McKinsey Quarterly

The business opportunity in water conservation

For many companies, water efficiency is a long-term requirement for staying in business, a big commercial opportunity, or both.

Giulio Boccaletti, Merle Grobbel, and Martin R. Stuchtey

In a world where demand for water is on the road to outstripping supply, many companies are struggling to find the water they need to run their businesses. In 2004, for instance, Pepsi Bottling and Coca-Cola closed down plants in India that local farmers and urban interests believed were competing with them for water. In 2007, a drought forced the US Tennessee Valley Authority to reduce its hydropower generation by nearly a third. Some $300 million in power generation was lost.

Businesses everywhere could face similar challenges during the next few years. A larger global population and growing economies are placing bigger demands on already-depleted water supplies. Agricultural runoff and other forms of pollution are exacerbating the scarcity of water that is clean enough for human and industrial use in some regions, and changes in climate may worsen the problem. Scarcity is raising prices and increasing the level of regulation and competition among stakeholders for access to water. To continue operating, companies in most sectors must learn how to do more with less.

Achieving that goal is an opportunity as well as a necessity. Many of these same companies are developing products and services that can help business customers raise their water productivity. In agriculture, improved irrigation technologies and plant-management techniques

Giulio Boccaletti is an associate principal in McKinsey's London office, **Merle Grobbel** is a consultant in the Cologne office, and **Martin Stuchtey** is a principal in the Munich office.

are yielding "more crops per drop." New approaches now rolling out will help oil companies, mines, utilities, beverage companies, technology producers, and others use water more efficiently. Closing the gap between supply and demand by deploying water productivity improvements across regions and sectors around the world could cost, by our estimate, about $50 billion to $60 billion annually over the next two decades. Private-sector companies will account for about half of this spending, government for the rest. Many of these investments yield positive returns in just three years.

Making a business out of improving water efficiency won't be easy. Successful providers will have to migrate from selling equipment and components to selling solutions aimed at helping business customers reduce their water and energy use. The providers will therefore have to develop new skills and capabilities, particularly in marketing and sales, to identify and capture the higher-value-added solutions that business-to-business markets need. They must also engage more actively in shaping the regulations that will define this market—standing on the sidelines is no longer an option. Nearly every sector will be affected, whether a company is improving its own water productivity or selling equipment and services to help other companies do so.

Doing more with less

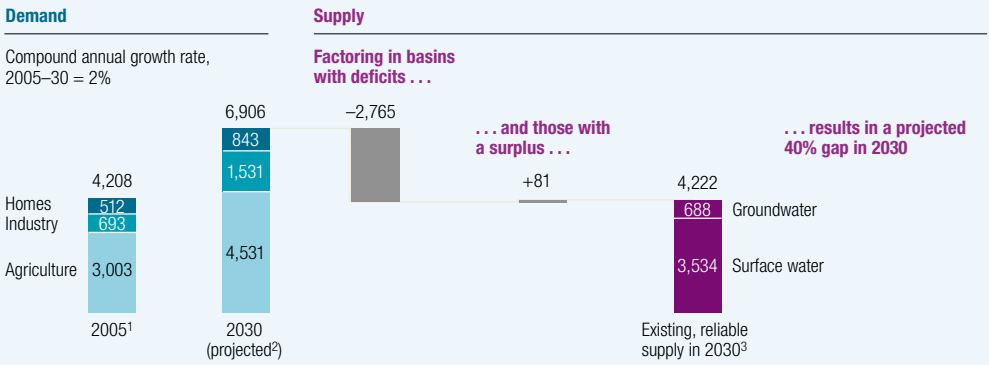
Many countries face a growing gap between the amount of water they can supply reliably to their economies and the amount they need. Assuming continued economic and population growth, by 2030 water supplies will satisfy only 60 percent of global demand (exhibit) and less than 50 percent in many developing regions where water supply is already under stress, including China, India, and South Africa. Closing the gap by increasing supply—through desalination, the drilling of deep wells, or transporting surface water—will be extremely difficult and expensive. More likely, governments will need to manage demand, either by raising the price of water or by capping the amount of it that users can draw.

These moves will have a direct impact on local and multinational businesses. They need water—often in large quantities—for their processes, products, and operations. Their global assets reside in countries where rules governing water usage and prices will vary, along with access to water.

Take Chile, for example—one of the world's most important mining centers and also among the driest spots on Earth. Here the authorities allocate fresh-water rights among companies strictly, closely monitor their usage of water, and pressure them to use less of it; for example,

Exhibit: **Running on empty**

By 2030, water supplies will satisfy only 60 percent of global demand on average.



[1] Based on inputs from International Food Policy Research Institute (IFPRI).
[2] Based on frozen-technology scenario and no increase in water efficiency after 2010; figures do not sum to total, because of rounding.
[3] Supply at 90% reliability, including infrastructure investments scheduled and funded through 2010; supply in 2005 is 4,081 billion cubic meters per year, projected improvements in technology and infrastructure brings 2030 total to 4,866 billion cubic meters per year; net of environmental requirements.

Source: IFPRI; McKinsey analysis

the country's third-largest copper mine, Xstrata's Collahuasi operation, was asked to reduce its rate of water extraction to 300 liters a second by 2010, from 750 liters now. To make up the difference needed to remain in operation, the company has considered building a desalination plant or shipping in water to the mine. It is also deploying new technologies and processes, such as using less water to separate waste rock (called tailings) from ores and recycling more of the water used in the process.

Companies in several sectors are improving their water productivity. The Swedish pulp-and-paper producer SCA,[1] for instance, aims to reduce its overall water consumption by 15 percent from 2005 to 2010. SCA tracks its performance through a resource-management system that collects and aggregates data on energy, water, transport, and raw-material use, as well as waste and emission levels from both production sites and business divisions. The brewing conglomerate SABMiller launched a water footprint study to compare its total water usage, from crop to consumer, in different countries and has used the findings to target improvements throughout the value chain. By 2015, it hopes to use 25 percent less water per liter of beer produced.

Several other big corporations, such as Ford Motor Company, Nestlé, and P&G, have been reducing their water usage too. The first step is usually to study where their processes use water and how much of it. Often, these companies discover a few areas where they can make significant improvements for a small outlay. A mining company, for

[1] Svenska Cellulosa Aktiebolaget.

Dragon-boat competition in the Bedok Reservoir; created in 1986 to capture stormwater runoff, Singapore.

© Flickr credit here...

example, found that more than 30 percent of the expense associated with water came from potable water. By fixing leaks in a single pipeline leading to a mine, the company cut the cost of potable water by 5 percent. After examining the total costs associated with water usage, it discovered that 40 percent of them came from the energy needed to run pumps.

Few companies, however, look beyond near-term water constraints, as important as they are, to a more comprehensive assessment of the longer-term business risks associated with water scarcity. Bottling companies are among the exceptions, in part because water scarcity already influences their strategic decisions, such as where to locate operations. More and more decisions about where to put assets involve such environmental considerations.

Where the opportunities are

Many solutions that will help companies use water more efficiently in their operations—from farms to semiconductor fabs, bottling plants to nuclear ones, steel mills to oil rigs—will be new products and services under development today. Global industrial players, such as ABB, GE, and Siemens, already have large water businesses and continue to develop new products in this area for large industrial users and water utilities. IBM provides technologies to measure and track water efficiency efforts and to improve water treatment and irrigation. A few oil companies are thinking about getting into the water market by selling the pumping technology they've developed for their own operations.

Roughly speaking, the broadest range of opportunities for new products and services falls into three areas: improving the productivity of water treatment and distribution, of water-intensive industrial and power processes, or of water usage in agriculture. These segments are evolving on different time lines and involve different sets of solutions, but a broad range of companies could be successful in any of these areas.

Treatment and distribution

Municipal or private water utilities and many large businesses spend hundreds of billions of dollars a year making water fit for human

consumption and industrial activity and then transporting it, through pumps and pipes, from treatment plants to points of use. The costs include expenditures on new infrastructure, such as a new treatment plants—China and India alone are building hundreds of them to treat water and wastewater—and on operating and maintaining systems. Two-thirds of this spending occurs in developed countries, but much of the growth in new systems will take place in Asia and other developing regions over the next two decades. Trillions of dollars will be spent on technology, equipment, and services.

Meeting this growth with existing technologies is a huge business in itself. In China alone, we estimate, the market for the current membrane technology used to clean wastewater will grow by more than 30 percent a year over the next two decades. Introducing new technologies and services will eventually be an even bigger opportunity, both for existing players and new entrants.

In many European and US cities, for instance, the same sewage systems collect residential and commercial wastewater, runoff rainwater, and melted snow. Singapore, by contrast, collects different gradations of discharged water separately and can redirect some of it to uses (such as watering lawns and gardens) requiring lower levels of quality. Then it goes on to treatment plants for cleaning and reuse in other applications—a far more efficient approach. In Masdar City, a planned community under construction in Abu Dhabi, urban designers hope to recycle as much as 80 percent of the water the community will use. And new desalination technologies are reducing the cost (and the extensive energy) involved in desalinating water, as well as increasing its quality. As water needs grow in the developed and developing world alike, and regulations and water prices come to reflect the need to manage demand, new solutions could provide significant value to public and private buyers.

Companies already active in this space have many opportunities to introduce new products, including devices that collect wastewater from sinks to reuse for flushing toilets, technology for collecting and reusing condensate from air-conditioning systems, more water-efficient appliances, and ultraviolet disinfection technology adapted for home use (for instance, to wash clothes with treated rainwater). Hong Kong's water department has developed systems to use seawater in toilets and may soon use it to cool commercial buildings. There are also opportunities for innovators. On the drawing board today are ideas for recycling desalinated brines, low-energy technology that separates industrial waste into irrigation-quality water and valuable chemical by-products, and ways to condense fog into usable water.

Industrial efficiency

Power and industrial companies use significant amounts of water in production processes and as a coolant—16 percent of global demand today, rising to 22 percent by 2030, with about 40 percent of this growth in China. Moving water at these volumes and using it in some processes (such as steel making or power production) requires a great deal of energy, so using less water to do more also means using less energy. One bottling company, for example, is starting to deploy a new technology, called radical water, to clean bottles.[2] The traditional process requires about five hours of cleaning; with the new one, the company can clean the same number of bottles in just 30 minutes, using significantly less water and energy.

Other technologies that can help businesses to reduce their water usage and energy costs include thickening paste tailings[3] in mines, closed-loop systems in pulp and paper plants, and flow control and automatic shut-off valves in textile production. These solutions sometimes require trade-offs, however. Dry or closed-loop cooling systems in power plants, for instance, use up to 97 percent less water but are also less efficient. (In South Africa, Eskom uses dry-cooling technology because of the looming prospect of water shortages, but in another climate the efficiency trade-offs may not make sense.) Emerging new technologies also help companies in industries such as power to use water more efficiently in energy-intensive processes. The market for these solutions will grow dramatically in just a few years as regulations and increased water prices make using large amounts of water more costly.

Finally, many manufacturers don't have the information they need to manage the water that flows through their processes—information that is critical for improving productivity. Technology providers are starting to develop products that can help these industrial companies improve the way they track their water usage and monitor their progress.

Agriculture

Farming accounts for 71 percent of global water withdrawals, a proportion that we project will decline only slightly, to 65 percent by

[2] Radical water, or electrochemical-activation (ECA) technology, to use its scientific name, creates unique properties in water molecules, resulting in an extremely potent yet environmentally friendly biocide. Trials and considerable R&D have proved that ECA solutions are efficacious against numerous bacteria (including MRSA), viruses, fungi (including their spores), yeasts, and many waterborne protozoa. ECA technology is particularly effective in the removal and ongoing control of biofilm, which, left unchecked, is most often responsible for the continuous contamination of the processing environment.

[3] A way to thicken tailings and any remaining process water. By 2030, this technology could save as much as 4 percent of the projected gap between water supply and demand in South Africa, or 125 million cubic meters annually. It offers savings of approximately $0.60 per cubic meter of water, with payback periods of one to two years.

2030. Water scarcity is tied both to the growing and the trading of food. India, for instance, now has just half of the water it will need in 2030, and agriculture will account for about half of the growth in water demand over the next two decades. It will account for about half of all water use in China by 2030 and for about a third in Brazil—and neither country will have enough water for all its needs in 20 years.

Finding ways to use water more efficiently in agriculture is critical. Agricultural companies are already looking for ways to design seeds and fertilizers that require less water, and better drip irrigation technologies will keep farmers from overwatering their fields. Many other sectors can provide valuable solutions under the right economic conditions. A large industrial company, for instance, could provide farming communities with pumps that it now sells to water utilities, broadening its customer base while improving efficiency in agriculture. IT solutions can help as well. They are too expensive for subsistence farmers, but water scarcity may promote consolidation and the emergence of larger farming groups that would need—and could afford—efficiency tools.

Even raising the water productivity of farms in rainy locales is a critical piece of the puzzle. Maintaining rain-fed land and improving its productivity are particularly important, since to the extent that agriculture uses water from rain, it is unnecessary to extract water for irrigation. In India, this source provides 17 percent of the total potential for agriculture to close the gap between demand and supply. The opportunities include a better fertilizer balance in fields, integrated pest management, and improved drainage systems.

Finally, financial institutions and investors can benefit from efforts to boost water productivity in treatment, efficiency, and agriculture. Banks will need to provide capital for many water productivity investments, especially when the public sector can't. The investment can be attractive for lenders, but they will have to know where and how to play. In India, for instance, some drip irrigation projects could help farmers reduce the cost of certain inputs (such as fertilizer) by up to 50 percent, depending upon the crop. Investors could capture a share of this value either as lenders or as equity holders in companies active in the drip irrigation value chain. China needs about $1.8 billion a year in capital to reduce leakage in municipal water systems. With a 22 percent rate of return, these investments could be an attractive solution for municipal utilities and their lenders alike.

Winning in water

Water is a large market, but as it grows, the rules for winning will change. Buyers of water-related goods and services, ranging across

the public and private sectors, have very different needs. For many years, water has been largely a "pull" market: utilities and businesses request bids on new equipment, and the companies making it respond. As the market grows and novel technologies become available, profitable new opportunities will emerge. Today, by meeting only the minimum standards of customers, an equipment provider has little opportunity to prove that it can give them better service, with lower costs and lower levels of risk over a life cycle. New technologies will change that.

Related articles on mckinseyquarterly.com
When sustainability means more than green
Valuing social responsibility programs
Meeting the challenges of China's growing cities

Providers will also need to engage more actively with regulators, which over the next five years are going to design water-management policies that will determine which new technologies succeed or fail. What's more, capital costs for many projects are so high that purchases of new technologies often depend on a public buyer's ability to put together complicated deals for capital financing. Tomorrow's winners will have to tackle these issues.

Developing a sales and marketing approach

Even large industrial players in the water market have found it difficult to grow in this sector. Their sales efforts, reflecting the diversity of customer segments, suffer from fragmentation across different business units. Public-sector buyers often have slow, exacting procurement processes. Corporate buyers of new water facilities often want not just components but also integrated solutions for managing water in production processes—requiring significant levels of niche-sector expertise from sellers. Highly fragmented agricultural buyers favor low-cost solutions, while desalination players are few in number and put a premium on technological innovation. Meeting these different needs requires a variety of approaches.

For this reason, large industrial suppliers typically organize their sales efforts by sector, with water-related equipment as part of the mix of solutions they provide to buyers in it. The trade-off is focus. Frequently, sales of water products take a back seat to sales efforts for higher-ticket items, such as power equipment. With no specific focus on water as a business, these suppliers feel no pressure to expand it. As a result, they are vulnerable to new entrants that specialize in the water market.

One industrial company, recognizing the opportunity to grow along with the water market, is trying to change its approach: it has created

a special initiative in which sales and marketing employees across sector-based business units identify and target new opportunities. The initiative reports directly to a top executive, and team members have incentives to increase sales in water markets rather than just their respective sector-focused businesses. Over time, the company believes, a focused sales force will find new openings for higher-value services and integrated solutions.

Engage on regulation

What will shape the sector's economics, separating winners from losers, is regulation. Many water users are already actively clarifying critical positions with regulators. Water utilities, for instance, are capital-intensive businesses that make money selling water. In a world where regulators want to reduce demand for it by pricing it higher or establishing caps on its use, these utilities will need new models and a reasonable way to transition from old ones. In the United Kingdom, where water utilities have mostly been privatized, their executives are helping leaders of Ofwat, the UK Water Services Regulation Authority, to understand the nature of competition in the sector, the impact of demand management and pricing issues, and other matters that will shape the water market in coming decades. Similarly, some mining companies are working with regulators to determine the economic impact of the use of water and the options for consuming it more efficiently.

Sellers of water products and services too must participate in these debates, as some large industrial companies in the water space already do. They recognize that if regulators in a region favor water reuse as a strategy for conservation (as Singapore does), this preference will tilt the market odds in favor of companies that offer those technologies. The public-affairs units of some such companies are trying to understand how they could engage in conversations with regulators in a given region about new regulatory strategies.

• • •

Inescapably, water will become a strategic factor for companies in most sectors. All businesses will need to conserve, and many will make a market in conservation. Tomorrow's leaders in water productivity are getting into position today.

We welcome your comments on this article. Please send them to quarterly_comments@mckinsey.com.