuichem.com/csr/report/pdf/csr2008_e.pdf; PotashCorp, "Online Sustainability Report '08." See: http://www.potashcorp.com/media/pdf/sustainability/reports/2008/POT_SR2008.pdf

DuPont's Water Target

DuPont is one of the few companies in the entire study to disclose an absolute reduction target for water use. The company has set a 10-year goal to reduce water consumption by at least 30 percent at company facilities located in water-scarce or stressed regions. In addition to this goal, DuPont also commits to holding its company-wide water consumption flat on an absolute basis through the year 2015, offsetting any increased demand from production volume growth through conservation, reuse, and recycling.

Source: DuPont, "2008 Sustainability Progress Report." See: http://www2.dupont.com/Sustainability/en_US/assets/downloads/DuPont_2008_Sustainability_Progress_Report.pdf

Syngenta, Monsanto & BASF: Developing Drought-Resistant Products

Syngenta reports developing crop varieties that can tolerate drier conditions, including drought-resistant corn and sunflowers, rice strains with low water needs, and sugar beets that can grow in tropical climates. It highlights a new product – Invinsa™ – developed to protect crop yield during extended periods of high temperature and mild-to-moderate drought – in other words, conditions expected to result from climate change.

Monsanto has set a goal of reducing by one-third the amount of irrigated water needed to produce a metric ton of corn, cotton, soybeans or spring-planted canola in 2030, compared with the base year 2000. Its strategy is to develop seeds that produce higher-yielding crops with the same or fewer resources. To meet this goal, it has partnered with BASF on a \$1.5 billion R&D collaboration in plant biotechnology focused on increasing the drought-resistance of these crops.

Sources: Syngenta, "Annual Review 2008." See: <http://www.syngenta.com/ar2008/usingNatRes.html>; Monsanto, "2008-2009 Responsibility & Sustainability Report." See: http://www.monsanto.com/pdf/responsibility/2008-2009_mon_csr_report.pdf

3. Disclosure of Direct Operations

Over half (8 of 15) of the reviewed companies report information on general environmental management systems, but none provide information on water-specific management systems or policies. Only one-third disclose information on efforts to reduce water use or recycle water. Disclosure related to water quality is even poorer, with just three companies reporting on efforts to reduce wastewater discharge.

Only two chemical companies – DuPont and Sumitomo – disclose water use reduction targets. BASF and Sumitomo were the only companies reporting targets for wastewater discharge.

4. Disclosure of Supply Chain

None of the chemical companies reviewed disclose any programs or initiatives to engage suppliers on water use or water quality.

5. Disclosure of Stakeholder Engagement

More than half the chemical companies report engaging stakeholders on water resource management. Four of the 15 companies disclose some form of international-level stakeholder engagement, five companies discuss collaboration with local governments to address drinking water and sanitation issues, and three companies report watershed management efforts. Monsanto, for instance, reports partnering with The Nature Conservancy to work with farmers in the watersheds of the upper Mississippi River Basin to identify conservation techniques that best retain nutrients on-farm.

6. Disclosure of Water-Related Opportunities

Two-thirds (10 of 15) of the chemical companies reviewed disclose market opportunities related to products intended to save water or improve water quality. Four companies disclose new investments in R&D to bring more water-efficient products to market. For instance, Dow reports construction of a new Water Technology Development Center at the company's facilities in Tarragona, Spain to support the goal of driving a 35 percent reduction in the cost of water reuse and desalination technologies by 2015. Similarly, DuPont stated that it aims to double investment in water-related R&D programs to \$640 million by 2015.

Agricultural chemical makers Syngenta and Monsanto both discuss new product lines aimed at helping farmers to produce more crops with less water. BASF highlights a new plastic used in filter membranes for cleaning and treating water. Linde reports on the company's CO₂-based water treatment technologies.

ELECTRIC POWER SECTOR

The U.S. electric power industry accounts for 41 percent of the country's total freshwater withdrawals, requiring an estimated 136 billion gallons a day for generating and then cooling the steam that drives electric turbines.²⁸ The water-intensiveness of electric power generation varies both by cooling technologies used (e.g. once-through versus and closed-cycle cooling) and by fuel stock, with fossil fuels and nuclear power requiring more water for cooling than wind, natural gas, and photovoltaic solar power.^{29, 30}

Electric power plants – particularly those fueled by coal – are also major sources of heavy metal pollution in waterways, and account for 94 percent of all water releases of arsenic in the United States.³¹ Traditionally power plants have emitted the heavy metals from combusted fuels into the air via smoke stacks. However, due to stronger air pollution laws, these contaminants are increasingly collected in air pollution filtering devices and then added to plants' wastewater effluent, which is discharged into lakes and rivers.³²

Overview: Water-Related Risks for the Electric Power Sector

The electric power sector faces significant physical, regulatory, and litigation risks related to water.

Physical Risks

Water scarcity and unpredictability of supply may pose significant risks to electric power operations. Severe drought in the southeastern United States in 2007-2008 brought several power plants within days of a forced shut down due to lack of water for cooling.^{33, 34} Since 2000, ongoing drought conditions in the western United States have threatened hydroelectric operations at Nevada's Hoover Dam, jeopardizing a significant source of power for Los Angeles.³⁵ Scientists predict that by 2025 water scarcity will result in constraints on electricity production in Arizona, Utah, Texas, Louisiana, Georgia, Alabama, Florida, California, Oregon, and Washington.³⁶

28. Joan F. Kenny, et al., "Estimated Use of Water in the United States in 2005," *U.S. Geological Survey Circular 1344*. See: <http://water.usgs.gov/watuse/data/2005/>

29. "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.

30. Concentrated (as opposed to photovoltaic) solar power systems can be water-intensive, requiring equivalent amounts of water as some coal plants if water-cooling rather than air-cooling is used.

31. Piper Crowell and John Rumpel, "Wasting Our Waterways: Toxic Industrial Pollution and the Unfulfilled Promise of the Clean Water Act," *Environment America Research & Policy Center*, Fall 2009.

32. Charles Duigg, "Cleansing the Air at the Expense of Waterways," *The New York Times*, October 12, 2009. See: <http://www.nytimes.com/2009/10/13/us/13water.html>

33. Lateef Mungin, "Two off-line power plants help region hit water goal," *The Atlantic Journal-Constitution*, December 20, 2007.

34. Associated Press, "Drought could shut down nuclear power plants," January 23, 2008. See: <http://www.msnbc.msn.com/id/22804065/>

35. John Lippert and Jim Efstathiou Jr., "Las Vegas Running Out of Water Means Dimming Los Angeles Lights," *Bloomberg News*, February 26, 2009. See: http://www.bloomberg.com/apps/news?pid=20601109&sid=a_b86mnWn9.w

36. S.R. Bull et al., "Effects of climate change on energy production and distribution in the United States," U.S. Climate Change Science Program, Washington, DC, 2007, pp. 45-80.

Hydropower is likely to be most directly affected by climate change because of its sensitivity to the amount and timing of natural water flows.³⁷ In the Atlanta area, hydroelectric power generation by the local utility declined 51 percent in 2007 due to drought, forcing the utility's parent firm, Southern Company, to buy \$33 million in carbon-intensive fossil fuels to replace the lost power.³⁸ In the Pacific Northwest, hydropower accounts for approximately 70 percent of the electrical energy generated. A recent study projecting the effects of climate change on energy supply in the region found that substantial changes in the amount and seasonality of water supply would lead to an estimated decrease in regional hydropower production during summer months of nine to 11 percent by 2020.³⁹

Water scarcity may also constrain deployment of carbon capture and storage (CCS) technologies by the electric power sector. In the United States, major investments are already being made in projects to store underground carbon emissions generated by coal-fired power plants – three commercial scale CCS projects are currently underway – and more are expected if federal climate change legislation is passed.⁴⁰ However, CCS technology significantly increases overall cooling requirements and can therefore increase water use by up to 90 percent.⁴¹ This is particularly problematic for electric power companies operating in regions of the United States that depend on coal for fuel supplies but face growing water constraints, such as the southeast.

Regulatory Risks

Reduced water for cooling and higher temperatures of available water pose increased regulatory risk for electric utilities. In many countries, including the United States, regulations limit the temperature of water discharged by power plants, in order to mitigate heat-related damage to aquatic species. When a heat wave raises river temperatures, power plants – particularly nuclear plants – may not achieve sufficient cooling within permit limits, and may be forced to reduce their power output. During the 2003 heat wave in France responsible for approximately 15,000 deaths, 17 nuclear reactors had to reduce power output because of the high temperatures of cooling water.⁴²

37. IPCC, "Climate Change Impacts, Adaptation, and Vulnerability," Contributions of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge and New York: Cambridge University Press, 2007.

38. Justin Rubner, "Drought hits Hydropower," *Atlanta Business Chronicle*, November 16, 2007. See: <http://atlanta.bizjournals.com/atlanta/stories/2007/11/19/story2.html>

39. Alan F. Hamlet, et. al., "Effects of projected climate change on energy supply and demand in the Pacific Northwest and Washington State," Department of Civil and Environmental Engineering, University of Washington, 2008.

40. "Secretary Chu Announces \$3 Billion Investment for Carbon Capture and Sequestration," U.S. Department of Energy, press release, December 4, 2009.

41. Carry King, "Water Demand Projections for Power Generation in Texas," Prepared for the Texas Water Development Board, *Bureau of Economic Geology*, August 31, 2008.

42. Marc Poumadere, et al. "The 2003 Heat Wave in France: Dangerous Climate Change Here and Now." *Risk Analysis*, Vol. 25, No. 6. December 2005, pp. 1483-1494.

Regulatory denial of power plant construction permits based on water concerns is unprecedented and expected to increase. In 2004, local regulators rejected a proposed 720 MW plant near Kingman, Arizona because of concerns about how much water it would draw from the local aquifer.⁴³ In 2006, the Idaho state assembly unanimously passed a moratorium on the construction of new coal-fired power plants due to water and other environmental concerns, leading Sempra Energy to scrap its plans to build a 1,200 MW power plant in the state.⁴⁴

Wastewater discharges from coal plants contaminate waterways and local drinking supplies, and will face stricter regulation in the United States. In September 2009, the EPA announced its intention to revise existing rules for water discharges from coal-fired power plants.⁴⁵ The EPA's decision is driven by the high level of pollutants in coal plant discharges and the expectation that these discharges will increase significantly in coming years, as new air pollution equipment is installed. These rules will for the first time regulate the significant volume of arsenic, mercury, selenium, lead and similar pollutants released annually in the plants' wastewater streams.⁴⁶

Coal combustion waste is likely to be regulated and coal ash impoundments are facing heightened scrutiny. Toxic waste from coal-fired power plants became a national concern in December 2008 when the Tennessee Valley Authority's Kingston plant spilled 1.1 billion gallons of coal ash into a river, an accident heralded as the biggest environmental disaster of its kind.⁴⁷ The clean-up costs for the spill are estimated at up to \$1.2 billion, not including potential litigation costs or fines.⁴⁸ In August 2009, the EPA issued a report identifying 584 coal ash dumps across the country, more than twice the number than had been previously identified.⁴⁹

The EPA is currently considering whether to regulate coal combustion waste as hazardous waste and/or whether to regulate the structural integrity of coal ash surface impoundments through wastewater discharge permits.⁵⁰ A 2007 analysis by the Department of Energy pegged the industry's costs of meeting coal ash regulation based on receiving a "hazardous" designation as high as \$11 billion a year.⁵¹

43. April Reese, "Western Power Plants Come Under Scrutiny as Demand and Drought Besiege Supplies," *Land Letter*, March 4, 2004.

44. Craig D. Rose, "Sempra Abandons Bid to Build 2 Coal-Fired Electric Plants," *The San Diego Union-Tribune*, March 30, 2006. See: http://www.redorbit.com/news/science/451070/sempra_abandons_bid_to_build_2_coalfired_electric_plants/index.html

45. "EPA Expects to Revise Rules for Wastewater Discharges from Power Plants," U.S. Environmental Protection Agency, press release, September 15, 2009.

46. Taryn Luntz, "EPA to Limit Metal Discharges From Coal Plants," *The New York Times*, September 15, 2009. See: <http://www.nytimes.com/gwire/2009/09/15/greenwire-epa-to-limit-metal-discharges-from-coal-plants-62391.html>

47. *Ibid.*

48. "TVA Reports Fiscal Year 2009 Financial Results," Tennessee Valley Authority, press release, November 25, 2009.

49. Sue Sturgis, "EPA reveals almost twice as many dangerous coal ash dumps as previously known," *Facing South*, The Institute for Southern Studies, August 31, 2009. See: <http://www.southernstudies.org/2009/08/epa-reveals-almost-twice-as-many-dangerous-coal-ash-dumps-as-previously-known.html>

50. "Coal Combustion Residue: Status of EPA's Efforts to Regulate Disposal," U.S. Government Accountability Office, press release, October 30, 2009. See: <http://www.gao.gov/new.items/d1085r.pdf>

51. Shaila Dewan, "Hundreds of Coal Ash Dumps Lack Regulation," *The New York Times*, January 6, 2009. See: <http://www.nytimes.com/2009/01/07/us/07sludge.html>

Litigation Risks

Electric power companies face scrutiny and potential legal action from advocacy groups, communities, and residents over their use of and impacts on freshwater.

In 2009, Virginia Power, a division of Dominion Resources, lost a legal challenge by an environmental group contesting its right to draw one million gallons of water per minute per reactor from a man-made lake to cool its plant in Louisa county, Virginia.⁵² The Richmond Circuit Court ruled that Virginia Power's water quality permit violated the Clean Water Act, delaying construction of an additional nuclear reactor on the site.⁵³

Inter-state legal battles over water rights can affect electric power companies.

Georgia, Florida, and Alabama have been fighting for nearly 20 years over how to allocate water from the shared Apalachicola-Chattahoochee-Flint river basin. All three states have seen significant population and economic growth in recent decades, and thus increased residential and industrial demand for water. Georgia, in particular, has been gripped by drought. In July 2009, a federal judge ruled that the U.S. Army Corps of Engineers had been illegally drawing water from Lake Lanier for Atlanta's needs, and that most Atlanta-area counties would have to stop withdrawing water from the lake within three years unless the U.S. Congress intervenes.⁵⁴ As a result, Southern Company, which has power plants in all three states, may be faced with new constraints on its water withdrawals.

52. Rebecca Smith, "Water Worries Shape Local Energy Decisions," *The Wall Street Journal*, March 26, 2009. See: <http://online.wsj.com/article/SB123802383042842123.html>

53. Carlos Santos, "Judge Rules Against Dominion on North Anna permit," *Richmond Times-Dispatch*, February 23, 2009. See: http://www2.timesdispatch.com/rtd/news/state_regional/article/judge_rules_against_dominion_on_north_anna_permit/213446/

54. Kristi E. Swartz, "Perdue forms team to fight water ruling," *The Atlanta Journal-Constitution*, July 23, 2009. See: <http://www.ajc.com/news/georgia-politics-elections/perdue-forms-team-to-99459.html>

Findings: Water Risk Disclosure in the Electric Power Sector

Key Findings

The sector showed weak water risk disclosure overall, with an average score of 19 out of 100. Pinnacle West/APS, an Arizona-based utility, achieved the highest level of disclosure in the sector with 38 points; Florida Power & Light (FPL) provided the most limited disclosure, receiving eight points.

- *Water accounting.* Fewer than half of the electric power companies reviewed provide data on total water withdrawals, and of these only one company – American Electric Power – discloses site-level data. Less than one-third report data on wastewater discharge.
- *Risk assessment.* Nearly all the electric power companies disclose some level of physical risk related to water scarcity, and all report exposure to regulatory risk.
- *Wastewater reduction targets.* None of the companies disclose targets to reduce contaminants in wastewater discharges from power plants, such as arsenic and lead, in advance of expected EPA regulation.
- *Supplier engagement.* None of the companies disclose efforts to engage or assess fuel suppliers on water impacts and risks, despite the fact that the sector purchases large quantities of oil, coal, uranium, and natural gas.

Company Highlights

Pinnacle West/APS reports using treated sewage to cool its power plants in Arizona, preserving enough potable water for approximately 75,000 homes.

PG&E discloses that during the 2007 Californian drought, the company's hydroelectric generation dropped from 22 to 13 percent of its delivery mix, resulting in a 39 percent rise in greenhouse gas emissions.

Electric Power*: Quality of Water Risk Disclosure**

| | Water accounting | Risk assessment | Direct operations | Supply chain | Stakeholder engagement | Totals*** |
|--------------------------------------|------------------|-----------------|-------------------|--------------|------------------------|------------|
| Potential points per category | 36 | 24 | 27 | 7 | 6 | 100 |
| Pinnacle West/APS | 10 | 12 | 14 | 0 | 2 | 38 |
| American Electric Power (AEP) | 16 | 10 | 10 | 0 | 0 | 36 |
| PG&E | 0 | 12 | 12 | 0 | 2 | 26 |
| Exelon | 3 | 10 | 6 | 0 | 2 | 21 |
| Southern Company | 7 | 6 | 4 | 0 | 1 | 18 |
| Dominion Resources | 1 | 8 | 6 | 0 | 2 | 17 |
| Energy | 0 | 10 | 3 | 1 | 2 | 16 |
| Xcel Energy | 3 | 6 | 7 | 0 | 0 | 16 |
| Duke Energy | 4 | 6 | 2 | 0 | 2 | 14 |
| Constellation Energy | 2 | 10 | 2 | 0 | 0 | 14 |
| AES Corporation | 0 | 12 | 0 | 0 | 0 | 12 |
| NRG Energy | 0 | 8 | 1 | 0 | 2 | 11 |
| Florida Power & Light Group (FPL) | 0 | 4 | 2 | 0 | 2 | 8 |

Evaluation key

Water accounting: Data on water use, wastewater discharge, and supplier water use.

Risk assessment: Disclosure of water-related physical, regulatory, reputational and litigation risks.

Direct operations: Disclosure of water-related policies, management systems, non-compliance, conservation activities and reduction targets.

Supply chain: Disclosure of supplier collaboration, assessment, and target-setting related to water risk.

Stakeholder engagement: Disclosure of collaborations with local, national and international stakeholders to preserve watersheds and improve access to safe drinking water and sanitation.

*Only U.S.-based electric power companies were reviewed in this study. Among U.S. companies, those reviewed were chosen on the basis of the size and water intensity of their generation assets.

**Based on most recent annual financial filings and sustainability reports available as of 6/30/09.

***Companies were scored on an overall scale of 0-100 possible points.

PG&E: The Water-Energy Nexus in California

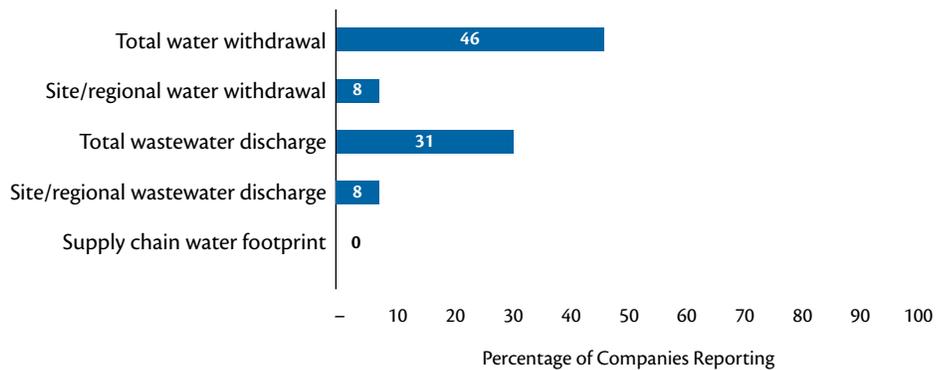
In its corporate responsibility report, PG&E cites drought conditions in California as posing a threat to the company's hydroelectric generation, as well as its overall climate change mitigation efforts:

"Water scarcity is one of the most complex and pressing issues facing the western United States and has become even more acute recently. California is expected to suffer its third straight year of drought in 2009, leading to restrictions on local water use, rising water bills and economic losses that could rise to \$3 billion. We are also seeing increased wildfires and diminished hydroelectric power generation..."

"...On the electric supply side, if PG&E's future hydroelectric generation is reduced due to drought conditions or climate change, PG&E might have to replace some of this carbon-free generation with fossil-fueled generation, typically natural gas-fired turbines. The ongoing drought in California illustrates the possible negative consequences of climate change to our greenhouse gas mitigation efforts: During the 2007 drought, PG&E's hydroelectric generation dropped from 22 to 13 percent of our delivery mix, resulting in a 39 percent increase in our verified greenhouse gas emissions rate."

Source: PG&E, "2008 PG&E Corporate Responsibility Report." See: http://www.pgecorp.com/corp_responsibility/reports/2008/img/pge_crr_2008.pdf

Electric Power Sector: Water Accounting Disclosure



Findings by Indicator

1. Disclosure of Water Accounting

Six out of 13 electric power companies reviewed provide data on water withdrawals. Four companies report data on wastewater discharge, and of these, Pinnacle West was the only company to report site-level discharge data.

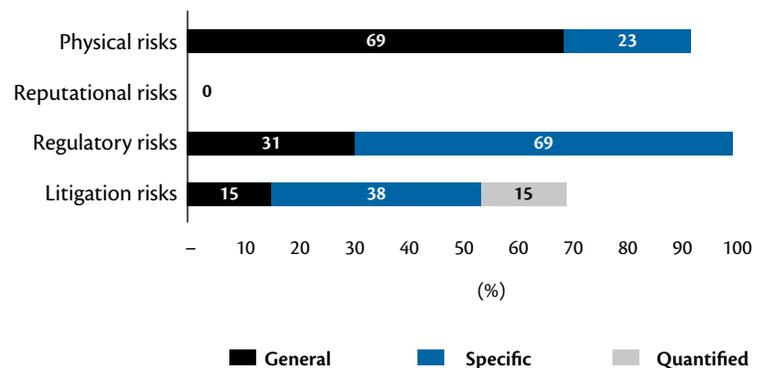
AEP was the only electric power company to provide detailed site-level water withdrawal data. The company's sustainability website names the primary water sources used by each of its power plants, and indicates which plants account for five percent or more of the flow of a given water body, or are drawing water from rivers or lakes that are home to rare or endangered species.

2. Disclosure of Risk Assessment

With the exception of NRG Energy, all the electric power companies surveyed disclose some level of physical risk related to water scarcity.

All the companies report their exposure to water-related regulatory risks and 68 percent provide information on litigation risks. No electric power company reports water-related reputational risks.

Percentage of Electric Power Companies Reporting Water-Related Risks



3. Disclosure of Direct Operations

The electric power companies provide limited disclosure on water-related management systems and policies. Only two electric power companies – Entergy and Xcel – disclose details on water-related non-compliance incidents.

Seven of the 13 companies report actions taken to reduce water withdrawals, with PG&E and Southern Company providing the most detailed disclosure. Regarding efforts or strategies for reducing or treating wastewater discharge, only two companies – AEP and NRG Energy – provide detailed information.

None of the companies disclose quantified targets to reduce contaminants in wastewater discharged from power plants. PG&E and Pinnacle West/APS disclose water use reduction targets for their offices, but not for their generation plants.

4. Disclosure of Supply Chain

Only one company – Entergy – provides information on collaboration with its non-fuel suppliers on water management. Entergy discloses that “[w]e joined with other investor-owned electric companies to form the Electric Utility Industry Sustainable Supply Chain Alliance, which is working with the Edison Electric Institute to improve the environmental performance of non-fuel suppliers. The Alliance is expected to engage suppliers to improve impacts on air emissions, water consumption, landfill reduction and energy efficiency.”

None of the companies disclose efforts to engage or assess fuel suppliers on water impacts or risks, despite the fact that the sector purchases significant quantities of oil, coal, natural gas, and uranium.

5. Disclosure of Stakeholder Engagement

Eight out of the 13 electric power companies reviewed report engaging with stakeholders on water management. Duke Energy, for example, highlights its collaboration with 17 public water system owners along the Catawba River basin in the Carolinas to implement a five-year strategic plan for addressing long-term supply and demand issues in the region. FPL discusses its participation in the Florida Everglades Mitigation Bank, a coalition that helps protect 13,500 acres of wetlands while providing mitigation credits for developers and private landowners.

AEP: Carbon Capture & Storage

American Electric Power (AEP) notes in its 2008 sustainability report that the EPA has proposed new regulations for the underground storage of carbon, a technology designed to help large carbon emitters sequester greenhouse gas emissions thousands of feet below ground. The EPA regulations would add a new category of injection wells to the Safe Drinking Water Act regulations and create siting, testing, and monitoring requirements to prevent leaks to freshwater aquifers.

AEP states that “[c]arbon dioxide in water is not necessarily a problem; but too much can turn water slightly acidic and allow other heavy metals and toxic substances to leach into the water supply more easily. Carbon dioxide will be separated from drinking water aquifers by many thousands of feet. Typically, drinking water supplies are only a few hundred feet deep in the Midwest, whereas injection of CO₂ would take place at depths of more than 8,000 feet.”

Source: AEP, “2008 Corporate Sustainability Report.” See: <http://www.aep.com/citizenship/crreport/>

Pinnacle West/APS: Efficiencies with Water Reuse

Pinnacle West/APS highlights the use of treated wastewater to cool its power plants in Arizona:

“[The company] is one of the largest users of treated effluent for power generation in the United States... In 2008 over 61 percent of our total power plant water came from treated effluent. At the Palo Verde Nuclear Generating Station and our Redhawk natural gas-powered facility, we use treated effluent purchased from seven cities in the Phoenix metropolitan area for cooling. A 35-mile pipeline carries treated wastewater from the City of Phoenix and Tolleson sewage treatment facilities to Palo Verde, where we use an advanced wastewater treatment process capable of preparing 90 million gallons of water each day for use at both Palo Verde and Redhawk.”

Each year, Palo Verde’s water reclamation facility processes about 21 billion gallons of treated effluent for power plant use, preserving enough potable water for about 75,000 homes.”

Source: Pinnacle West/APS, “2008 Corporate Responsibility Report.” See: <http://www.pinnaclewest.com/main/prnw/AboutUs/commitments/ehs/2008/ehs/water/default.html>

FOOD SECTOR

“I am convinced that, under present conditions and with the way water is being managed, we will run out of water long before we run out of fuel...The decisions of the coming years will determine whether a major global crisis of water and food shortage can be avoided.”

—Peter Brabeck-Letmathe
Chairman, Nestlé⁵⁹

Water plays a fundamental role in the food industry. Agriculture accounts for roughly 70 percent of water use globally, with this share rising as high as 90 percent in some developing countries.⁵⁵ Agricultural water use has doubled over the past century.⁵⁶ A number of factors have driven this increased use of water. Global food consumption has increased dramatically since the 1960s, driven by population growth and propelled by the Green Revolution and wider use of irrigated agriculture. As economies develop, people tend to consume more meat, which can require up to 10 times more water than cereal to produce the same calorie content.

Agriculture also has significant impacts on downstream water quality. Surface and groundwater quality can be severely affected by run-off linked to the use of agricultural inputs such as pesticides, herbicides, and nitrogen fertilizers. Eutrophication – the over-enrichment of water by fertilizers such as nitrogen and phosphorus – has created over 415 aquatic “dead zones” around the world, characterized by oxygen depletion and harmful algal blooms.⁵⁷ In the United States, the discharge of nutrients from midwestern farms into the Mississippi River has been linked to an aquatic dead zone in the Gulf of Mexico the size of New Jersey. Drinking water impacts are also significant: an August 2009 study by the Natural Resources Defense Council found that 33 million Americans drink tap water containing pesticides, with contamination most severe in the agricultural states of Illinois, Iowa, Indiana, Missouri, and Nebraska.⁵⁸

Overview: Water-Related Risks for the Food Sector

The most significant and relevant water-related risks to the food sector are physical, regulatory, and litigation risks.

Physical Risks

Commodity shortages due to drought or changing weather patterns can lead to significant price volatility on the global market, as seen by recent spikes in global rice prices due to drought-induced production collapses in Australia. More recently, severe drought in India has driven up prices for sugar, contributing to a 28-year high in the global price for the commodity.⁶⁰ In California, increasing water prices have

55. UNEP, “Vital Water Graphics, Freshwater by Sector in 2000,” 2000. See: <http://www.unep.org/dewa/assessments/ecosystems/water/vitalwater/15.htm#16>

56. Hamed Bakir, “Water Demand Management and Pollution Control: Key to securing and safeguarding the water supplies of MENA in the 21st Century,” WHO Regional Centre for Environmental Health Activities, Amman, Jordan, 2001. pp. 2.

57. Mindy Selman et al., “Eutrophication and Hypoxia in Coastal Areas: A Global Assessment of the State of Knowledge,” World Resources Institute, March 1, 2008. See: <http://www.wri.org/publication/eutrophication-and-hypoxia-in-coastal-areas>

58. “U.S. Drinking Water and Watersheds Widely Contaminated by Hormone Disrupting Pesticide, Atrazine,” Natural Resources Defense Council, press release, August 24, 2009.

59. “A water warning: Peter Brabeck-Letmathe, chairman of Nestlé, argues that water shortage is an even more urgent problem than climate change,” *The Economist*, November 19, 2008. See: http://www.economist.com/theWorldin/PrinterFriendly.cfm?story_id=12494630

60. Dana Krechowicz, “Environmental Challenges for the Food and Beverage Industry,” World Resources Institute, August 27, 2009. See: <http://www.wri.org/stories/2009/08/environmental-challenges-food-and-beverage-industry>

led farmers to cut to the stump hundreds of healthy, mature avocado trees that were economical when water was abundant.⁶¹ The overall lack of water has also forced the state's farmers to abandon or leave unplanted more than 100,000 acres of agricultural land, resulting in more than \$300 million in agricultural revenue losses to date. That number is expected to exceed \$2 billion by the 2010 season.⁶²

First-generation biofuels production can have an especially large water footprint.⁶³

The entire production cycle of corn-based ethanol – from growing irrigated crops to pumping biofuel into a car – can consume 20 times as much water for every mile traveled compared to gasoline.⁶⁴ First-generation biofuel plantations can also compromise water quality through the leaching of pesticides and nutrients.⁶⁵

In recent years, some proposed corn-based ethanol plants in the American midwest have been scuttled due to concerns by communities and regulators about the plants' impacts on groundwater. In 2007, backers of a proposed plant in Jamestown, North Dakota, withdrew their application when it became clear that the plant's million-gallons-a-day appetite would drain too much from a local aquifer.⁶⁶ In Erskine, Minnesota, a grassroots opposition led by local residents concerned about a proposed plant's impact on groundwater eventually led to the project's demise.⁶⁷

Regulatory Risks

The European Union's Water Framework Directive places growing pressure on the agricultural sector to better manage water resources. Enacted in 2000, the Framework calls for a fundamental change in the management of water in Europe with a requirement that member states ensure "good ecological status" for all water bodies by 2015. Agriculture is expected to bear a major share of the directive's implementation costs, as farmers are compelled to reduce their release of nutrients and other emissions into water bodies.⁶⁸

There is growing scrutiny by U.S. regulators of the agricultural sector's water impacts. For example, the EPA announced in October 2009 that it would reevaluate the environmental safety of the widely used pesticide Atrazine.⁶⁹ Also in 2009, the

61. Julie Small, "Water shortage forces avocado growers to cut down trees," *Southern California Public Radio* 89.3 KPCC, April 14, 2009. See: <http://www.scpr.org/news/2009/04/14/water-shortage-forces-avocado-growers-cut-down-tre/>

62. "State of Emergency Proclamation on Water Shortage," Office of the Governor, press release, February, 2009. See: <http://gov.ca.gov/proclamation/11557/>

63. 'First-generation biofuels' are biofuels made from sugar, starch, vegetable oil, or animal fats using conventional technology, as opposed to 'second-generation' biofuels, such as cellulosic biofuels, which are derived from nonfood crops.

64. Michael E. Webber, "Energy Versus Water: Solving Both Crises Together," *Scientific American*, October 2008. See: <http://www.sciam.com/article.cfm?id=the-future-of-fuel>

65. Robert B. Jackson et al., "Trading Water for Carbon with Biological Carbon Sequestration," *Science* 310, no. 5756 (23 December 2005): 1944-1947. See: <http://www.sciencemag.org/cgi/content/full/310/5756/1944>

66. "Ethanol's Water Shortage," *The Wall Street Journal*, October 17, 2007. See: http://online.wsj.com/article/SB119258870811261613.html?mod=googlenews_wsj

67. Mike Christopherson, "Agassiz Energy LLC looking to dissolve," *Crookston Times*, December 16, 2009. See: <http://www.crookstontimes.com/news/x967378060/Agassiz-Energy-LLC-looking-to-dissolve>

68. Kallis, Giorgos and David Butler, "The EU water framework directive: measures and implications," *Water Policy*, (2001) 125-142.

69. "EPA Begins New Scientific Evaluation of Atrazine." U.S. Environmental Protection Agency, press release, October 7, 2009.

Obama administration announced that it would set strict new limits to reduce agricultural nutrients flowing into waterways in Florida.⁷⁰

For food processors, increased regulation of agricultural inputs and run-off could affect costs of procurement. For companies that run animal feeding operations, stronger national regulation could limit expansion in certain regions and require investments in new treatment technologies, both of which carry financial implications.

Litigation Risks

Meat producers are particularly vulnerable to lawsuits tied to the environmental impacts of their animal operations. In 2006, a lawsuit by the environmental advocacy group Waterkeeper Alliance, alleging violations of the Clean Water Act against Smithfield Foods, resulted in a settlement in which the company agreed to implement millions of dollars in environmental safeguards at 275 hog farms in North Carolina.⁷¹ The following year, the state passed a law permanently banning the construction of new hog waste “lagoons” – large ponds used to store manure. In another example, the Oklahoma attorney general sued Tyson Foods and 13 other poultry companies in 2005 to pay for cleanup of poultry waste that had contaminated the Illinois River watershed.⁷² As of December 2009, the case was still being litigated.

70. “Our Views: Clean Water Victory,” *Florida Today*, November 22, 2009. See: <http://m.floridatoday.com/news.jsp?key=273022>

71. Lauren Etter, “Chicken Litter: The Aerial Hunt for Poultry Manure,” *The Wall Street Journal*, November 3, 2009. See: <http://online.wsj.com/article/SB125721391914624061.html>

72.. Robert Glennon, *Unquenchable: America’s Water Crisis and What to Do About It* (Washington, D.C.: Island Press, 2009), 73.

Findings: Water Risk Disclosure in the Food Sector

Key Findings

The sector showed limited water risk disclosure overall, with an average score of 18 out of 100. Unilever, based dually in the Netherlands and the UK, ranked highest in the sector with a score of 34; agribusiness firms Archer Daniels Midland (ADM) and Bunge provided the weakest disclosure, each receiving a score of nine.

- **Water use data.** Eighty-five percent of the food companies reviewed report data on total water use, but none provide detailed site or regional level data. Less than one-third report wastewater discharge data.
- **Reduction targets.** Fewer than half report setting water use reduction targets. Only one company – Unilever – discloses a quantified target for reducing wastewater discharges.
- **Risk disclosure.** Nearly all the food companies surveyed disclose some level of physical risk related to water scarcity, particularly with respect to their supply chains.
- **Supply chain.** Despite the sector’s physical risk exposure, less than one-third of food companies report addressing water risk in their agricultural supply chains.
- **Stakeholder engagement.** Nearly half the companies disclose efforts to engage stakeholders on watershed preservation and drinking water and sanitation issues.

Company Highlights

Danone reports the water footprint for its Milk and Water divisions at each stage of the product lifecycle, including raw material production, processing, packaging, and logistics.

Nestlé quantifies the relative levels of physical water risk facing the company’s 481 factories, 49 of which are located in the most highly water-stressed countries in the world.

Food: Quality of Water Risk Disclosure*

| | Water accounting | Risk assessment | Direct operations | Supply chain | Stakeholder engagement | Totals** |
|--------------------------------------|------------------|-----------------|-------------------|--------------|------------------------|------------|
| Potential points per category | 36 | 24 | 27 | 7 | 6 | 100 |
| Unilever | 12 | 2 | 12 | 3 | 5 | 34 |
| Nestlé | 9 | 4 | 13 | 1 | 2 | 29 |
| Smithfield Foods | 9 | 10 | 3 | 0 | 3 | 25 |
| Danone | 7 | 2 | 8 | 0 | 3 | 20 |
| General Mills | 4 | 4 | 7 | 3 | 1 | 19 |
| Tyson Foods | 4 | 6 | 7 | 0 | 0 | 17 |
| Kellogg | 4 | 4 | 7 | 0 | 0 | 15 |
| Kraft Foods | 3 | 4 | 8 | 0 | 0 | 15 |
| ConAgra | 2 | 4 | 5 | 1 | 0 | 12 |
| Dean Foods | 0 | 8 | 4 | 0 | 0 | 12 |
| Sara Lee | 3 | 4 | 5 | 0 | 0 | 12 |
| Archer Daniels Midland (ADM) | 0 | 4 | 3 | 0 | 2 | 9 |
| Bunge | 3 | 4 | 2 | 0 | 0 | 9 |

Evaluation key

Water accounting: Data on water use, wastewater discharge, and supplier water use.

Risk assessment: Disclosure of water-related physical, regulatory, reputational and litigation risks.

Direct operations: Disclosure of water-related policies, management systems, non-compliance, conservation activities and reduction targets.

Supply chain: Disclosure of supplier collaboration, assessment, and target-setting related to water risk.

Stakeholder engagement: Disclosure of engagement with local, national and international stakeholders to preserve watersheds and improve access to safe drinking water and sanitation.

*Based on most recent annual financial filings and sustainability reports available as of 6/30/09.

**Companies were scored on an overall scale of 0–100 possible points.

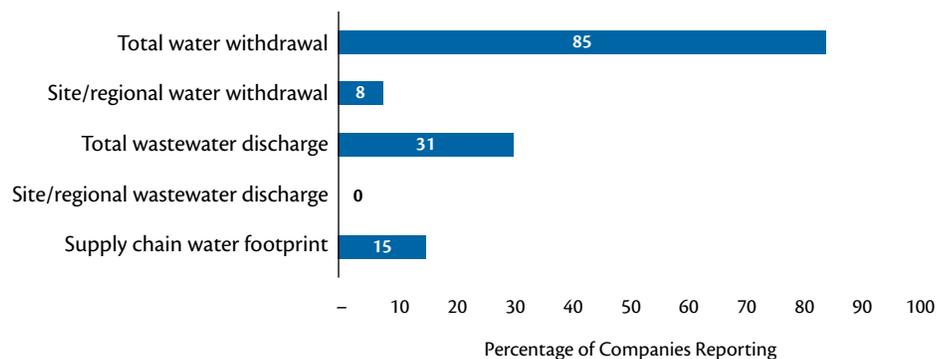
Unilever's Water Accounting

Unilever's sustainability website provides comprehensive water performance data. The company discloses data on both normalized and absolute water use, including its main sources of water withdrawals. Its website displays water use data for 14 years, showing a downward trend from an average of 7.95 m³/ton in 1995 to 2.97 m³/ton in 2008 – a 63 percent decrease on a production basis.

The company discloses equally comprehensive data on wastewater discharge, showing both total and normalized figures on effluent, as well as the volume discharged directly to the environment versus to municipal treatment plants. Unilever also provides rough data on the water footprint of its value chain, including water use embedded in the activities of its agricultural suppliers as well as product use by consumers. The company estimates that its manufacturing makes up less than five percent of its total water footprint.

Source: Unilever, "Sustainable Development Report 2008." See: <http://www.unilever.com/sustainability/environment/water/>

Food Sector: Water Accounting Disclosure



Findings by Indicator

1. Disclosure of Water Accounting

Almost 85 percent (11 out of 13) of the food companies reviewed report data on total water withdrawals. A few companies break down this data by the source of use – groundwater, municipal water or surface water. None of the food companies reviewed provide regional or site-level data, with the exception of Bunge, which operates in 30 countries but reports only on its Brazilian operations.

Data reporting on total wastewater discharge was weak in this sector, with only four companies – Danone, Nestlé, Smithfield, and Unilever – disclosing the volume and quality of wastewater discharge. None of the companies provide a breakdown of their discharge at the site or regional level.

Danone and Unilever also provide rough estimates of the water use embedded in their supply chains. For example, Danone reports the water footprint for its Milk and Water divisions at each stage of the product lifecycle, including raw material production, processing, packaging, and logistics.

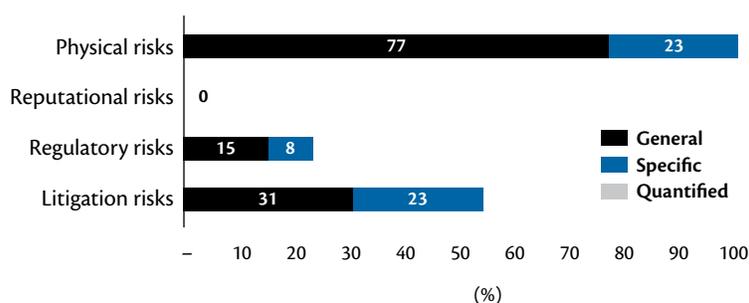
2. Disclosure of Risk Assessment

Every food company reviewed discloses some level of physical risk. The majority of the food companies cite climate change – and its potential impacts on water availability and agricultural productivity – as a possible risk to their operations. However, this disclosure usually provides only a generic description of risks, without discussion of specific at-risk operations or supply chains.

Nestlé's disclosure stood out for providing a quantification of the relative levels of physical water risk facing the company's 481 factories, 49 of which are located in the most highly water-stressed countries in the world.

Only three of the 13 food companies reviewed provide detailed information on their exposure to water-related regulatory risks. Seven companies disclose exposure to water-related litigation risks, with Smithfield and Tyson Foods providing the most detailed information. None of the companies report any possible reputational risks.

Percentage of Food Companies Reporting Water-Related Risks



3. Disclosure of Direct Operations

Only three food companies highlight water-specific policies or management systems in their disclosures. In Nestlé’s Water Management report, the company describes its water policy, which serves as a reference and standard for company managers. The Nestlé Environmental Management System translates the policy into concrete action at the factory level, and defines criteria for monitoring compliance. Danone discloses that the bonuses of senior managers are tied to the company’s performance on water-related criteria.

Of the 13 companies reviewed, only four discuss their compliance with water- and wastewater-related regulations. Tyson Foods, for example, provides a solid breakdown of all the company’s water-related violations along with relevant penalties and fines.

Six of the 13 food companies reviewed have set targets for reducing water usage. Only Unilever discloses a quantitative target for reducing wastewater discharge.

Kellogg: Water Scarcity Risks

Kellogg’s 2008 Corporate Responsibility Report highlights the risks that water scarcity could pose to its business:

“...Sustainable water use is an issue of increasing global importance, and one we take very seriously. Water scarcity presents several potential risks for our company. In our agricultural supply chain, the place of Kellogg’s largest water impact, farmers use significant quantities of irrigated water to produce the agricultural commodities used in our products. Drought conditions in agricultural regions thus have the potential to increase grain prices, which in turn affects our input costs...Water scarcity in areas where our facilities are located could potentially disrupt manufacturing. In addition, water used for irrigation and manufacturing must meet certain quality standards, so we are dependent on other users within each watershed to maintain acceptable quality.”

The company does not discuss these risks in its 2008 10-K filing.

Source: Kellogg, “2008 Corporate Responsibility Report.” See: <http://www.shareholder.com/visitors/dynamicdoc/document.cfm?documentid=2441&companyid=K&page=1&pin=&language=EN&resizethree=yes&scale=100>

Nestlé: Assessing Water Stress

Nestlé reports that of its 481 factories worldwide, 49 are located in 13 of the 45 most water-stressed countries identified by the World Water Council’s Water Poverty Index. The company has evaluated the relative performance of these 49 factories. Local factory management has begun conducting local stress assessments to help identify new water-saving projects onsite and in the community.

To further improve local capacity for water management, the company’s bottled water division – Nestlé Waters – is developing its own internal water stress index that combines the national-level Water Poverty Index with a local-level index of water stress at specific Nestlé Waters factory locations.

Source: Nestlé, “The Nestlé Water Management Report.” See: <http://www.Nestlé.com/Resource.axd?id=F7879D21-0C3F-4099-AF79-6BA10BF5A5B4>

Danone: Incentivizing Water Performance

Danone highlights an incentive system that integrates environmental and social criteria – including water objectives – into executive compensation:

"In 2008, with a view to instituting radical changes in behaviour and harmonising the social, societal and environmental ambitions of Groupe Danone with the day-to-day operation of the enterprise, the Group decided to change the system of bonuses distributed to managing directors and top management (1,000 people concerned). The system is now comprised of three tiers: ...a social, societal and environmental tier which includes criteria related to employee training, workplace safety, reduction in water consumption, measurement of the carbon footprint and, from 2009 onwards, the reduction of the carbon footprint..."

Source: Danone, "2008 Sustainability Report."
See: <http://phx.corporate-ir.net/External.File?site=m=UGFyZW50SUQ9OTI2OXx0aGlsZElEPS0xfFR5cGU9Mw==&t=1>

4. Disclosure of Supply Chain

Four food companies disclose efforts to address water risk in their supply chains, with Unilever and General Mills providing the most detail. Unilever reports comprehensively on its evaluation of suppliers on water management as well as collaborations with suppliers to improve water efficiency and reduce water usage. General Mills' Green Giant division works with growers to reduce water consumption and minimize use of agrochemicals for key crops. For instance, General Mills reports a 50 percent water use reduction goal for its broccoli suppliers, and discusses efforts to help convert their operations from furrow to drip irrigation, which has reduced water use by nearly 1.2 billion gallons a year.

5. Disclosure of Stakeholder Engagement

Approximately 46 percent (six out of 13) of the companies report having worked with governments, NGOs, and local communities on drinking water, sanitation, or watershed protection activities in regions where they operate. Companies providing detailed disclosure in this area include Danone, General Mills, Smithfield, and Unilever.

Unilever: Stakeholder Engagement

Unilever discloses a systematic approach to working with suppliers and other stakeholders on water management to improve efficiency and reduce water-related risks.

Suppliers: Unilever's Sustainable Agriculture Program works with agricultural suppliers to implement water reduction efforts such as drip irrigation. In Brazil, the company worked with tomato suppliers to reduce water use by up to 30 percent.

Local communities: Unilever cites numerous efforts to improve watersheds and drinking water quality in regions where it has factories. For example, the company's Surabaya, Indonesia factory requires clean water for operations, but is situated near a river that suffers from industrial and household pollution. Unilever reports providing management expertise and equipment to assist local communities in reducing pollution and developing new industries, such as fish farming.

International collaboration: In 2007, Unilever joined the CEO Water Mandate, which brings together companies, NGOs, governments, and the United Nations to improve corporate policies and practices related to water. The company also played a role in establishing the Water Footprint Network, a multi-stakeholder group developing a standard way to measure the impact of water use.

Source: Unilever, "Sustainable Development Report 2008." See: <http://www.unilever.com/sustainability/>

HOMEBUILDING SECTOR

Homes consume 11 percent of all the freshwater in the United States.⁷³ Many of the largest homebuilders in the United States are developing homes in regions facing both rapid population growth and dwindling water resources. A combination of fast growth, limited water supply, and growing environmental regulation means that homebuilders face both increased water-related risks and opportunities as they site, design, construct, and market new homes.

Construction activities like clearing, grading, and excavating, disturb soil and sediment, which can be washed off construction sites during storms and can pollute nearby waterways and aquifers. The EPA has identified stormwater runoff from construction sites as one of the most significant threats to water quality nationwide.⁷⁴

Homebuilders can also play a role in influencing residential water use by installing more water-efficient appliances, employing xeriscaping (water-sensitive landscaping) and through appropriate siting of new developments. In December 2009, the EPA released its WaterSense certification, creating the first voluntary, national water-efficiency specification for single-family new homes. WaterSense-labeled new homes will be 20 percent more efficient than typical new homes, and will require independent inspection and certification.⁷⁵

Overview: Water-Related Risks for the Homebuilding Sector

A review of the sector reveals homebuilders to be vulnerable to all four water-related risks: physical, reputational, regulatory, and litigation.

Physical Risks

Climate change will affect precipitation patterns and water availability in several high-growth regions of the United States, potentially limiting development opportunities for homebuilders. A 2005 Brookings Institution report showed that 10 of the 15 fastest-growing metropolitan areas are in the relatively arid western states of Nevada, California, Texas, Colorado, Arizona, and Utah.⁷⁶ A broad consensus among climate scientists holds that these states are on a trajectory within years or decades to become even drier, to a level equivalent to the 1930s era Dust Bowl.⁷⁷

73. "Water Use in the United States," National Atlas, September 10, 2007. See: http://nationalatlas.gov/articles/water/a_wateruse.html

74. Lisa Jackson, "Testimony of Lisa P. Jackson, Administrator, U.S. Environmental Protection Agency Before the Committee on Transportation and Infrastructure," United States House of Representatives, U.S. Agency for Environmental Protection, October 15, 2009.

75. "EPA Releases Final Specification for WaterSense New Homes: This will help homeowners increase water efficiency and save on their utility bills," U.S. Environmental Protection Agency, press release, December 10, 2009.

76. William H. Frey, "Metro America in the New Century: Metropolitan and Central City Shifts Since 2000," Washington, DC: Brookings Institution, 2005.

77. Richard Seager, et. al., "Model Projections of an Imminent Transition to a More Arid Climate in Southwestern North America," *Scienceexpress*, April 5, 2007.

Regulatory Risks

Existing or anticipated water shortages may lead regulators to restrict or prohibit housing development in certain regions. Municipalities may restrict or place moratoriums on the availability of utilities, such as water and sewer taps. In some areas, municipalities may enact growth control initiatives, which will restrict the number of building permits available in a given year. In California, state laws require water agencies to withhold approvals until it has been determined that sufficient water resources exist for at least 20 years to serve large new developments.⁷⁸ In 2008, the water district in the Los Angeles suburb of Riverside became California's first major agency to cite this law in a decision that put on hold seven proposed commercial and residential developments.⁷⁹

City governments in drought-stricken areas of the country – including Los Angeles, Austin, and San Antonio – are also taking measures to encourage homebuilders to adopt water-efficient practices.^{80,81} Landscaping practices – which represent as much as 70 percent of total household water use in some regions – are a particular focus. In Las Vegas, for example, building codes now prohibit new homes from having a lawn in the front yard.⁸²

Homebuilders are increasingly subject to wastewater discharge regulation. In November 2009, the EPA released new guidelines that limit effluent discharge for the construction and development industry.⁸³ The final rule requires construction site owners and operators that disturb one or more acres to implement erosion and sediment control and pollution prevention measures in order to control pollutants in discharges from construction sites. When 10 or more acres of land are affected by construction activities at one time, site owners and operators will be required to monitor and sample discharges, and to comply with a numeric standard. Compliance with the new rule is estimated to cost the industry \$1 billion.⁸⁴

78. CA DWR, "Senate Bill (SB) 610/ Senate Bill (SB) 221 Guidebook FAQs," California Department of Water Resources, Division of Statewide Integrated Water Management: Water Use and Efficiency, 2009.

79. Robert Glennon, *Unquenchable: America's Water Crisis and What to Do About It*. (Washington D.C.: Island Press, 2009), 1-20.

80. Sara Schaefer Munoz, "Homeowners, Builders Tackle Water Scarcity," *The Wall Street Journal*, February 23, 2007. See: <http://online.wsj.com/article/SB117210858915115606.html>

81. Robert Glennon, *Unquenchable: America's Water Crisis and What to Do About It*. (Washington D.C.: Island Press, 2009), p. 171.

82. Gwendolyn Bounds, "Turf Battle Heats Up Over Limits on Water-Guzzling Landscapes," *The Wall Street Journal*, September 18, 2009. See: <http://online.wsj.com/article/SB10001424052970203278404574416990861394378.html>

83. "EPA Issues Rule to Reduce Water Pollution from Construction Sites," U.S. Environmental Protection Agency, press release, November 23, 2009.

84. Susan Charles and Shantell Feaser, "United States: Construction and Development Industry Receives New and Costly Pollutant Control, Monitoring and Reporting Requirements," *Mondaq*, December 22, 2009. See: <http://www.mondaq.com/unitedstates/article.asp?articleid=91556>

Reputational Risks

Homebuilders may be subject to campaigns by environmental groups if they perceive proposed developments as damaging to freshwater resources. In Florida, for example, environmental groups have targeted Lennar Corporation, seeking to halt its development of a proposed 7,000-unit planned community in a region of the Florida wetlands previously off limits to development.⁸⁵ Despite the incorporation of green building standards into the development's design, local activists continue to oppose its siting.⁸⁶

Litigation Risks

Homebuilders face the risk of having permits overturned in court because of water availability considerations. In 2007, the California Supreme Court overturned a permit for an 18,000-unit home development under construction at the southern edge of Sacramento due to uncertainties about the project's long-term water supply.⁸⁷ This case set new state standards for analyzing the water supply of proposed real estate developments, including the requirement that environmental impact assessments consider the impacts of providing water throughout the entire existence of the project, not just in the first phase of development.⁸⁸

85. "Call to Action," Clean Water Action, press release, May 6, 2009.

86. Paul Brinkmann, "Lennar concept isn't so green, detractors say," *South Florida Business Journal*, November 21, 2008. See: <http://southflorida.bizjournals.com/southflorida/stories/2008/11/24/story3.html>

87. Robert Glennon, *Unquenchable: America's Water Crisis and What to Do About It*. (Washington D.C.: Island Press, 2009).

88. *Ibid.*

Findings: Water Risk Disclosure in the Homebuilding Sector

Company Highlights

KB Home describes how it is integrating water-efficient features into its building lines, including WaterSense-labeled toilets and bathroom sink faucets. The company is also partnering with the Southern Nevada Water Authority and the Southern Nevada Home Builders Association to create the first Water Smart home, which saves up to 75,000 gallons of water per year compared to homes built in the 1990s.

Key Findings

The homebuilders studied in this report provided the most limited disclosure on water risk of all the sectors reviewed, with an average score of nine out of 112.

Los Angeles-based KB Home scored the highest of the group, with 15 points; D.R. Horton, Hovnanian, NVR and Ryland came in at the bottom, each scoring four points.

- *Risk assessment.* Eighty percent of the homebuilders reviewed cite drought or floods as physical risks to their business and cite regulatory risks linked to storm and surface water management. Seventy percent report water-related litigation risks; none report reputational risks.
- *Water-related opportunities.* There was some disclosure from homebuilders on investment in and sales of more water-efficient homes. Five companies – Beazer, Centex, KB Home, Pulte, and Toll Brothers – provide some level of detail on this topic.
- *Disclosure gaps.* None of the companies report any data on water use or wastewater discharge, nor do they discuss engaging suppliers or stakeholders on water issues.

Homebuilding: Quality of Water Risk Disclosure**

| | Water accounting | Risk assessment | Direct operations | Supply chain | Stakeholder engagement | Opportunities | Totals** |
|--------------------------------------|------------------|-----------------|-------------------|--------------|------------------------|---------------|------------|
| Potential points per category | 36 | 24 | 27 | 7 | 6 | 12 | 112 |
| KB Home | 0 | 8 | 6 | 0 | 0 | 1 | 15 |
| Pulte | 0 | 10 | 2 | 0 | 0 | 1 | 13 |
| Toll Brothers | 0 | 12 | 0 | 0 | 0 | 1 | 13 |
| Beazer Homes | 0 | 10 | 0 | 0 | 0 | 1 | 11 |
| Lennar | 0 | 10 | 0 | 0 | 0 | 0 | 10 |
| Centex | 0 | 2 | 3 | 0 | 0 | 1 | 6 |
| D.R. Horton | 0 | 4 | 0 | 0 | 0 | 0 | 4 |
| Hovnanian | 0 | 4 | 0 | 0 | 0 | 0 | 4 |
| NVR | 0 | 4 | 0 | 0 | 0 | 0 | 4 |
| Ryland | 0 | 4 | 0 | 0 | 0 | 0 | 4 |

Evaluation key

Water accounting: Data on water use, wastewater discharge, and supplier water use.

Risk assessment: Disclosure of water-related physical, regulatory, reputational and litigation risks.

Direct operations: Disclosure of water-related policies, management systems, non-compliance, conservation activities and reduction targets.

Supply chain: Disclosure of supplier collaboration, assessment, and target-setting related to water risk.

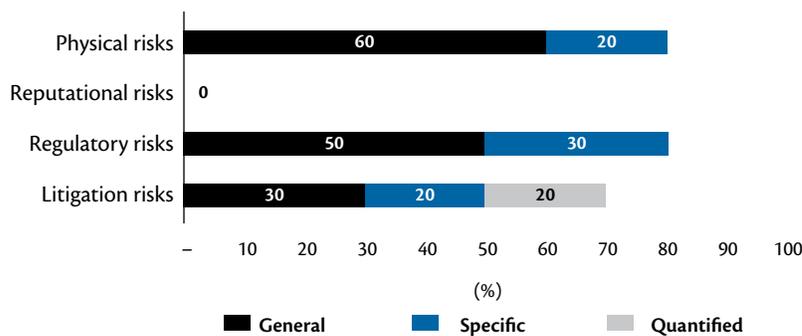
Stakeholder engagement: Disclosure of engagement with local, national and international stakeholders to preserve watersheds and improve access to safe drinking water and sanitation.

Opportunities: Disclosure of investment in and sales of water-efficient products.

*Based on most recent annual financial filings and sustainability reports available as of 6/30/09.

**Companies were scored on an overall scale of 0-112 possible points.

Percentage of Homebuilders Reporting Water-Related Risks



Findings by Indicator

1. Disclosure of Water Accounting

None of the homebuilders surveyed report data on their water use or wastewater discharge in their direct operations.

2. Disclosure of Risk Assessment

Eighty percent of the reviewed homebuilders disclose exposure to water-related physical risks. Seven companies provide general discussion of the fact that droughts and floods – as well as increasing impacts of climate change – could affect the availability of water. For example, KB Home notes in its sustainability report that “[r]estrictions on water use are already quite [common in many areas...]. In addition, climate changes affect precipitation patterns and water availability, which may impact new development opportunities.”

Eighty percent of reviewed companies also disclose water-related regulatory risks. Common risks cited by these companies include federal and state level laws relating to storm and surface water management, water usage, and disposal.

Seventy percent of the companies disclose their litigation risks, with several detailing consent decrees with the EPA involving potential civil penalties related to effluent discharge and stormwater management practices.

None of the homebuilders disclose any reputational risks.

3. Disclosure of Direct Operations

Only three homebuilders disclose actions implemented to reduce water usage. For example, both KB Home and Pulte report measures taken in water-stressed regions such as Arizona, Nevada, and California to install rain sensors that monitor and limit irrigation of landscaping on unsold properties and at office buildings.

4. Disclosure of Supply Chain

None of the homebuilders disclose any information on efforts to engage or collaborate with suppliers on water impacts or risks in their supply chain.

Regulatory Risks: KB Home and Toll Brothers

In their 2008 10-Ks, KB Home and Toll Brothers provide brief descriptions of key water-related regulatory risks:

KB Home: “We are also subject to a variety of local, state and federal statutes, ordinances, rules and regulations concerning the environment, and recently entered into a consent decree with the EPA and certain states concerning our storm water pollution prevention practices. These laws and regulations and the consent decree may cause delays in construction and delivery of new homes, may cause us to incur substantial compliance and other costs, and can prohibit or severely restrict homebuilding activity in certain environmentally sensitive regions or areas.”

Toll Brothers: “Municipalities may restrict or place moratoriums on the availability of utilities, such as water and sewer taps. In some areas, municipalities may enact growth control initiatives, which will restrict the number of building permits available in a given year. If municipalities in which we operate take actions like these, it could have an adverse effect on our business by causing delays, increasing our costs or limiting our ability to operate in those municipalities.”

5. Disclosure Stakeholder Engagement

None of the companies disclose any specific strategies or activities for collaborating with local or regional stakeholders on water management.

6. Disclosure of Water-Related Opportunities

Only five of the 10 companies – Beazer, Centex, KB Home, Pulte, and Toll Brothers – report information on investment in and sales of more water-efficient homes.

Key water-saving features discussed include WaterSense appliances, xeriscaping, and moisture sensor irrigation systems. KB Home provides the most detailed disclosure on this topic.

KB Home: Water-Efficient Homes

KB Home describes how it is integrating water-efficient features into its building lines:

“In 2008, we introduced WaterSense labeled toilets and bathroom sink faucets to our line of *My Home. My Earth.* environmentally friendly options and continue to expand our commitment to this EPA water-efficiency designation, which recognizes products that provide significant water savings.”

“In 2008, we began installing only ENERGY STAR qualified appliances in our newly built homes. These appliances incorporate advanced technologies that use 10–50% less energy and water than standard models. . . In 2008 alone, we estimate that installing ENERGY STAR qualified appliances rather than standard models reduced... water consumption by up to 21 million gallons of water.”

“[We are] partnering with the Southern Nevada Water Authority and the Southern Nevada Home Builders Association to create the first Water Smart home, which saves up to 75,000 gallons of water per year compared to homes, built in the 1990s. Since 2005, we have built 6,800 Water Smart homes in the greater Las Vegas area.”

Source: KB Home, “2009 Sustainability Report.” See: http://www.kbhome.com/pdf/KB_Home_Sustainability_Report_2009.pdf

MINING SECTOR

Water plays an essential role in the mining of metals and minerals that serve as key industrial inputs. Consequently, many conflicts between local communities and mining companies revolve around water. The majority of large-scale mines today use open-pit methods, where water plays a vital role in cooling and lubricating cutting and drilling equipment, transporting and processing ore, managing waste tailings, and suppressing dust.⁹⁰

Ore mining and processing can contaminate surface and groundwater. Acid runoff – formed in a mine when air and water come in contact with sulfide-bearing rock – affects water quality directly by reducing pH levels and increasing concentrations of toxic metals in mine drainage water. In addition, spills of coal sludge or cyanide can severely affect freshwater resources.

Many minerals sector operations extract ore from below the water table, requiring them to manage flows in mines by extensive groundwater pumping, which can affect local hydrology and ecosystems.

Finally, closed mines can pose significant long-term environmental liabilities, as they must be pumped and treated indefinitely to prevent contamination of surface and ground waters. For example, the total liability to the Canadian government of acid rock drainage from former mine sites is estimated to be between \$2 billion and \$5 billion CAD.⁹¹

Overview: Water-Related Risks for the Mining Sector

The mining sector's operations are especially vulnerable to all four risks: physical, reputational, regulatory, and litigation – as reflected in many of the firms' disclosures.

Physical Risks

The mining sector's reliance on high volumes of water makes it vulnerable to water scarcity. Mining operations cannot be relocated, making the sector susceptible to changing local water availability, as well as to pressure from local communities to reduce water use.

Aluminum processing can be extremely energy-intensive, and particularly susceptible to reductions in energy production due to drought. In 2008, Rio Tinto cut output at its New Zealand smelter by five percent, or 1,400 metric tons a month, because of power constraints caused by drought.⁹² In Brazil (which is 90 percent dependent on hydroelectric power production), drought conditions in 2001 sharply curtailed electricity supply, prompting extensive energy rationing. Aluminum

“Companies, including Rio Tinto, cannot afford to regard water as an inexpensive commodity... Tough economic times reinforce the need to recognize there is a cost to using water. Beyond the broader social and environmental benefits of conserving our water resources, it makes good business sense not to waste water and to reduce our water use.”

— Tom Albanese, CEO, Rio Tinto⁸⁹

89. “Rio Tinto and Water,” Rio Tinto. See: <http://www.riotinto.com/documents/RTandWater.pdf>

90. Bell, Fred G. and Laurance J. Donnelly, *Mining and its Impact on the Environment*, London: Taylor and Francis, 2006.

91. Natural Resources Canada, “Biotechnology, chemical and physical treatment of mining effluents,” See: <http://www.nrcan-rncan.gc.ca/mms-smm/tect-tech/ser-ser/met-tem-eng.htm>

92. Saijel Kishan and Gavin Evans, “Chilean Drought, Power Shortages Drive Up World Metal Prices,” *The Washington Post*, May 11, 2008. See: <http://www.washingtonpost.com/wp-dyn/content/article/2008/05/10/AR2008051000151.html>

smelters – including those owned by Alcoa and Vale – were forced to reduce production by 25 percent.⁹³

Mining operations may be disrupted by severe rain or flooding, and climate change is expected to increase the frequency and severity of such extreme weather events. Cyclonic rains in 2007 flooded the pit of Energy Resources of Australia’s (a subsidiary of Rio Tinto) Ranger uranium mine, halting operations. The flooding reduced the company’s first-half net profits 71 percent below the previous year’s performance,⁹⁴ and sparked fears about the company’s ability to contain run-off that could contaminate the adjoining Kakadu National Park.⁹⁵

Reputational Risks

Unaddressed community concerns and protests about the water impacts of mining can lead to the loss of social license to operate. In 2004, thousands of local residents in the Cajamarca area of Peru staged protests against the expansion of Newmont’s Yanacocha mine into nearby Cerro Quilish, a mountain that supplies water to local farmers.⁹⁶ As the protests over water resources wore on, Newmont’s stock price plunged seven percent in two weeks.⁹⁷ In response to the public outcry, the company announced that further exploration would be suspended. Newmont relinquished its drilling permit and was forced to reclassify the 3.9 million ounces of gold at Cerro Quilish from “proven and probable reserves” to “mineralized material not in reserves.”⁹⁸ The 3.9 million ounces reclassified would have yielded an approximate valuation of \$1.6 billion if realized (given an average market price of gold in 2004 of \$409.72 per ounce).⁹⁹ Present day, mark to market valuations of these potential reserves (assuming current prices of \$1100 per ounce) equate to roughly \$4.3 billion.

Campaigns by advocacy groups and affected industries over water impacts also create reputational risks for the mining sector. For example, the proposed Pebble Mine in Alaska, a joint venture between Anglo American and Northern Dynasty, has created unprecedented levels of opposition from a broad coalition of environmental groups, the fishing industry, and even retail jewelers such as Tiffany & Company.¹⁰⁰ The proposed copper and gold mine would be sited at the headwaters of Bristol Bay in Alaska, which produces 50 percent of the world’s commercial supply of wild sockeye salmon.¹⁰¹ Critics claim that the mine poses a significant and unacceptable risk to water quality and downstream fish stocks.¹⁰²

93. Patricia A. Plunkert, “Aluminum,” *U.S. Geological Survey Minerals Yearbook*, 2001.

94. “Miner misses out on uranium boom,” *Nuclear Territory News*, July 26, 2007. See: <http://ntnews/articles/article.php?id=1913>

95. Giles Parkinson, “Peak water threatens Australian industry,” *Climate Change Corp*, March 6, 2009. See: <http://www.climatechangecorp.com/content.asp?ContentID=6007>

96. Tania Mellado, “Peru farmers threaten strike over gold mine, water,” *Planet Ark*, September 9, 2004.

97. Michael Riley and Greg Griffin, “Fighting Back,” *Denver Post*, December 13, 2004. See: <http://www.wman-info.org/news/newmont%20part%202>

98. Newmont, 2005 10-K filing.

99. Gold 2004 London PM Fix – U.S. Dollars. Website: www.kitco.com

100. Steve Herz and Bonnie Gestring, “Reputational Risks, Regulatory Challenges and Legal Uncertainties,” *Anglo American’s Pebble Mine Investor Advisory*, October 29, 2009.

101. Alaska Department of Fish and Game, Division of Sportfish, Research and Technical Services. “Fishery Management Report no. 06-37. Annual Management Report 2005 Bristol Bay Area,” June 2006.

102. Steve Herz and Bonnie Gestring, “Reputational Risks, Regulatory Challenges and Legal Uncertainties,” *Anglo American’s Pebble Mine Investor Advisory*, October 29, 2009.

Regulatory Risks

There is growing support in the United States for tighter regulation of mining impacts on water resources. In 2009, the U.S. Senate and House of Representatives introduced legislation to reform the country's dominant mining legislation, the 1872 Mining Law. Provisions in these new bills would create stricter standards for mining operations' impacts on water quality and for ongoing water treatment at closed operations.¹⁰³

The Obama administration seeks to curtail mountain top removal by coal miners because of water quality concerns. Mountain top removal is a form of strip mining that blasts ridge tops to expose coal deposits, sometimes resulting in unused rock and dirt being dumped into valleys and streams. In October 2009, the EPA vetoed a water permit for the country's largest-ever proposed mountain top coal mine in West Virginia – the first time the agency has taken such action since the enactment of the Clean Water Act in 1972.¹⁰⁴ Also in October 2009, the EPA announced it was delaying up to 79 permit applications for coal mining projects in Central Appalachia due to concerns that the projects would damage water quality in nearby streams.¹⁰⁵

Governments in emerging economies are increasingly responsive to community demands to reject mining projects because of water concerns. In 2002, after several years of community opposition to a proposed gold mine by the Canadian firm Manhattan Minerals in the agricultural region of Tambogrande, Peru, 94 percent of the population voted against permitting the mine.¹⁰⁶ Opposition to the project was based primarily on the mine's expected impact on water resources central to the local economy. Peru's Ministry of Mining upheld the referendum and stopped the project, preventing the company from developing an ore body with a projected value of \$1.33 billion.¹⁰⁷ Similarly, Nevada-based Meridian Gold had to halt development of an open-pit gold mine upstream from the tourist town of Esquel, Argentina in 2006, when less than 20 percent of the town supported the project in a referendum. In response, the government passed a law imposing a three-year moratorium on mining activity in the region.¹⁰⁸

Litigation Risks

Reliance on water rights, in combination with increased advocacy attention and growing competition from other water users, can lead to litigation risks for the mining sector. The mining sector regularly faces legal proceedings in pursuing or maintaining water rights – loss of those rights can curtail operations.

103. EWG, "Environmental Working Group Statement on S. 796, the Hardrock Mining and Reclamation Act of 2009," July 2009.

104. Erica Peterson, "EPA plans to veto Spruce Mine permit," *West Virginia Public Broadcasting*, October 16, 2009. See: <http://www.wvpubcast.org/newsarticle.aspx?id=11690>

105. Kris Maher, "Mining Companies Hit Wall on Mountaintop Blasting," *The Wall Street Journal*, October 8, 2009. See: <http://online.wsj.com/article/SB10001424052748703298004574459363401191286.html>

106. "Tambogrande Speaks Out," Oxfam America, June 20, 2002. See: http://fr.oxfamamerica.org/en/newsandpublications/news_updates/archive2002/art2763.html

107. "Manhattan Minerals still fighting for Tambogrande," *Engineering and Mining Journal*, January 1, 2003.

108. "Meridian Gold Comments on the Decision to Suspend Mining in Chubut," Meridian Gold press release, July 21, 2006.

Findings: Water Risk Disclosure in the Mining Sector

Company highlights

Alcoa was the only mining firm to disclose a wastewater reduction goal, reporting a target of zero process water discharge by 2020.

Anglo American details its open-source Socio-Economic Assessment Toolbox (SEAT), a community assessment and engagement tool for minimizing local sustainability (including water-related) impacts.

Key Findings

The mining sector demonstrated the strongest water risk disclosure of all the sectors surveyed, with an average score of 28 out of 100. The Swiss miner Xstrata ranked highest in the sector with a score of 42; coal miner Peabody Energy came in at the bottom, receiving eight points.

- *Water accounting.* Data reporting in this sector was relatively strong, with 77 percent reporting water use data and four of these companies providing site-level data.
- *Risk disclosure.* All the mining companies report physical and regulatory risks, while nearly two-thirds report litigation risks, and more than one-quarter report reputational risks.
- *Reduction targets.* Six of the 13 mining companies report setting quantitative targets to improve their water use efficiency.
- *Direct operations.* The mining sector had strong disclosure on water management efforts in direct operations, with eight companies providing information on water-specific management systems, strategies or policies.
- *Stakeholder engagement.* Seventy-seven percent of companies disclose collaborating with local governments and communities to solve water-related conflicts and manage local water resources.

Mining: Quality of Water Risk Disclosure*

| | Water accounting | Risk assessment | Direct operations | Supply chain | Stakeholder engagement | Totals** |
|--------------------------------------|------------------|-----------------|-------------------|--------------|------------------------|------------|
| Potential points per category | 36 | 24 | 27 | 7 | 6 | 100 |
| Xstrata | 14 | 4 | 21 | 0 | 3 | 42 |
| Barrick | 22 | 6 | 8 | 0 | 2 | 38 |
| Rio Tinto | 8 | 10 | 14 | 0 | 5 | 37 |
| Alcoa | 8 | 8 | 18 | 0 | 1 | 35 |
| Anglo American | 11 | 6 | 12 | 0 | 4 | 33 |
| Freeport-McMoRan | 3 | 16 | 9 | 0 | 3 | 31 |
| BHP Billiton | 11 | 10 | 9 | 0 | 0 | 30 |
| Teck | 9 | 8 | 10 | 0 | 0 | 27 |
| Vale | 5 | 4 | 13 | 1 | 4 | 27 |
| Newmont | 9 | 4 | 11 | 0 | 1 | 25 |
| Consol Energy | 0 | 12 | 3 | 0 | 0 | 15 |
| Massey Energy | 0 | 10 | 5 | 0 | 0 | 15 |
| Peabody Energy | 0 | 4 | 4 | 0 | 0 | 8 |

Evaluation key

Water accounting: Data on water use, wastewater discharge, and supplier water use.

Risk assessment: Disclosure of water-related physical, regulatory, reputational and litigation risks.

Direct operations: Disclosure of water-related policies, management systems, non-compliance, conservation activities and reduction targets.

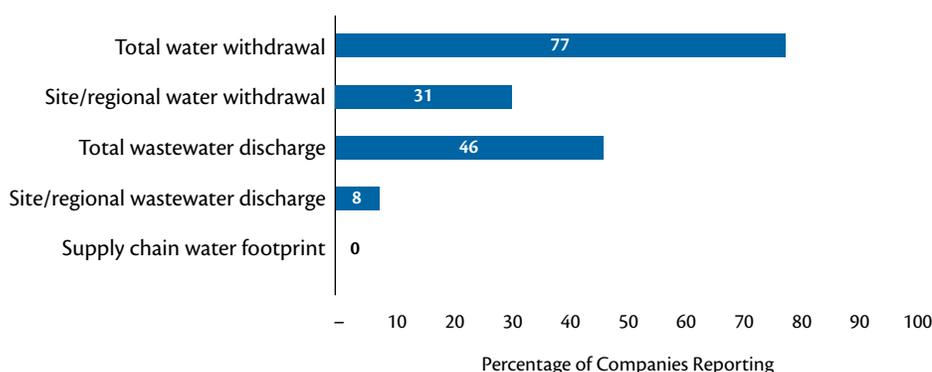
Supply chain: Disclosure of supplier collaboration, assessment, and target-setting related to water risk.

Stakeholder engagement: Disclosure of engagement with local, national and international stakeholders to preserve watersheds and improve access to safe drinking water and sanitation.

*Based on most recent annual financial filings and sustainability reports available as of 6/30/09.

**Companies were scored on an overall scale of 0-100 possible points.

Mining Sector: Water Accounting Disclosure



Findings by Indicator

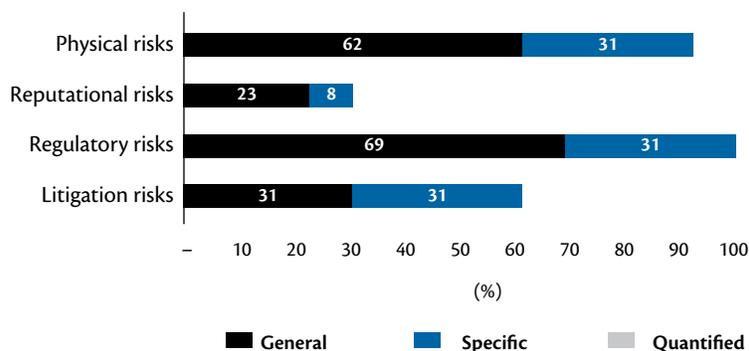
1. Disclosure of Water Accounting

Seventy-seven percent (10 out of 13) of the mining companies surveyed report data on their water usage. Four of these – Alcoa, Anglo American, Barrick and Xstrata – break down water use data to the site level. Newmont provides data on both the source of water used (for example, groundwater or municipal), as well as on wastewater discharge destination (for example, ocean, external treatment, or surface water). Fewer companies (46 percent) disclose data on wastewater discharge.

2. Disclosure of Risk Assessment

Ninety-three percent of the reviewed companies disclose some level of physical risk related to water availability. In its stand-alone 32-page Water Report, Rio Tinto identifies the physical risks water poses to its operations: “Access to water is critical to Rio Tinto’s operations. Rio Tinto owns and manages more than 110 operations around the world, located in six geographical regions across seven different climate zones. Each Rio Tinto operation has its own set of water challenges. Some are located in water scarce environments, where increasingly they compete with other water users, while others need to manage surplus water resulting from storms or groundwater.”

Percentage of Mining Companies Reporting Water-Related Risks



Barrick: Comprehensive Water Accounting

Barrick provides the most detailed water accounting of all the mining companies reviewed. The company discloses site and regional level data for both water use and wastewater discharge at its more than 25 mines worldwide. For some sites, the company reports up to four years of performance data.

Source: Barrick Corporate Website. See: <http://www.barrick.com/CorporateResponsibility/Reporting/PerformanceTables/Environment/default.aspx>

Teck: Assessing Global Water Risk

Teck discloses that the company has conducted a Global Water Risk Assessment that included analysis of water scarcity issues affecting the company’s direct operations, mapping of company sites to identify whether any employees live in areas that lack access to safe water or sanitation, and quantifying and benchmarking its sites’ total water use and efficiency.

Source: Teck, “2007 Sustainability Report.” See: <http://www.teck.com/Generic.aspx?PAGE=Teck+Sustainability+Pages%2fReport+Archive&portalName=tc>

Rio Tinto: Water Management Systems

Rio Tinto discloses the company's water management system and standards:

"The water standard was developed in 2003 and sets down Rio Tinto's minimum expectations for water management. It applies to all Rio Tinto operations – from the exploration stage right through to closure – as part of a series of environmental standards that help deliver consistent performance wherever we operate. To meet the water standard, each operation is required to have:

- A water balance and water management plan that helps to prepare for all water needs and challenges.
- Skilled water personnel who understand how to assess water risk, manage water in their operations and engage with the community.
- Appropriately designed water infrastructure, such as water storages and borefields, which reflect leading practice.

Operations are audited against the standard every two years. Audit results show that while some operations are meeting the standard, others are still working to improve their water balances and water management plans."

Source: Rio Tinto, "Rio Tinto and Water"
See: <http://www.riotinto.com./documents/RTandWater.pdf>

All of the surveyed companies disclose exposure to water-related regulatory risks. Four companies provide detailed descriptions of these risks and the likely impacts on their operations.

Sixty-two percent of mining companies report water-related litigation risks, with several highlighting water rights as a risk factor. For example, in its 2008 10-K, Freeport-McMoRan notes that "...we cannot predict the potential outcome of pending or future legal proceedings on our water rights, claims and uses. The loss of some or all water rights for any of our mines, in whole or in part, or shortages of water to which we have rights could require us to curtail or shut down mining production and could prevent us from pursuing expansion opportunities."

Four of the 13 mining companies (31 percent) discuss reputational risks related to impacts on water or the environment. In its 2008 20-F filing, Rio Tinto reports that "[s]ome of the Group's current and potential operations are located in or near communities that may regard such an operation as having a detrimental effect on their environmental, economic or social circumstances. The consequences of community reaction could also have a material adverse impact on the cost, profitability, ability to finance or even the viability of an operation."

3. Disclosure of Direct Operations

The mining sector had strong disclosure of water management efforts in direct operations, with eight companies providing information on water-specific management systems, plans, or policies. Rio Tinto details its water management system, as does Vale, which notes in its 2008 20-F filing that "[t]he Hydrological Resources Management System implemented throughout Vale includes evaluation of the availability of water in the areas where we operate and programs to rationalize and control water use." BHP Billiton was the only mining company reviewed to disclose a policy banning the disposal of waste rock or tailings into rivers.

Eighty-five percent of the surveyed companies (11 of 13) report information on their water-related regulatory compliance, and five companies – Alcoa, Xstrata, Consol Energy, Freeport and Newmont – also disclose relevant fines and efforts undertaken to remediate cases of non-compliance.

Six of the 13 mining companies report setting quantitative targets to improve their water efficiency. Alcoa was the only mining firm to set a wastewater reduction goal, reporting a target to achieve zero process water discharge by 2020.

4. Disclosure of Supply Chain

None of the mining companies reviewed disclose engaging with their suppliers on water-related risk – with the exception of Vale, which mentions that it assesses its suppliers regularly on environmental performance.

5. Disclosure of Stakeholder Engagement

Ten of the 13 surveyed companies (77 percent) report engaging with stakeholders on water management issues. Most of the companies disclose collaborating with local governments and communities to solve water-related conflicts and to manage local water resources more efficiently. Xstrata discusses specific negotiations with communities concerned about the company's water impacts and Anglo American details its open-source Socio-Economic Assessment Toolbox (SEAT), a community assessment and engagement tool for minimizing local sustainability (including water-related) impacts.

Xstrata: Stakeholder Engagement in Chile

Xstrata discusses the company's engagement with local communities on water concerns at its El Morro project in northern Chile:

“Three years of intense consultation with the communities in the Huasco Valley and surrounding areas enabled local people to express their concerns to the company and participate in the final mine design. The potential strain on water supplies was the main concern expressed. As a result, Xstrata Copper plans to build a desalination plant on the coast to supply the mine's entire water needs during construction and operation, at a cost of \$500 million, or 20% of our total estimated investment in the project. The site will also use technology to reduce both water consumption and waste deposited in the tailings dam.”

Source: Xstrata, “Corporate Sustainability Report 2008.” See: http://www.xstrata.com/assets/pdf/x_sustainability_2008.pdf

OIL & GAS SECTOR

“...Oil sands production requires an extremely large quantity of water... While much of this water is recycled and used many times over, the oil sands use more water per year than the entire city of Calgary. The amount of water consumed per barrel of oil produced has been declining, but a 2006 Government of Alberta report warned that there simply may not be enough available water to meet the needs of all planned oil sands projects.”

—Standard Chartered Bank, “Water: The Real Liquidity Crisis”¹¹²

Oil and water don’t mix. But water risk management is certainly a factor for companies across the oil and gas sector. Oil refining uses large quantities of water – one to two-and-a-half gallons of water for every gallon of product – for processing and cooling.¹⁰⁹ Oil sands extraction and upgrading is particularly water-intensive, with water usage ranging on average from two to four-and-a-half barrels of water per barrel of synthetic crude oil – in an area of Canada where water scarcity is a growing concern.¹¹⁰

Water contamination is also a significant risk, particularly in areas where oil and gas operations intersect with drinking water supplies. Pumping oil and gas out of the ground can produce large volumes of low-quality water known as “produced water.” As oil fields age, water production increases. According to U.S. Department of Energy figures, the global oil industry produces more water than oil, with water extraction exceeding oil extraction by two to three times.¹¹¹

Oil and gas refining operations can also negatively affect freshwater quality through uncontrolled spills or wastewater discharge. Unconventional forms of natural gas extraction, like coal-bed methane, tight sands, and shale gas use drilling technologies with the potential to contaminate drinking water aquifers.

Overview: Water-Related Risks for the Oil & Gas Sector

A review of the oil and gas sector reveals the industry to be vulnerable to all four risks: physical, reputational, regulatory, and litigation.

Physical Risks

Oil refiners face risks of higher shipping costs, non-availability of feedstock, and constraints on production when drought decreases river flows or limits water availability. Oil refineries require large volumes of process steam and cooling water and are frequently sited near navigable rivers, lakes or seaports. In the summer of 2009, the Rhine River – the main waterway for refineries in Germany and Switzerland – experienced unusually low water levels, leading to a 21 percent increase in the costs of transporting gasoline by barge.¹¹³

Water availability is a significant constraint for operators in the Albertan oil sands, which represent 95 percent of Canada’s estimated petroleum reserves of 174 billion barrels and 50-70 percent of the remaining investible oil assets for Western

109. EPA Region 9, “Sustainable Water Infrastructure, Water Efficiency by Sectors.” See: <http://www.epa.gov/region09/waterinfrastructure/oilrefineries.html>

110. Alberta EII, “Water Use In Alberta,” Water Innovation in the Oil Patch Forum, Alberta Employment, Immigration and Industry, PTAC, May 29, 2007.

111. NETL, “Produced Water Management Information System: Introduction to Produced Water,” National Energy Technology Laboratory. See: <http://www.netl.doe.gov/technologies/pwmis/intropw/index.html>

112. Alex Barrett et al., “Water: The Real Liquidity Crisis,” Standard Chartered Bank, March 20, 2009.

113. Rachel Graham and Nidaa Bakhsh, “Rhine Barge Rates for Oil Products Advance on Low Water Levels,” *Bloomberg News*, September 25, 2009. See: <http://www.bloomberg.com/apps/news?pid=20601100&sid=apg55vof0NcM>

companies.¹¹⁴ The water intensity of oil sands extraction and upgrading is high, yet many of the active oil sands projects in the region depend on the declining flows of the Athabasca River as their primary source of water. Between 1970 and 2005, the Athabasca saw its average summer flow decline by 29 percent, and climate scientists predict that average flow could decline by 24-68 percent by the end of this century.¹¹⁵ Current regulations do not take into account the ecological limits of the Athabasca, let alone future constraints on water supply, meaning that future projects could face significant risks.

Oil shale production, which has emerged in recent years as a significant new focus for oil industry R&D investment, requires two to five gallons of water per gallon of refinery-ready oil.¹¹⁶ In the United States, oil shale resources are predominantly located in states such as Colorado, Utah, and Wyoming, which already face relative water scarcity. Predictions call for these states to become more water-stressed in the future due to climate change – leading to concerns by regulators and governments about the industry’s long-term impacts on local water supplies.¹¹⁷

Reputational Risks

Oil spills that pollute surface and groundwater can pose significant reputational risks to energy companies. Major oil spills in the past – including Exxon’s Valdez spill and the alleged contamination of Ecuadorean waterways by Texaco (now owned by Chevron) – have garnered high public visibility and generated some of the most sustained levels of environmental protest and financial liability.

Community concerns about wastewater can affect the siting and expansion of oil and gas processing facilities. In 2007, BP made headlines with its application for a permit to discharge additional pollutants into Lake Michigan from its oil refinery in Whiting, Indiana. The company sought the permit in order to process oil sands crude. Local environmental groups and concerned citizens coordinated an aggressive campaign that ultimately led BP to pledge to invest in technology that would allow it to restrict its wastewater discharges to pre-expansion levels.¹¹⁸

Regulatory Risks

In the United States, federal and state governments will likely increase their oversight of potentially water-contaminating chemicals used for deep shale natural gas drilling. Shale gas drillers use a technology known as “hydraulic fracturing” to tap into deep underground deposits to release natural gas. The process involves injecting a mix of water, chemicals and sand or plastic beads into compressed rock to open cracks and release trapped gas. But environmentalists and

114. “Alberta’s Energy Reserves 2008 and Supply/ Demand Outlook 2009-2018”, *ERCB 2009 ST-98 Report* and “Worldwide Look at Reserves and Production. Special Report,” *Oil & Gas Journal*, December 22, 2008, Vol. 106, Issue 48.

115. University of Alberta, “Running Out of Steam: Oil Sands Development and Water Use in the Athabasca-Watershed: Science and Market Based Solutions,” *Environmental Research & Studies Center*, May 2007.

116. James T. Bartis, “Oil Shale Development in the United States: Prospects and Policy Issues,” *Rand Corporation*, 2005.

117. Jeremy Miller, “Water Scarcity and the Western Oil Shales,” *The New York Times*, June 9, 2009. See: <http://greeninc.blogs.nytimes.com/2009/06/09/water-scarcity-and-the-western-oil-shales/>

118. “BP Pledges No Increase in Lake Michigan Discharge Limits at Whiting Refinery,” *BP*, press release, August 23, 2007.

some lawmakers are concerned that fracturing has contaminated water supplies with the chemicals used in the drilling process, and could disturb underground rock formations, releasing naturally occurring substances like arsenic or mercury into aquifers.¹¹⁹ There are also concerns about disposal of the drilling fluid mixture after it is pumped back out of the well. Investors and environmentalists have asked that energy companies disclose the specific chemicals used in the fluids that are injected into wells and then later stored in pools before undergoing treatment.

Federal legislation to regulate fracturing is currently being considered in the U.S. House of Representatives and the Senate. The legislation would require drilling companies to comply with the Safe Drinking Water Act and disclose the chemicals used in their hydraulic fracturing processes.¹²⁰ The threat of legislation led ExxonMobil to include a clause that would allow it to back out of the \$41 billion offer it made in December 2009 to buy natural gas producer XTO Energy if Congress made fracturing illegal or “commercially impracticable.”¹²¹

Regulators in New York State, which sits above the massive Marcellus Shale gas deposit, are also increasing scrutiny of the water impacts of fracturing. In September 2009, the New York State Department of Environmental Conservation released draft permit conditions that would require disclosure of chemicals used, specific well construction protocols, and baseline pre-testing of surrounding drinking water wells.¹²² In December 2009, the City of New York, worried that gas drilling in New York State could threaten the city’s watershed, called for a ban on the practice, and the U.S. EPA also weighed in, urging New York State regulators to undertake a broader study of the potential environmental and human health impacts of drilling.¹²³

New regulatory requirements for managing tailings ponds in Alberta will increase the costs to oil sands operators. Oil sands extraction processes generate tailings as a waste by-product generally composed of water, sand, silt, clay, and residual bitumen. Numerous cases document leakage of toxic fluids from tailings ponds into the Athabasca River or into groundwater, and to date, no tailings ponds have been fully reclaimed.¹²⁴ In February 2009, the Alberta Energy Resources Conservation Board released a directive requiring operators to reclaim existing tailings ponds and reduce disposal to new ponds on an aggressive timeline.¹²⁵ A recent investor study of the oil sands sector found that no oil sands companies disclose the cost of tailings reclamation

119. Katie Howell, “More Oversight Sought for Hydraulic Fracturing,” *The New York Times*, November 4, 2009. See: <http://www.nytimes.com/gwire/2009/11/04/04greenwire-more-oversight-sought-for-hydraulic-fracturing-35961.html>

120. Ibid.

121. Russell Gold, “Exxon Can Stop Deal if Drilling Method Is Restricted,” *The Wall Street Journal*, December 16, 2009. See: <http://online.wsj.com/article/SB10001424052748703581204574600111296148326.html>

122. Fritz Mayer, “Rules versus permit conditions,” *The River Reporter*, November 12-18, 2009. See: <http://www.riverreporter.com/issues/09-11-12/news-rules.html>

123. Mireya Navarro, “E.P.A., Concerned Over Gas Drilling, Questions New York State’s Plans,” *The New York Times*, December 30, 2009. See: <http://www.nytimes.com/2009/12/31/science/earth/31drill.html>

124. Michelle de Cordova and Jamie Bonham, “Drawing Lines in the Sands: Oil Sands Benchmarking,” Ethical Funds, November 2009.

125. Shawn Denstendt and Jessica Ng, “New Oil Sands Tailings Requirements Increase Regulatory Scrutiny,” *Osler*, February 5, 2009. See: <http://www.osler.com/resources.aspx?id=16840>

– which is likely to be substantial – in easily understandable form, and none provide detail on how they determine how much money to set aside each year.¹²⁶

Litigation Risks

Energy companies face litigation risks for spills and contamination of freshwater resources. The widespread contamination of groundwater linked to methyl tertiary butyl ether (MTBE), a gasoline additive and suspected carcinogen, has given rise to over 70 lawsuits filed against major oil companies in the United States. Estimates place oil companies' payments at over \$423 million on settlements over 30 years related to MTBE suits involving the contamination of 153 public water systems.¹²⁷ In October 2009, a federal jury awarded \$104.7 million in compensatory damages against ExxonMobil for MTBE contamination of New York City's groundwater and drinking water supply.¹²⁸

126. Michelle de Cordova and Jamie Bonham, "Drawing Lines in the Sands: Oil Sands Benchmarking," Ethical Funds, November 2009.

127. Weitz & Luxenberg, "Weitz & Luxenberg P.C. Secures \$423 Million MTBE Settlement Against Oil Giants," Weitz & Luxenberg, press release, May 8, 2008.

128. Jonathan Fitzgarrald, "Greenberg Glusker's Robert Chapman Secures \$105M Damage Award in Exxon Groundwater Contamination Trial," *Reuters*, October 19, 2009. See: <http://69.63.131.239/news/releases/Exxon>

Findings: Water Risk Disclosure in the Oil & Gas Sector

Company Highlights

BP provides an interactive world map that allows readers to identify facilities operating in water-stressed regions and access short profiles of those sites.

ConocoPhillips recently established a Qatar-based Global Water Sustainability Center focused on examining methods to treat and reuse by-product water from oil production and refining operations.

Key Findings

The sector showed relatively weak water risk disclosure overall, with an average score of 19 out of 100. BP achieved the highest level of disclosure in the sector with 35 points; Canadian natural gas producer EnCana came in at the bottom with four points.

- *Water accounting data.* Nearly two-thirds of the oil and gas companies reviewed report total water usage, with only two – BP and Royal Dutch Shell – providing access to site and regional data. Fewer than half provide any wastewater discharge data.
- *Risk disclosure.* Slightly more than half the oil companies report some level of physical risk. All but one disclose some regulatory risk. Litigation and reputational risk disclosure was limited to three and four companies, respectively.
- *Reduction targets.* Only two companies – both oil sands operators – disclose water use reduction targets; only one – Total – reports a wastewater reduction target.
- *Supply chain engagement.* No companies disclose engaging with suppliers on water management or risks, despite the sector's significant reliance on contracted companies to perform drilling services.
- *Stakeholder engagement.* Over half the companies report stakeholder engagement with local communities on water management issues.

Oil & Gas: Quality of Water Risk Disclosure*

| | Water accounting | Risk assessment | Direct operations | Supply chain | Stakeholder engagement | Totals** |
|--------------------------------------|------------------|-----------------|-------------------|--------------|------------------------|------------|
| Potential points per category | 36 | 24 | 27 | 7 | 6 | 100 |
| BP | 19 | 6 | 10 | 0 | 0 | 35 |
| Suncor Energy*** | 10 | 4 | 13 | 0 | 0 | 27 |
| Total | 10 | 4 | 10 | 0 | 3 | 27 |
| Nexen | 7 | 8 | 8 | 0 | 3 | 26 |
| Royal Dutch Shell | 5 | 10 | 8 | 0 | 2 | 25 |
| ExxonMobil | 5 | 8 | 6 | 0 | 4 | 23 |
| Chevron | 3 | 6 | 5 | 0 | 2 | 16 |
| ConocoPhillips | 2 | 10 | 4 | 0 | 0 | 16 |
| Devon Energy | 4 | 4 | 6 | 0 | 2 | 16 |
| Canadian Natural Resources | 2 | 2 | 8 | 0 | 0 | 12 |
| Chesapeake Energy | 0 | 2 | 3 | 0 | 2 | 7 |
| Range Resources | 0 | 4 | 3 | 0 | 0 | 7 |
| EnCana | 0 | 2 | 1 | 0 | 1 | 4 |

Evaluation key

Water accounting: Data on water use, wastewater discharge, and supplier water use.

Risk assessment: Disclosure of water-related physical, regulatory, reputational and litigation risks.

Direct operations: Disclosure of water-related policies, management systems, non-compliance, conservation activities and reduction targets.

Supply chain: Disclosure of supplier collaboration, assessment, and target-setting related to water risk.

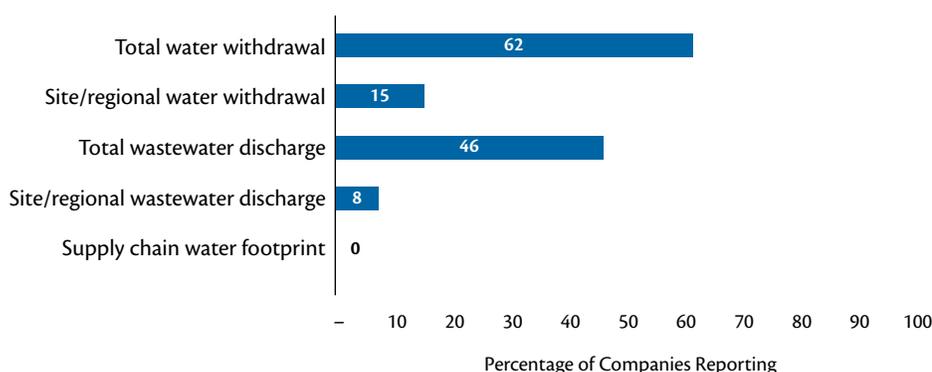
Stakeholder engagement: Disclosure of engagement with local, national and international stakeholders to preserve watersheds and improve access to safe drinking water and sanitation.

*Based on most recent annual financial filings and sustainability reports available as of 6/30/09.

**Companies were scored on an overall scale of 0-100 possible points.

***Suncor's data was evaluated prior to the company's merger with Petro-Canada.

Oil & Gas Sector: Water Accounting Disclosure



Findings by Indicator

1. Disclosure of Water Footprint

Eight out of the 13 oil and gas companies evaluated report their total water usage.

Of these, BP and Royal Dutch Shell provide access to site and regional level water use data through dedicated facility reports. The reviewed companies were weaker with respect to disclosing wastewater discharge, with only six companies (46 percent) providing some level of data in this area. BP was the only oil company to report site-specific wastewater discharge data. None of the oil companies provide information on their suppliers' water footprint.

2. Disclosure of Risk Assessment

Fifty-four percent of the reviewed companies provide some disclosure on water-related physical risks.

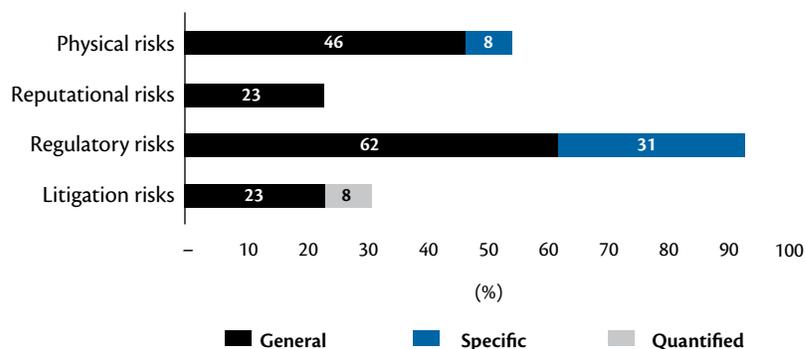
Most of the companies provide very high-level information, noting that water scarcity and water quality may possibly constrain their direct operations. For example, Shell states: "By 2025, two-thirds of the world's population could be living in areas where fresh water supplies are under serious stress...Our industry is not a big water user, compared for example, to agriculture. But growing crops to make biofuels and mining bitumen from oil sands can be water intensive; and some oil and gas operations use (and produce) quantities of water that can be significant in water stressed areas." Nexen notes more pronounced water scarcity and quality risks in the Albertan oil sands region, where multiple users draw on the Athabasca River, the region's main water resource.

BP: Mapping Water Risk

In addition to providing detailed water use and wastewater discharge data, BP's sustainability website features an interactive world map that allows readers to access short profiles of facilities operating in water-stressed regions. Of the 49 BP sites on the map, the company highlights four that are in areas where local community freshwater supplies have been assessed as under stress. These sites include BP's Castellon refinery in Spain, production facilities in Pakistan and exploration and production facilities in the Gulf of Suez and the U.A.E.

Source: BP, "Environmental Mapping Tool." See: <http://www.bp.com/hsetool.do?categoryId=9027867&issuelid=3>

Percentage of Oil & Gas Companies Reporting Water-Related Risks



Suncor: Reducing Water Use in the Oil Sands

In its 2008 sustainability report, Suncor discloses reducing its water use by 22 percent over the past six years, with most of these gains made at the company's oil sands operations. In 2008, it used 3.1 m³ of water to produce 1 m³ of oil – a 37 percent reduction in water use intensity since 2002. Suncor realized these savings through increased reuse and recycling. For example, the company recycles approximately 90 percent of the water used to make steam at its in situ operation through a continuous loop system, eliminating the need for fresh surface or groundwater.

Suncor recently adopted a 10-year water management plan designed to recycle and reuse larger amounts of wastewater and tailings water, reducing its need to withdraw river water. The budgeted costs to execute this plan exceed \$500 million. As part of this plan, Suncor set a company-wide target to reduce total water intake by 12 percent by 2015 from a 2007 baseline.

Source: Suncor, "2009 Summary Report on Sustainability." See: http://www.suncor.com/pdf/2009_Report_on_Sustainability_Summary.pdf

All the oil and gas companies reviewed – with the exception of ExxonMobil – provide some description of their exposure to water-related regulatory risks. Only four companies – Chevron, ExxonMobil, Shell and ConocoPhillips – disclose water-related litigation risks.

Three of the oil companies reviewed – BP, Nexen, and Shell – disclose some information on reputational risks. Nexen, for example, notes in its 2008 10-K filing that "the public may react negatively to certain water disposal practices related to water saturated CBM [coal-bed methane] projects, even though these water disposal practices are regulated to ensure public safety and water conservation. Negative public perception around water saturated CBM production could impede our access to the resource."

3. Disclosure of Direct Operations

Five oil and gas companies report water-related policies or standards. All the companies in the sector disclose efforts towards reducing water consumption or reusing/recycling existing water resources. Most discuss steps taken to increase the use of brackish/saline water in their operations, thereby recycling "produced" water and reducing the use of freshwater.

Only two of the 13 oil and gas companies reviewed disclose water use reduction targets. Suncor reports a company-wide target to reduce total water withdrawals by 12 percent by 2015 with a 2007 baseline. Canadian Natural Resources discloses a water efficiency target for one site, Primrose, where it aims to reduce freshwater intake by 73 percent by 2013 compared to 2006 levels. Total was the only company to disclose a target to reduce hydrocarbon contamination levels in wastewater discharges.

4. Disclosure of Supply Chain

None of the oil companies reviewed disclose engaging with their suppliers on water-related impacts or risks, despite the industry's significant reliance on service companies for drilling and shipping activities, among others.

5. Disclosure of Stakeholder Engagement

Fifty-four percent of companies report engaging with stakeholders on water management issues. Companies disclose a range of engagement activities with local communities to solve water-related issues such as watershed management (ExxonMobil), clean drinking water projects (Chevron), and groundwater protection (Nexen).

ConocoPhillips's Global Water Sustainability Center

ConocoPhillips reports on the company's investment in R&D for water technologies:

"ConocoPhillips' Global Water Sustainability Center opened in early 2009 with the mission of examining methods to treat and reuse byproduct water from oil production and refining operations and conduct other projects relating to industrial and municipal water sustainability. The center is located in the Qatar Science and Technology Park (QSTP) in Doha...[and] aims to develop innovative, efficient and cost-effective technologies to treat byproduct water for potential use in applications such as crop irrigation, livestock watering, wildlife habitats, or industrial cooling and recycling within the operation facility...ConocoPhillips intends for the facility to become a center of excellence for key water-related technologies in the petroleum and water industries."

Source: ConocoPhillips, "2008 Sustainable Development Report." See: http://www.conocophillips.com/EN/susdev/documents/6280095SustainableDev_web.pdf

SEMICONDUCTOR SECTOR

Without semiconductors, the data systems running our computers, cell phones, and automobiles would come to a halt. Yet semiconductor manufacturing is a thirsty process. The silicon wafers must be rinsed after each of several dozen semiconductor layers is applied and etched, requiring massive amounts of water. To make a single 300-millimeter wafer, a typical semiconductor plant requires approximately 2,000 gallons of water.¹²⁹ This translates to between two to four million gallons of water per day at a typical fabrication plant or “fab,” roughly the equivalent of the daily water requirements for a city of 50,000 people.¹³⁰

In addition to the massive quantity of water required, water quality is a key concern. Semiconductor manufacturing plants need water thousands of times purer than drinking water. This ultrapure water is filtered and refined through expensive and sophisticated processes, resulting in the cleanest water found on earth. Because numerous chemicals are used to etch silicon wafers, however, wastewater from semiconductor plants can contain a range of contaminants including arsenic, antimony, phosphorous, hydrogen peroxide, nitric acid, sulphuric acid, and hydrofluoric acid.

According to analysis by JPMorgan, a water-related shutdown at a semiconductor fabrication facility operated by Intel or Texas Instruments could result in \$100–\$200 million in missed revenue during a quarter, or \$0.02 or \$0.04 per share.¹³¹

Overview: Water-Related Risks for the Semiconductor Sector

A review of the sector reveals the most salient water risks for semiconductor makers are physical and litigation risks.

Physical Risks

Semiconductor manufacturing is highly water-intensive, requiring large volumes of water of the highest industrial quality. At the same time, a large number of semiconductor factories are located in arid or semi-arid regions of the world, such as the American southwest, where rapid population growth and longer-term climate change impacts will likely heighten existing stress on water resources.

Offshore production, in particular, heightens vulnerability to physical water risk. Semiconductor firms face increased physical risk in Asian and Pacific Rim countries. Rapid population and economic growth is already stressing water resources – trends further exacerbated by the increasing number of manufacturing facilities moving to the region. In Beijing, the water supply situation is so problematic that chipmakers must truck water to their facilities several weeks out of each year. The large Semiconductor Manufacturing International Corp. facility outside Beijing, for

129. “Pure water, semiconductors and the recession,” *Global Water Intelligence*, Vol. 10, Issue 10, October 2009. See: <http://www.globalwaterintel.com/archive/10/10/market-insight/pure-water-semiconductors-and-the-recession.html>

130. IEEE Interview (Transcript) with Laurie Howell, Ting Sun and Farhang Shadman, “Semiconductor Manufacturing Plants can use as much water as a small city,” Engineers of the New Millennium: The Global Water Challenge Special Report from IEEE.

131. Marc Levinson et al., “Watching water: A guide to evaluating corporate risks in a thirsty world,” JPMorgan Global Equity Research, March 31, 2008.

example, maintains its own backup reservoirs, in addition to the backup reservoirs of the Beijing and Tianjin water utilities.¹³²

Currently, 11 of the top 14 integrated circuit foundries in the world are located in the Asia-Pacific region, accounting for over 75 percent of the industry's sales.¹³³

Litigation Risks

Semiconductor firms face litigation risks associated with groundwater contamination. Historically, semiconductor operations in the United States have been subject to litigation and Superfund obligations linked to groundwater contamination. Perhaps the most significant historical example is Fairchild Semiconductor Corporation's 56-acre San Jose plant in Silicon Valley, which was officially listed as a Superfund site in 1989.¹³⁴ Motorola has two Superfund sites where solvents used in the manufacture and cleaning of semiconductors contributed to groundwater contamination. The company is expected to pay the EPA's oversight costs, estimated at over \$1.5 million.¹³⁵

132. "Water: The Emerging Business Concerns," *Travel Daily News*, January 4, 2007. See: http://www.traveldailynews.com/pages/show_page/20520-Water:-The-Emerging-Business-Concerns

133. Marc Levinson et al., "Watching water: A guide to evaluating corporate risks in a thirsty world," JPMorgan Global Equity Research, March 31, 2008.

134. Weitz & Luxenberg P.C. See: http://www.weitzlux.com/environmentallawsuit/california/fairchildsemicondu_145457.html#report

135. "Phoenix superfund site enters next phase of clean up," Environmental Protection Agency, press release, September 29, 2009.

Findings: Water Risk Disclosure in the Semiconductor Sector

Key Findings

The sector showed relatively poor water risk disclosure overall, with an average score of 21 out of 100.

Toshiba ranked highest in the sector with a score of 35. Micron provided the weakest disclosure, receiving only one point.

- *Water accounting data.* The majority of the semiconductor makers report data on water use, but relatively few provide data on wastewater discharge.
- *Risk disclosure.* Nearly two-thirds of the reviewed companies disclose water-related physical risks and regulatory risks, while less than one-third report on litigation risks.
- *Supply chain disclosure.* Only two companies provide information on actions taken with suppliers to improve environmental impacts, and water-specific information was limited. This lack of discussion was notable in light of the fact that many semiconductor companies outsource a significant amount of chip production to other firms.
- *Stakeholder engagement.* Only one company, Intel, reports on efforts to collaborate with stakeholders on water resource management.

Company Highlights

ST Microelectronics discloses the total financial savings achieved from its water reduction efforts, totaling \$119 million over a five-year period.

Texas Instruments notes that all its facilities maintain a water management system that is ISO 14001-compliant.

Semiconductors: Quality of Water Risk Disclosure*

| | Water accounting | Risk assessment | Direct operations | Supply chain | Stakeholder engagement | Totals** |
|--------------------------------------|------------------|-----------------|-------------------|--------------|------------------------|------------|
| <i>Potential points per category</i> | 36 | 24 | 27 | 7 | 6 | 100 |
| Toshiba | 20 | 4 | 11 | 0 | 0 | 35 |
| Intel | 11 | 6 | 14 | 1 | 2 | 34 |
| Samsung | 21 | 2 | 6 | 0 | 0 | 29 |
| United Microelectronics | 15 | 6 | 6 | 0 | 0 | 27 |
| Taiwan Semiconductors | 10 | 6 | 8 | 1 | 0 | 25 |
| ST Microelectronics | 12 | 2 | 8 | 0 | 0 | 22 |
| Advanced Micro Devices (AMD) | 5 | 6 | 6 | 0 | 0 | 17 |
| Analog Devices | 4 | 2 | 9 | 0 | 0 | 15 |
| Texas Instruments | 4 | 4 | 7 | 0 | 0 | 15 |
| Infineon Technologies | 0 | 4 | 4 | 0 | 0 | 8 |
| Micron | 0 | 0 | 1 | 0 | 0 | 1 |

Evaluation key

Water accounting: Data on water use, wastewater discharge, and supplier water use.

Risk assessment: Disclosure of water-related physical, regulatory, reputational and litigation risks.

Direct operations: Disclosure of water-related policies, management systems, non-compliance, conservation activities and reduction targets.

Supply chain: Disclosure of supplier collaboration, assessment, and target-setting related to water risk.

Stakeholder engagement: Disclosure of engagement with local, national and international stakeholders to preserve watersheds and improve access to safe drinking water and sanitation.

*Based on most recent annual financial filings and sustainability reports available as of 6/30/09.

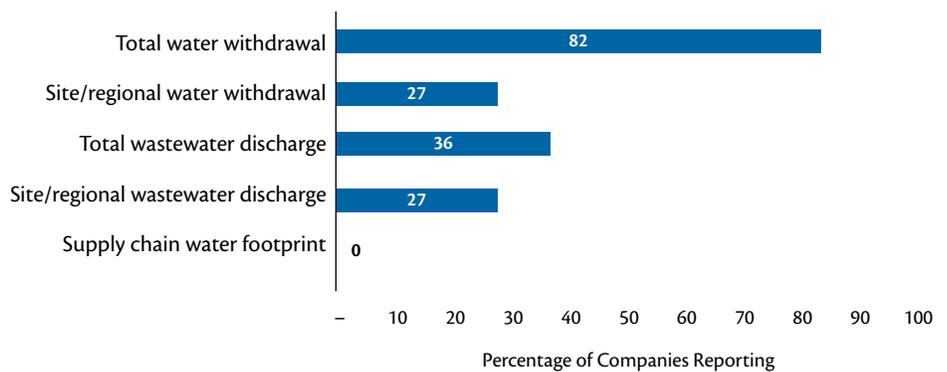
**Companies were scored on an overall scale of 0-100 possible points.

ST Microelectronics: Putting a Price on Water Savings

Geneva-based ST Microelectronics discloses the total costs versus savings for three key inputs associated with its semiconductor manufacturing: water, energy, and chemical use. The company monetized savings for each of these inputs, and reports that its water conservation efforts have resulted in cumulative water-related savings of US\$119 million between 2004 to 2008.

Source: ST Microelectronics, "2008 Corporate Responsibility Report." See: <http://www.st.com/stonline/company/sd/report08/cr08.pdf>

Semiconductor Sector: Water Accounting Disclosure



Findings by Indicator

1. Disclosure of Water Accounting

The majority (82 percent) of the semiconductor makers reviewed report information on water use, and of these nine companies, three break down this data to the site or regional level. Only four companies provide data on their wastewater discharge, with Samsung, Taiwan Electronics, and United Microelectronics presenting facility-level data on these indicators. None of the companies report water performance data on their suppliers.

2. Disclosure of Risk Assessment

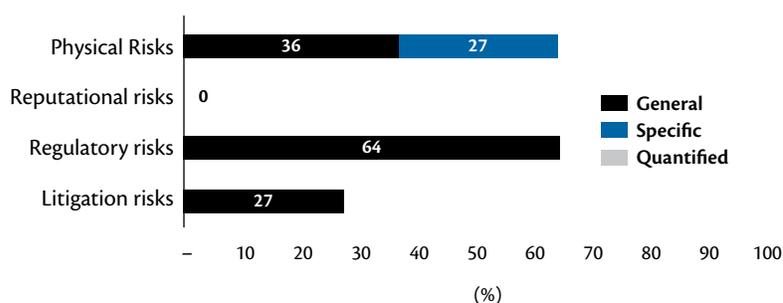
Sixty-three percent (seven out of 11) of the reviewed companies disclose water-related physical risks. For example, Intel in its 2008 10-K states that, "Many of our operations are located in semi-arid regions, such as Israel and the southwestern United States. Some climate change scenarios predict that such regions can become even more vulnerable to prolonged droughts due to climate change." Taiwan Semiconductors in its 2008 20-F filing also cites the location of its Taiwanese operations as a physical risk: "The semiconductor manufacturing processes also use extensive amounts of fresh water. Due to the growth of the semiconductor manufacturers in the Hsinchu Science Park and Tainan Science Park, and the droughts that Taiwan experiences from time to time, there is concern regarding future availability of sufficient fresh water and the potential impact insufficient water supplies may have on our semiconductor production."

While seven of the 11 companies (64 percent) disclose regulatory risks, only three companies disclose water-related litigation risks: AMD, Infineon, and Texas Instruments. No companies mention reputational risks.

3. Disclosure of Direct Operations

Only Texas Instruments and Toshiba discuss water-related management systems. For example, Texas Instruments discloses an ISO-14001 certified water management system and related facility siting policy. Intel and Texas Instruments describe their water conservation actions in water-stressed regions in detail. In its CSR report, Intel discusses the company's water management plan in Arizona, which has lowered its plant's daily water demand by up to 75 percent.

Percentage of Semiconductor Companies Reporting Water-Related Risks



Six of the semiconductor companies reviewed disclose quantified targets to reduce water use. AMD reports (and has achieved) a target to cut water use by 40 percent on an efficiency basis by 2007, relative to a baseline year of 2002. Only one company – Toshiba – discloses a target for reducing wastewater discharge.

4. Disclosure of Supply Chain

Only two companies – Intel and Taiwan Semiconductors – provide some information on actions in their supply chains to improve environmental impacts, but water-specific information was limited. This lack of discussion was notable in light of the fact that many semiconductor companies outsource a significant amount of chip production to other firms.¹³⁶ Intel discloses that, since 1998, it has conducted the Supplier Continuous Quality Improvement (SCQI) Program, which includes supplier training, assessments, and continuous improvement plans. Taiwan Semiconductor reports that it similarly conducts surveys and site audits of its suppliers on environmental protection and hazardous materials reduction.

5. Disclosure of Stakeholder Engagement

Disclosure was limited on stakeholder engagement efforts related to water. Only one company – Intel – reports on efforts to collaborate with stakeholders on water resource management. In its 2008 CSR report, the company mentions collaborations with local communities towards water conservation, including funding and partnering on projects that replenish rivers and tributaries, and protect wetlands and native species near the company’s facilities in Massachusetts, Oregon, and Ireland.

Texas Instruments’ Water Management Systems

Texas Instruments describes the company’s management system for water conservation and discloses how it takes water availability into consideration when siting new facilities:

“Our environmental goal of “zero wasted resources” drives how we plan for and monitor water use, and how efficiently we actually use it. Each TI site maintains a water management system that is both OHSAS 18001- and ISO 14001-compliant, even if a site has not yet been certified...Each TI site also monitors its own progress for fair water use and conservation.

...As a practical consideration, when selecting the location of a new site, we consider whether the area has sufficient stores of water. We review both water quality and quantity during site selection, long before construction begins. Additionally, we consult with local water authorities to assess the long-term storage and use needs where we operate.”

Source: Texas Instruments, “2008 Corporate Citizenship Report.” See: <http://www.ti.com/corp/docs/csr/environment/WaterUse.shtml>

136. “Industry Data: Semiconductor & Fabless Facts,” Global Semiconductor Alliance. See: <http://www.gsaglobal.org/resources/industrydata/facts.asp>

Intel: Water Management in Arizona

Intel reports working with the city of Chandler, Arizona over the past decade to implement a water management system that has lowered Intel Arizona's daily water demand by up to 75 percent. The company details a series of water conservation activities undertaken to achieve these gains:

- **Aquifer recharge:** Since 1996, Intel has replenished over 3.5 billion gallons of water back to the underground aquifer, using reverse osmosis (RO) technologies to treat wastewater from its Chandler plants to drinking water standards.
- **Reclaim:** Over the past decade, the company has used more than 4.5 billion gallons of treated wastewater from Chandler's Ocotillo Water Reclamation Facility instead of tapping into potable water supplies to run cooling towers and air-abatement equipment, among other uses.
- **Recycle:** Using advanced technologies such as RO and a brine evaporation system, Fabrication Plant 22 in Chandler operates one of Intel's most efficient ultra-pure water (UPW) treatment facilities, producing roughly 0.85 gallons of UPW per gallon of city water – saving millions of gallons of water each year compared to other purification processes.

Source: Intel, "2008 Corporate Responsibility Report." See: http://download.intel.com/intel/cr/gcr/pdf/Intel_CSR_Report_2008.pdf

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