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PLANET

Meeting Sprint's Supplier Criteria:

Water Conservation

As of Nov. 2015

This guide was written for Sprint suppliers to help them meet our environmental criteria. However, it is free to be used by any individual or business that has an interest in water conservation.

Testimonials:

"Water poses critical sustainability challenges across corporate supply chains, so it's encouraging to see Sprint developing tools for its suppliers on water use and conservation."

Brooke Barton, Senior Program Director
Water Program, Ceres

"This guide comes at a critical time. Trying to meet ever-increasing demand for a finite resource, water providers face competing pressures – strained capital budgets, outdated equipment, old and leaking distribution systems, rising populations and social expectations, extreme and more variable climate conditions that exacerbate water scarcity and flooding. These pressures are causing governments, communities and industries to consider water's true value and develop more holistic and sustainable water solutions. Sprint, Black & Veatch and other leaders embrace and encourage the use of the guidelines presented in the Supplier Guide on Water Conservation to promote environmental stewardship and more overall water resilience."

Cindy Wallis-Lage, President
Water Business, Black & Veatch

"Water quality, stress, and/or scarcity are experienced at local levels, but are complex global issues that require the attention of any company operating in our globalized world. In fact, the World Economic Forum has consistently ranked water-related risks among its top global risks for likelihood and/or impact over the last five years. Sprint's Supplier Guide on Water Conservation is a great resource for any business to start reducing its water use and begin addressing the water related issues that may pose a risk to its business and customers. GM is pleased to have supported Sprint's efforts to develop this handbook and commends Sprint for its leadership in engaging its suppliers in a proactive and solutions based manner."

David J. Tulauskas, Director, Sustainability,
General Motors

"As water quality and scarcity become an increasing risk to global supply chains, Sprint's Supplier Guide on Water Conservation is a useful resource for businesses of all types. We applaud Sprint's efforts to share best practices across industries while helping to guide their suppliers to improve water conservation. Gap Inc. is proud to contribute to this effort and share highlights of our Water Quality Program while leveraging this guide with our own suppliers. We hope continued collaboration across industries will help to address increasing water challenges throughout the global supply chain."

Kindley Walsh Lawlor, VP Global Sustainability, Gap Inc.

"Sprint's Supplier Guide on Water Conservation is a valuable resource for us, our corporate partners, and the entire business community, and we are honored to be included. The private sector has a pivotal role to play in creating a sustainable future, and sharing knowledge of best practices is crucial to maximizing positive impact. At Nestlé Waters North America, we are proud to foster a culture of water stewardship, and we firmly believe that investing in today's technologies – along with future innovations – will help all of us do more with less water."

Debora Fillis Ryba, Sustainability Manager,
Nestlé Waters North America

"Sprint hit the nail on the head by pinpointing water as a key supply chain issue for our sector. While companies like Ericsson no longer manufacture, and tend to use largely municipal water, water issues nevertheless remain an important supply chain consideration. As a key natural resource, water will be increasingly important going forward. In addition to conserving water, our industry, the ICT sector, has an important role to play in increasing access to safe and reliable water, for example through mobile services that can be offered to consumer and utility sectors worldwide."

Elaine Weidman-Grunewald, Vice President
Sustainability & Corporate Responsibility, Ericsson

Introduction

Welcome to Sprint's Supplier Guide on Water Conservation. Whether you are seeking to learn more about how your business can reduce its water use, or wanting to fine-tune an existing process, this should serve as a great, easy-to-use resource. We created this handbook for two reasons:

1. Shrinking supplies of fresh water are becoming an issue few businesses can overlook. According to the World Resources Institute, more than two-thirds of the world will face water shortages by 2025.[1] In addition, the World Economic Forum rated water crises as the #1 risk in terms of impact in its 2015 Global Risks report.[2]
2. With over 6,000 suppliers, our supply chain accounts for much of Sprint's environmental impact. This handbook can help our suppliers to meet Sprint's environmental criteria by 2017 – which includes measuring, reporting, and reducing water consumption.

Throughout this guide, you will find practical approaches that Sprint and other leading companies have taken during their own water conservation journey. The companies chosen represent a variety of industries to illustrate a range of business water use. Examples of their water reduction efforts will be highlighted throughout the handbook and in case studies specific to their business operations in Chapter 3.

We hope you can chart a pathway for your own success with the help of this resource. Please note, the processes we review in this handbook are based on those found in international guides and standards. While they reflect our interpretation of best practices, they may not meet process and reporting requirements for other Corporate Social Responsibility (CSR) needs.

Foreword

By Darren Beck, Director of Environmental Initiatives, Sprint

At Sprint, we call our Corporate Responsibility (CR) program Sprint Good Works™. This name is based on our belief that doing good creates good – both for our business and society. We have established a set of operational priorities and long-term performance goals. Our board of directors is engaged and ensures the value of our CR efforts are understood and supported throughout the corporation and governing bodies.

Our operational priorities are focused on reducing our own environmental footprint. However, we recognize that our greatest social and environmental impact comes through stakeholder engagement and the services we provide to our customers and partners. Our CR strategy is built on the four goals below.

The Sprint Supplier Guide on Water Conservation was developed to help "influence our stakeholders," specifically our suppliers. It is the second in a series of guides we have developed to help support our suppliers in their journey toward greater sustainability. The first guide helped our suppliers tackle two areas they found most difficult to meet – completing a materiality assessment and measuring their greenhouse gas (GHG) emissions.

Water conservation was a natural choice as we decided to expand this series, since more than 99 percent of Sprint's water footprint is in our supply chain. This guide helps our suppliers understand how businesses are contributing to water scarcity, the benefits to conserving water and how to begin tracking, reporting and reducing the water use in their own operations.

Sprint CR Goals

Guiding Principles

We had five guiding principles in developing this supplier handbook:

1. **Base criteria on standards whenever possible.**
2. **Don't ask suppliers to do more than we do ourselves.**
3. **Use a materiality lens – theirs, not ours.**
4. **Be reasonable – understand the impact of what you are asking for.**
5. **Will it make their business stronger?**

With these principles in mind, we tried to use laymen's terms in this handbook that anyone can follow. This makes it easier for suppliers who have no dedicated team focused on sustainability, little or no sustainability expertise, and no budget to hire a third party to do this work for them. Also, we provided examples of how Sprint and other well-known companies have conserved water and how it benefits business.

Our goal is to inspire suppliers to embrace sustainability and its benefits, rather than just meet our criteria. We have been thrilled with the results we have seen from most of our suppliers to date. The longer we have worked with a supplier to elevate their sustainability performance, the more their business has benefited and the stronger our relationship has become. We believe that many other companies and their suppliers can benefit from this handbook, too. For that reason, we have made it publicly available for all to use.

Thank you to **Andrea Bryant,** Sprint's Corporate Responsibility Intern, for researching and coordinating the development of this guide. Thank you to **WWF, Ceres** and **The Nature Conservancy** for contributing their time, input and feedback on this guide. Our thanks as well to **Baxter International, Black & Veatch, Gap Inc., General Motors, Intel** and **Nestlé Waters** for the tips and case studies they shared to help illustrate how water conservation can benefit a company's triple bottom line. Last but not least, we appreciate the feedback received from our suppliers who reviewed the handbook as it was being developed. Your help and insight was greatly appreciated. We look forward to getting additional feedback to help make this tool even more beneficial for our suppliers and for other users.

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Chapter 1:

Corporate Responsibility and why it matters

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This Supplier Guide on Water Conservation is all about Corporate Responsibility (CR). Or, in simple terms, it is about connecting business success to social and environmental progress.

For Sprint, our operations are extensive and reach throughout the United States, U.S. Virgin Islands, Puerto Rico, and Guam. With approximately 31,000 employees and a wireless network that serves 57 million customers, our impact is significant. This is why we place great importance on minimizing our environmental footprint and maximizing positive social impact.

As we look at what issues matter most to Sprint's business from a CR perspective, greenhouse gas emissions, green devices, product recycling, and accessibility top the list. These are environmental, social and economic factors that could impact our ability to create value now or in the future. Water is a bit different, though. While our direct use of water is relatively low and considered less material to the business, it is the indirect use of water in our supply chain that is most material – accounting for more than 99 percent of our overall water footprint.

In this chapter, we will review what Sprint is asking its suppliers to do and why, then cover the importance of water and why it is a worthy issue for businesses to address.

1.1: Why did Sprint create this guide?

Sprint's CR Program has three pillars: People, Product and Planet. Our commitment to **people** means fostering an innovative, rewarding, diverse, and ethical workplace and supplier base. Our commitment to **product** means we offer the highest quality products and services we can, make them accessible to as many people as we can, and honor ethical business practices in doing so. Finally, our commitment to the **planet** means we foster responsible environmental stewardship in everything we do. Sprint strongly believes that in order to manage something you need to measure it, and that principle drove the creation of our 10-year sustainability goals.

By 2017, Sprint will strive to:

1. Reduce greenhouse gas emissions by 20 percent.
2. Secure 10 percent of energy from renewable sources.
3. Reduce electric energy consumption 20 percent.
4. Reduce operational waste-to-landfill by 30 percent.
5. Reduce use of paper by 40 percent.
6. Reduce use of water by 30 percent.
7. Send for reuse or recycle all of Network and IT e-waste.
8. Ensure that 90 percent of suppliers, based on sourceable spend, meet Sprint's social and environmental criteria.
9. Collect nine phones for reuse and recycling for every 10 that Sprint sells annually – a 90 percent collection rate.
10. Ensure 70 percent of wireless devices launched annually meet Sprint environmental criteria

View Sprint's CR Operating Priorities, our 10 long-term goals, and our progress toward these goals at http://goodworks.sprint.com/our-progress.

While Sprint continues to execute against our operational priorities, we recognize that these 10 sustainability goals cannot be achieved without strong relationships with our suppliers. That is the reason there is a supply chain goal among these top 10. Sprint believes that by jointly pursuing CR, Sprint, along with our suppliers, can improve our respective business performance and create value for both society and the environment.

This booklet addresses the eighth goal listed above – Sprint's objective is to have 90 percent of its suppliers, based on sourceable spend, meet our social and environmental criteria by 2017. With the creation of this guide, we are providing the guidance and tools that our suppliers need for their water conservation initiatives. Since Sprint has found that more than 99 percent of our water footprint is in our supply chain, we will have a larger impact on the environment by acting on water conservation together.

All of our suppliers contributing to the 90 percent of our sourceable spend are formally measured against our criteria, regardless of their industry. The criteria were introduced to suppliers in 2011 through Sprint's first CR supplier assessment process. With this booklet, we are introducing revisions to the criteria around water which will be effective for 2016. Some suppliers may receive additional Sprint criteria based on the specific products or services Sprint purchases.

The social and environmental criteria for Sprint suppliers (the underlined text is NEW for 2015) are:

1. Conduct and publish the results of a basic or intermediate-level CR materiality assessment by Dec. 31, 2014
   a. Measure and publicly report on both the total water and total energy usage for the operations. (Note: Public reporting for water is due by July 31, 2016)
   b. If material to your business, develop and publish a plan to reduce water and/or energy usage, including goals. (Note: Publication is due by Dec. 31, 2016)
2. Measure, publicly report and set a reduction target for greenhouse gas emissions by July 31, 2015
3. Develop and publish a human rights policy or statement
4. Develop and publish a safety policy or statement
5. Develop and publish an environmental policy or statement

Our goal with this guide is to provide a user-friendly, streamlined resource that enables you to more easily accomplish this work on water conservation. We believe that CR is a journey and not a destination. We hope you find the journey as beneficial as Sprint has and look forward to learning from your experiences.

1.2: Why does water matter?

Water matters because it is the world's most precious limited resource. In simple terms, water is fundamental to all life on Earth. Not only is water essential for life, but also to running a business. Many industries rely on water for manufacturing the products and food we use on a daily basis. For example, the water required to create your laptop could wash nearly 70 loads of laundry in a standard machine. And, a single cup of coffee takes 55 gallons of water to make, with most of that being used to grow the coffee beans.

Table 1: Typical water use per ton of product

Typical water use per ton of product	
Paper	21,000 - 528,000 gallons
Beer	2,113 - 6,604 gallons
Sugar	792 - 105,668 gallons
Steel	528 - 92,460 gallons
Soap	264 - 9,246 gallons
Gasoline	26 - 10,566 gallons

Source: Environmental Protection Agency. Lean & Water Toolkit: Achieving Process Excellence through Water Efficiency. http://www2.epa.gov/lean-government/lean-water-toolkit

Water quantity

Yet, how can there be water quantity issues when water covers three-quarters of the Earth's surface? It might appear that there is plenty to go around. However, in reality, we have a limited amount of usable fresh water. Over 97 percent of the earth's water is found in the oceans as salt water. About 2 percent is stored in glaciers, ice caps, and snowy mountain ranges. So, that leaves us only one percent that is fresh water, readily available for our daily needs. With only 1 percent of the earth's total water available for use, it makes sense that we take action to conserve this limited resource; especially, since access to water is not equally distributed globally.

Water quality

Now that we recognize that water is a very precious and limited resource, let's talk about water quality. Not all readily available water meets acceptable standards for human use. There are many places where serious water pollution takes place, thus decreasing the water available. This is why water quality is just as important as water quantity. About 40 percent of rivers and lakes in the United States surveyed by the Environmental Protection Agency (EPA) are way too polluted for swimming or fishing,

much less for drinking because they do not meet water quality standards.[3]

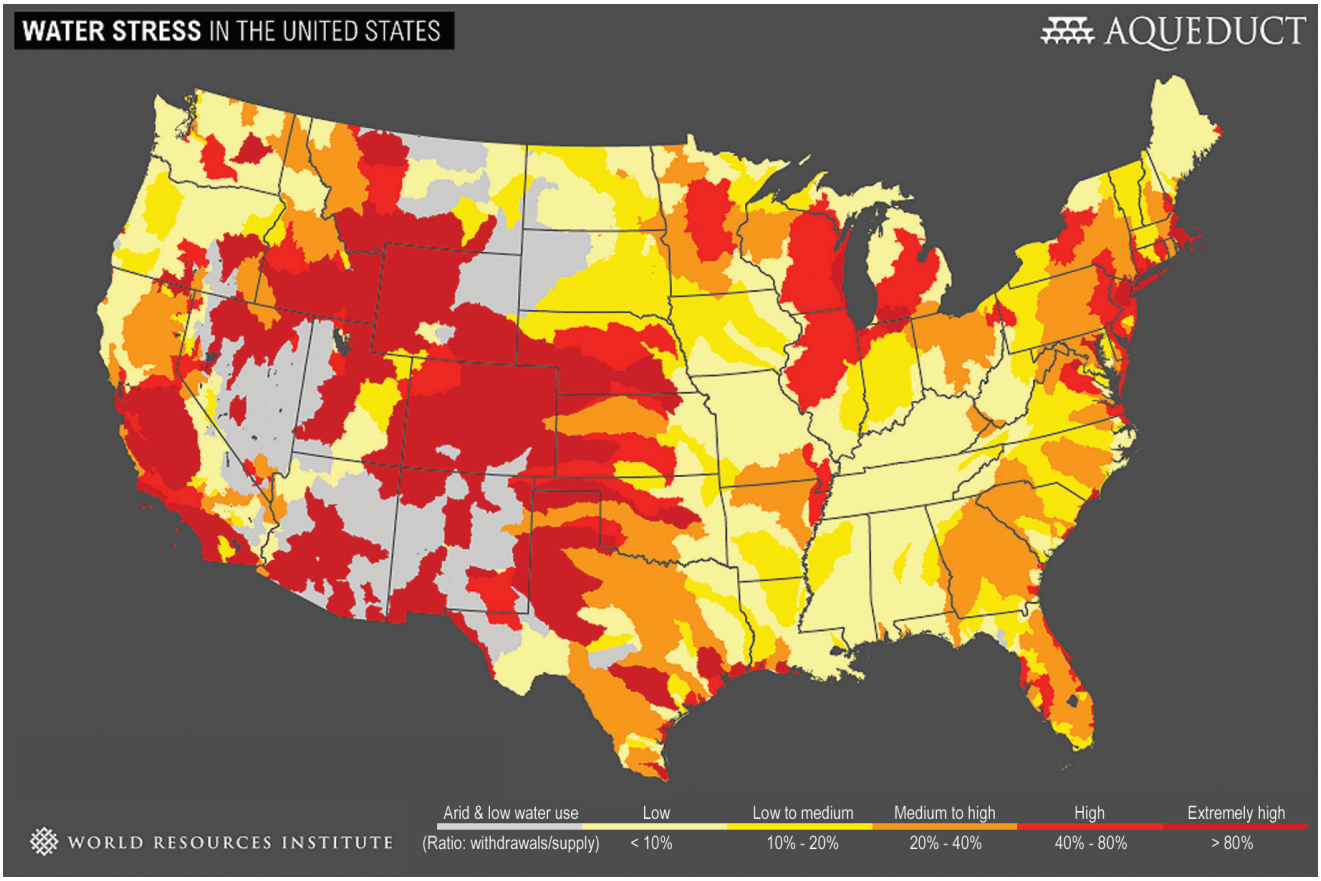
Population growth

Furthermore, population growth is occurring in regions already experiencing water quantity and quality issues. In 2013, over half of the world's cities with populations over 100,000 were located in water-stressed areas.[4] Experts predict that on our current usage course, more than two-thirds of the world's population could face water shortages by 2025.[5]

Business consumption and impact to water

One of the reasons we created this guide was to encourage our suppliers to better understand their water impacts and dependencies in order to reduce business risk. If your business is global, then you are exposed to a wider range of risks and opportunities. Where you choose to engage – geographically and on which issues – should reflect your exposure. For instance, if you operate in water-stressed areas, engaging in water conservation will help you minimize your risk and employ innovative interventions.

Figure 1: Water stress in the U.S. in 2013. Approximately 36 states (72 percent) have high or extremely high water stressed areas.



Source: World Resources Institute (WRI) Aqueduct Water Risk Atlas. 2010: http://www.wri.org/our-work/project/aqueduct/aqueduct-atlas

According to the World Resources Institute (WRI), water stress is when there is not enough water for agricultural, industrial, or domestic needs to be met. An area is said to experience water stress when the annual renewable freshwater available per person is less than 449,000 gallons, on either an occasional or on-going basis.[6] That amount is less than the 660,253 gallons of water which an Olympic pool holds. Having enough water at the right time of year, and consistently across years, is a serious challenge for many places across the U.S.

This guide focuses on these types of opportunities.

Every company has some dependency on water. For example, a manufacturing company uses water to produce products. An office-based service company typically uses water for restrooms, hydration, cleaning, and cooling. According to the EPA and as displayed in Figure 2, most business water consumption can be attributed to the production of goods in the agricultural sector (70 percent of the total).

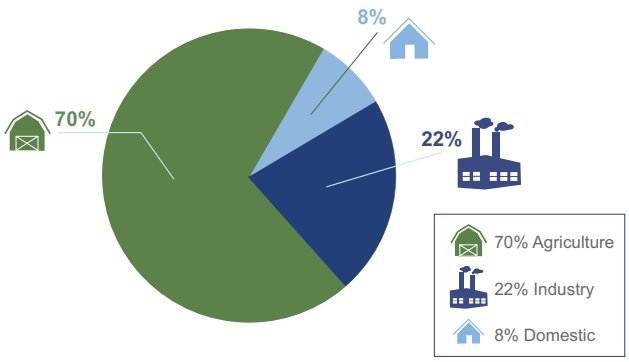
In the industrial sector, the following are generally identified as the most water-intensive: apparel, automobile, beverage, biotech/pharmaceutical,

chemical, forest products, food manufacturing, high-technology/electronics, metal mining, refining, utility, paper products, coal products.[7] For example, in apparel, cotton production is the most water-intensive since cotton is a very thirsty plant requiring about 6,600 gallons of water for each 250 grams of cotton produced – the amount needed for the average T-shirt (713 gallons of water). In electronics, the most significant portion of a business water footprint is associated with semiconductor manufacturing. Intel and Texas Instruments alone used more than 11 billion gallons of ultra-pure water for cleaning and rinsing in the production of silicon chips in 2007.[8]

Businesses also can have an impact on water quality by not properly treating wastewater and discharging it with chemicals and toxins from business processes back into water sources. This can lead to long-term health problems for nature, humans and animals. It can even increase the number of unusable water supplies available for businesses and increase the costs related to treating the water.

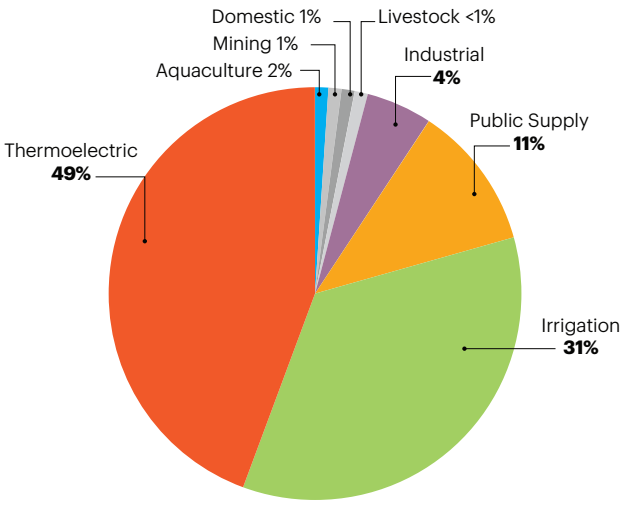
For detailed information on industry effluent limitation guidelines, go to this website: http://water.epa.gov/scitech/wastetech/guide/index.cfm.

Figure 2. Global percentages of water use by sector



Source: Bunge Citizenship. Water World: http://www.bunge.com/citizenship/water_world.html#

Figure 3. Total water withdrawals in the U.S. by categories in 2005



Source: United States. Geological Survey, United States Department of the Interior. Estimated Use of Water in the United States in 2005; Washington, DC, 2004: http://pubs.usgs.gov/circ/1344/pdf/c1344.pdf

1.3: What's in it for you?

There are many ways businesses can benefit from having water conservation efforts in place. Some of these benefits include cost savings, decreased risk, and enhanced reputation.

Cost savings

Historically, the price of water has increased and patterns indicate it will continue to rise in the coming years. For instance, according to Circle of Blue's annual survey of water rates in 30 major U.S. cities, the price of residential water increased 6 percent from 2014 to 2015, and 41 percent since 2010.[9] And from 2008 to 2012, commercial water rates have increased an average of 30 percent in the U.S., according to data gathered by Ecova, which tracks metrics from more than 700,000 facilities on an ongoing basis.[10]

Businesses are starting to realize that improving water quality and reducing water consumption can result in savings. If you know what is going on in relation to water in your operations and supply chain, then you can manage and avoid risks, thus reducing costs. For example, leaky, aging pipes waste 7 billion gallons of clean drinking water each day in the U.S. alone.[11] The average price of water in 2013 was $5.20 per 1,000 gallons.[12] If you applied that rate, fixing these leaks would save more than $36 million each day.

With fresh water becoming scarcer, prices will continue to grow, which will likely increase regulations and federal/local government oversight. Addressing water now can help your company avoid future fines and expenses by mitigating water-related risks. For example, new regulation could increase the costs of your business's operations, reduce the opportunities for investment, or change your business's competitive landscape (e.g., changed product standards, increased difficulty in obtaining water permits, poor coordination between regulatory bodies, unclear and/or unpredictable regulations on water allocation and wastewater discharge, etc.).

Business continuity

Businesses share a need with the public for reliable water services and sustainable water management. All businesses depend on water and impact it in some way, either directly through operations or indirectly through their supply chains. Because of this, an insufficient or contaminated water supply, or lack of infrastructure to reliably deliver that supply, could cause them to fail to maintain the volume and quality of their operations.[13] For example, a data center located in a severely dry region like Las Vegas can face significant water supply uncertainty with the potential for business operations impacts.

Such water challenges for business are already happening. In 2011, drought damaged or destroyed crops across the South and Midwest, causing more than $7.5 billion in losses to the agricultural industry in Texas alone. In 2010, Gap Inc's. cotton prices hit a nearly two-decade high, which put significant pressures on the apparel industry. Volatile climate patterns in key cotton-producing regions played a role in these price increases, and these climate patterns may have been caused, at least in part, by climate change.[14] By understanding how you depend on water and managing your water use to mitigate risks help you maintain a steady inflow of water to your business, you will continue providing products and services without interruption.

Increase good reputation

Businesses that are perceived to mismanage scarce water resources are more likely to suffer from damaged reputations, especially when their operations negatively affect basic human and environmental needs or conflict with legal requirements.[15] When water use results in negative impacts for communities and wildlife, business water usage can be blamed for problems even if the perceived role of business is disproportionate to the observed impacts.

Moreover, shareholders, governments, investors, consumers, employees, and other stakeholders want to know how companies are using and conserving this critical resource. Consumers are increasingly demanding that businesses use natural resources in environmentally and socially sustainable ways, including creating efficient and responsible water-related policies and practices. The number of investors requesting corporate water data and expecting action through, for example, the Carbon Disclosure Project (CDP), has quadrupled in just three years.[16]

Companies that have better water-related practices may see improved brand value and a subsequent expansion in sales.[17] By implementing water conservation efforts such as measuring and reporting water usage, businesses can display a high-level of transparency to their shareholders, demonstrate that they are creating shared value in addition to cost savings, and increase the trust in their business.

Chapter 2:

Measuring and reporting your water footprint

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2.1: Introduction

Now that you understand the importance of water and the role businesses can play in conservation, let's discuss how you go about measuring and reporting your company's water footprint. A common business saying states, "that what gets measured gets managed." This is also true for water conservation in business. This chapter will guide you on how to measure your company's water footprint, identify your water-related risks, and report your results.

2.2: What is a water footprint?

A water footprint is the total amount of water used directly and indirectly to run and support your business (as depicted in Figure 4). It is a method of accounting that helps a company understand where it uses water and how much is used at any given point. The water footprint of a business consists of two components: the direct water use by the producer (for producing/manufacturing or for supporting activities) and the indirect water use (in the producer's supply chain).[18]

Water footprint of a business is defined as the total volume of freshwater that is used directly and indirectly to run and support the business. The water footprint of a business consists of two components: the direct water use by the producer (for producing/manufacturing or for supporting activities) and the indirect water use (in the producer's supply chain).[19]

Direct water use refers to the water consumption and pollution in your company's own operations, like production, manufacturing, and/or supporting business activities. For example, water may be consumed and polluted while creating products like beverages, when extracting minerals during mining, when cleaning products like food and clothing, for cooling purposes in data centers or power plants, and for operating office buildings (e.g., kitchens, bathrooms, landscaping). In other words, it is the amount of water consumed and polluted in and around a business throughout the day for producing goods and services, as well as maintaining the functionality of your business. For example, in 2014 Sprint's direct water footprint was measured and reported to be 242.8 million gallons (918,931 m^3) of water that was used to help cool our network, office locations and retail stores, irrigate landscaping and provide refreshment and hygiene for employees.

Indirect water use refers to the water consumption and pollution associated with external inputs to your company's operations such as materials, components, consumable inputs, and services. For example, indirect water use is the water used in a supply chain for creating the product for sale. You may not drink, feel or see this water, but it may make up the majority of your water footprint though your business' supply chain. Sprint has learned that the majority of our total water footprint is used indirectly in our supply chain, primarily to produce mobile devices and equipment for our network.

The components of a total business water footprint include blue, green and grey areas, too (highlighted in Figure 4). The blue water footprint refers to consumption of surface and groundwater resources (e.g., rivers, lakes, aquifers) along the supply chain of a good or service. The green water footprint refers to the capture and consumption of rainwater during the production process. This is particularly relevant for agricultural and forestry products (products based on crops or wood). Lastly, the grey water footprint refers to the freshwater pollution that can be associated with the production of a product over its full supply chain.[20]

TIP: Wondering whether an aspect is material to your business? You can find helpful guidance in Sprint's Materiality Assessment and Greenhouse Gas Emissions Handbook here: http://www.sprint.com/companyinfo/scm/docs/SprintSupplierGuide_v1.0_092413.pdf

Sprint asks our suppliers to measure and report their direct, blue water footprint and, if material, to develop and publish a plan to reduce water usage, including goals. If your company has taken efforts to actively collect and use rainwater, it is worth tracking and reporting both your green and blue water. Grey water footprint expresses water pollution in terms of the volume polluted compared with the volume of water consumed. If your business discharges significant effluents (waste and contaminants) with the water used in its operations, then you may want to account for your grey and blue water footprint. While most companies start by tracking and reporting their blue water footprint, they eventually expand to provide a comprehensive view that includes green and grey.

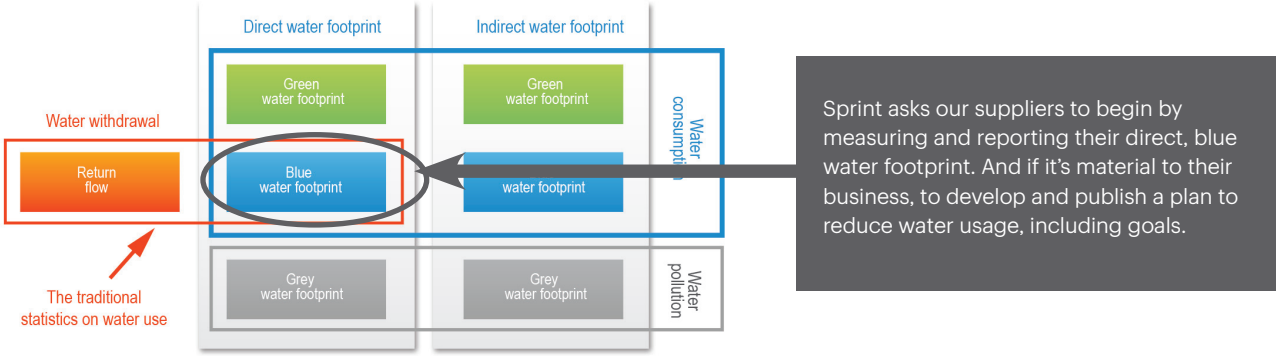
Figure 4 shows the entire water footprint, which includes: green, blue, and grey water footprint used directly and indirectly. Green and blue are part of the water consumption while gray water is water pollution, for example from business effluents. Note that the return flow (the part of water withdrawn that returns to the same source in the same condition and can potentially be withdrawn and used again) is not part of the water footprint since it is non-consumptive.[21]

Finding the answers to the following questions is the first step to creating your company's water footprint:

- Where is my business's water coming from?
- How much water is my business using?
- How much water is being reused or recycled?
- How much water is being sent to wastewater treatment plants?
- How much water am I contaminating during manufacturing and production or by providing a service, making the water unusable and taken out of the system?

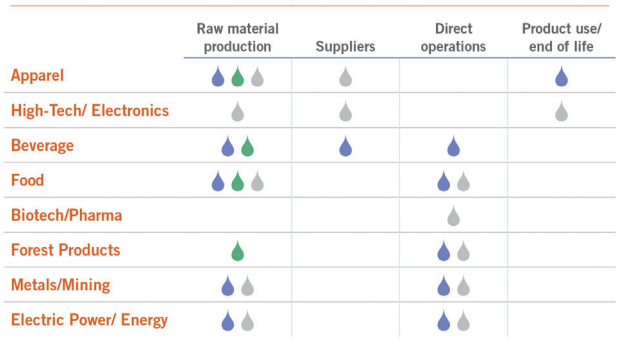
Figure 5 shows water footprint examples of several top water-consuming industry sectors. Later, you will read case studies for some of these industries.

Figure 4. Components of a water footprint



Source: Water Footprint Network. The Water Footprint Assessment Manual: Setting the Global Standard. Hoekstra et al. 2011: http://waterfootprint.org/media/downloads/TheWaterFootprintAssessmentManual_2.pdf

Figure 5. Relative water footprint by various industry sectors



Source: Ceres. Water scarcity and climate change: growing risks for businesses & investors. February 2009: http://www.ceres.org/resources/reports/water-scarcity-climate-change-risks-for-investors-2009/view

2.3: Measuring your water footprint

This section provides the guidance and tools needed to help you measure and create a basic model of your company's water footprint. The main steps to follow are: 1) Get ready; 2) Identify activities that use water and; 3) Collect available data.

For more details on how to develop a complete water footprint assessment, you may want to download "The Water Footprint Assessment Manual: Setting the Global Standard" published by the Water Footprint Network.

2.3.1: Get ready

Get executive buy-in

Identify the right executive sponsor. This should help ensure that resources are available and people are held accountable throughout the process. The sponsor should endorse assessing, publishing and improving your company's water footprint. Ideally, the sponsor should be a senior executive who oversees the most water-intensive operations within the business and/or has an interest in water conservation.

Assign a project manager, identify subject matter experts

Assign a project manager to lead your company's water footprint efforts. It is important for one person to "own" the process, including documentation, to ensure accuracy and consistency. For larger companies, the project manager may benefit from establishing a cross-functional team that can work together to ensure that the water footprint is comprehensive. The project manager will need to identify key functional owners and experts within the company who are directly responsible for water usage. These experts should have access to activity data and may have access to data systems that can be used to simplify (and standardize) the data collection process.

General Motors' Example: GM's cross-functional internal team represents groups such as Enterprise Risk Management, Global Manufacturing, Communications, Insurance, and Global Purchasing and Supply Chain. They are working together to develop a corporate water stewardship policy, understand the current state of water risks at the watershed level, understand GM's water footprint both locally and across the value chain, engage with internal and external stakeholders to evaluate risks and impacts, report their performance externally, and seek independent assurance.

SPRINT EXAMPLE: In 2010, Sprint studied which of our U.S. facilities faced the greatest risk of water scarcity over the next 40 years. Interest in the study's results led to the formation of Sprint's Water Conservation Committee in early 2011. This cross-functional committee was composed of members from the following Sprint teams: Corporate Responsibility; Environment, Health & Safety; Network Engineering; Information Technology (IT); Real Estate; Product Development; and Supply Chain Management. The committee initially worked to identify the drivers of Sprint's water use. The committee continues to meet regularly to evaluate innovative, cost-effective opportunities to reduce water use in high-volume sites and those located in areas at high risk for water scarcity. Details on those sites and an assessment of Sprint's business risks associated to water (which are low) can be found in Sprint's CDP Water Disclosure submissions.

Establish a baseline year

The baseline year is generally the first year you measure your water use. Targets and goals for water usage reduction are typically set against your baseline year. If your company has recently completed significant reduction activities, you may want to establish your baseline year before the current year so you can claim these reduction activities. The challenge here would be whether or not you have all the data needed to set a prior year baseline.

Set scope and boundaries

Now that you have a baseline year, the next step is to set the scope and boundaries that your company's water footprint and reporting will cover. It is up you to determine what activities to include in your water footprint. No general guidelines have been developed yet in the field of water footprint accounting, but the general rule is to include all processes within a production system that at least significantly contribute to your overall water footprint. You should determine what 'significant' means (e.g., an activity that contributes 5 percent or more of the total is often considered significant). If you trace the origins of a particular product, you will see that water is associated with a wide variety of inputs used in each process step.

TIP: It may be a challenge to determine which business activities to include when measuring your company's water footprint, as there are no generally accepted guidelines for reporting yet. However, the general rule is to include at least 'significant' contributions (e.g., activities that amount to 5 percent of more of your total water usage).

For boundaries, it is important to acknowledge how much control your company has over the activities that drive water use within its business. CDP offers thee common models of control guidance on water reporting. Consider which is the best fit for your operations:

- **Financial control:** Company controls operations by directing the financial and operating policies of the operations for creating economic benefits.
- **Operational control:** The business or one of its subsidiaries has the full authority to introduce and implement its operating policies at the operation.
- **Equity share approach:** Company accounts for its water data from operations according to its share of equity in the operations.

Many companies select operational control because the most readily accessible and accurate information they have on water is through their water bills. Sprint uses the operational control approach in determining which sites to include in our boundary. The sites where we have operational control include sites for which Sprint gets direct water bills and can monitor the water volume used. We exclude sites where water is provided through a lease and managed by a landlord.

TIP: As an extra step, if you rent spaces for your business, consider talking to your landlord to see what things could be done to conserve water in specific sites. It's important to have this conversation, especially if you are not the one paying for the water bills. Perhaps, the landlord already wants to start efforts for water conservation so why not take the next step, bring it up in a conversation, and start taking action. Even when the water bills are paid by the landlord, you may want to explain to them that getting new upgrades, fixing leaks, etc., would keep their water bill down. You would benefit too with a reduction in rent because it is often calculated by considering all of its parts, for instance: taxes, mortgage, insurance, maintenance and utilities.

2.3.2: Identify activities that use water

Once you have completed all of the steps in the "Get Ready" section, your next step is to identify the water usage activities that will be in you water footprint accounting. Sprint asks our suppliers to report their direct, blue water footprint. For example, if you are a large manufacturing company, then you may want to focus on the most common uses for water in manufacturing, which are cooling, process uses, cleaning, employee sanitation, and steam generation. There are many uses of water within any given manufacturing process. Each process is different, but many diverse manufacturing operations use water for:

1. Cleaning and rinsing products, parts and vessels, assembly line
2. Transporting parts or ingredients
3. As a lubricant
4. As a solvent or reactant in a chemical reaction
5. Forming a water seal to block out contact with air
6. Pollution control
7. Inclusion in the product such as in beverage manufacturing[22]

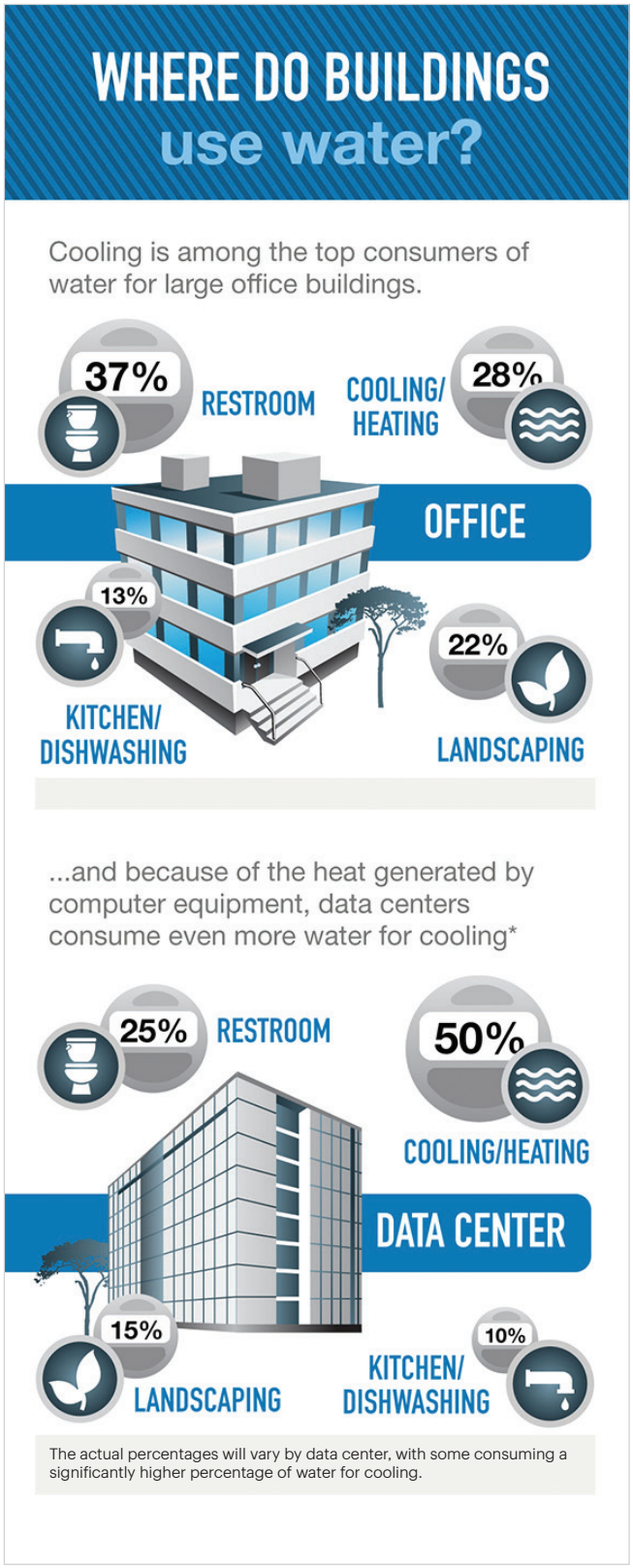
The rinsing or cleaning of process equipment alone can be a significant part of many food, beverage and pharmaceutical companies' manufacturing costs, accounting for as much as 50 to 70 percent of a facility's total water use.[23]

If you are a small business that provides services in an office setting, then you may be more focused on water used in bathrooms, drinking fountains, kitchens/dishwashing/laundry rooms, landscaping, and cooling/heating.

Or, if your business has mainly data centers, you may want to focus on cooling and heating since it uses the most amount of water. An illustration of both examples can be seen in Figure 6 on the following page.

TIP: Water use is measured in terms of volumes consumed (evaporated or incorporated into a product) and/or polluted per unit of time.[24] Some common metrics are: gallons per employee per day, gallons per square foot of building area per day, gallons per day per dollar of economic value added, gallons per product or service, among others.[25] For certain industries, some water units are already commonly used. For example, in agricultural products, cubic meters (or m^3)/ton or liters/kilogram (kg) is used. Whatever unit of measure you choose, use it consistently from year-to-year and across your business. Also, be careful when doing conversions. In case you need to convert your units, you may find it helpful to look at the Water Unit Conversions table in Appendix C.

Figure 6. Locations where buildings use water the most



Source: Where do buildings use water: http://business.edf.org/files/2014/09/WhereDoBuildingsUseWater_4.jpg

2.3.3 Collect available data

Once you have a list of water usage activities and know the period of time you want to target, you can begin collecting primary or secondary data. Primary data is observed data and is the most accurate data source. Examples of primary data include water meters or bills. In Appendix C of this guide, you will find guidance on how to read your water and sewer bill and a sample water audit template that is helpful to track water using meters. Secondary data may be necessary when primary data is not available or practical to get. Secondary data is generic or industry average data from published sources that are representative of a company's operations, activities, or products. Examples of secondary data include data from facilities where utilities costs are included in the lease or from life cycle inventory databases or literature studies.

Let's go more in depth on the primary data source of metering. Monitoring water coming in and water going out (wastewater – grey water) through meters is a helpful way to understand water use patterns, quickly find and fix unnecessary water use (i.e., leaks), identify cost-effective water use reduction opportunities, and track project savings. You can record your average water consumption for company facilities by reading your water and sewer meters daily, weekly or monthly. If it is daily, you want to read and record data at the beginning and end of operations. If your business has multiple buildings or processes, you can install separate meters at each location. Meter reading can be incorporated into your existing maintenance, security or cleaning routines. If you are interested in measuring your grey water, then you may want to also install meters to measure the wastewater flow outside your business facility. For more information on how to measure your wastewater flow and the various options, check out the EPA Wastewater Flow Measurement at: http://www2.epa.gov/quality/procedures-measuring-wastewater-flow.

TIP: You may want to consider getting meters that measure quality (i.e., particulates) in your wastewater, especially if you need to meet local water quality standards. For more information on wastewater monitoring and treatment go here: https://www.academia.edu/319633/Wastewater_Quality_Monitoring_and_Treatment

There are two types of water meters:

1. Source meters: measure the amount of water being supplied to a certain facility.
2. Sub-meters: measure facility water usage for specific activities such as cooling towers, process use, or landscaping.[26]

You may be wondering what facilities to meter; what activities to sub-meter; which meters/ sub-meters to select, install, and maintain; and how to read and record metered data on water use. If so, Appendix C shows some facility sub-metering recommendations from the EPA.

While doing this, consider these questions:

- How much water is the facility using?
- Where in the facility is the water being used?
- When is the water being used?
- How and for what is it being used?
- Who controls its use?
- Why is water needed here?
- Where does the water go after being used?
- Where is it discharged to?
- Who treats it? [27]

2.4: Identifying water risks

In the 2015 World Economic Forum's Global Risks report, the potential for water crises is ranked #1 in terms of impact and #8 in terms of likelihood for the next 10 years.[28] Think of water-related risks as water events that bring negative impacts to your direct and/or indirect operations, regardless of size. Business leaders are starting to realize that their company's long-term profitability and viability depend on the right quantity and quality of water available.

Table 2: Industry sectors with high and medium exposure to water-related risks

High Priority	Medium Priority
Agriculture	Construction & materials
Beverage producers	Gas distribution & multi-utilities
Biomass power production	Manufacturing of industrial household goods, home construction, leisure goods
Chemicals	Media (printed)
Clothing & apparel	Real estate (asset owners)
Electric power production	Transportation
Food producers	Travel & leisure
Food retailers	
Forestry & paper	
Freshwater fishing and aquaculture	
Hydropower production	
Mining	
Oil & gas	
Pharmaceuticals & biotech	
Technology hardware & equipment, semiconductors	
Water utilities and services	

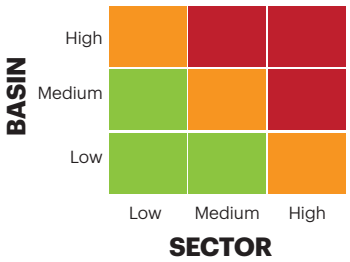
Source: Ceres, The Ceres Aqua Gauge: A Framework for 21st Century Water Risk Management, 2011: http://www.ceres.org/resources/reports/aqua-gauge

Water-related risks vary among industry sectors. For example, if your business is in the beverage industry, the importance and materiality of water to your business is extremely high, so the water-related risks will also be high. Even if water isn't a key ingredient in your end product, your operations could be subject to risk. In 2013, 70 percent of Global 500 businesses that responded to the CDP Water Questionnaire reported exposure to one or more water-related risks that could substantively affect their business. Furthermore, 53 percent reported having already experienced them in the previous five years.[29] One detrimental impact reported by Intel was experienced in their Ireland facility. Intel requires highly purified water to refine the silicon used in their chips. In January 2010, they encountered poor water quality and quantity in nearby water supplies caused by an extreme cold front that hit Europe. Because of a shortage of rock salt, local officials used an agricultural fertilizer to melt ice on the roads. This created a contaminated runoff that negatively impacted the water supply on which Intel relied.[30]

To conduct a high-level risk assessment that estimates your exposure to water-related challenges, begin by looking at the general exposure of your industry sector to water-related risks and likelihood of adverse water-related impacts. Then, look at the risk exposure and likelihood of adverse impacts associated with the specific river basins in which you operate. Table 2 (left) offers an overview of industry sectors usually exposed to significant water-related business risks due to the nature of their water use. Industry sectors not included in these two lists may still face acute, location-specific water-related challenges.[31]

After determining your risk based on industry sector, consider where your business is located, estimate your likelihood of experiencing or creating adverse external impacts, and locate yourself on the matrix in Figure 7. This high-level risk assessment can be

Figure 7: Measuring relative exposure to water risk and impacts



Source: CEO Water Mandate. Corporate Water Disclosure Guidelines: Toward a Common Approach to Reporting Water Issues. 2014: http://ceowatermandate.org/files/Disclosure2014.pdf

accomplished by using some of the tools listed in Appendix B. If your company falls in the red areas, you should benefit significantly from measuring and reporting your water footprint and quickly initiating water conservation efforts.

In Figure 8, you will find an overview of three common types of business-related water risk (physical, regulatory and reputation) associated with a company's location and behavior.

Water assessment tools could help you identify water-related risks to your business. These tools can estimate how much water is being consumed throughout the globe, indicate areas of water stress now and in the future, estimate how much water is available, and provide insights on the sustainability of water use in each place. While there is yet to be a perfect water assessment tool, there are several that give a solid frame of reference and help companies be more efficient in their water usage and make better decisions to mitigate water-related risks. For example, in 2010 Sprint gained knowledge and experience by working with NRDC and Tetra Tech to overlay the location of our facilities onto a map of U.S. counties to determine which were the most at risk for water scarcity. In Appendix B, you can find several helpful water assessment tools that are available at no cost to the public online.

Figure 8. Types of water risk

	Physical risk	Regulatory risk	Reputation risk
Basin-related risk Linked to location	Water quantity (scarcity, flooding, droughts) and quality (pollution) within the river basin and the impacts this might have on society and the environment.	Strength and enforcement of water regulations and the consequences of restrictions by public institutions; either felt through direct regulatory action or from neglect, blockages or failure.	Perceptions around water use, pollution and behaviour that may have negative impacts on the company brand and influence purchasing decisions. Public perceptions can emerge rapidly when local aquatic systems and community access to water are affected.
Company-related risk Linked to behavior	Water quantity and quality issues related to the performance of the company and its supply chain.	The potential for changes in pricing, supply, rights, standards and license to operate for a particular company or sector.	When the actions of the company are poorly executed, understood or communicated with local stakeholders and where perceptions and brand suffer as a consequence.

Source: World Wildlife Fund Brief. Water Stewardship. Perspectives on Business Risks and responses to water challenges. 2013: http://awsassets.panda.org/downloads/ws_briefing_booklet_lr_spreads.pdf

Physical, regulatory and reputational risk may translate into increased costs and/or reduced revenues.[32] According to an analysis by JPMorgan, a water-related shutdown at a semiconductor fabrication facility operated by Intel or Texas Instruments could result in $100 million to $200 million in missed revenue during a quarter, or $0.02 or $0.04 per share.[33] Fortunately, this has not happened to Intel, and they believe it is unlikely to ever occur since they change their technology every two years. Intel would be able to relocate their manufacturing or build additional water reclamation capacity to meet customer demands.

In 2014, 78.8 percent of the global water risk areas identified by the WRI Aqueduct tool were physical risks (related to quantity and quality) while just 21.1 percent were either regulatory or reputational risk.[34]

2.5: Reporting your results

Once you have determined your water footprint and water-related risks, you'll want to determine how to report them externally. Until a standard is defined, you should choose an approach that seems to best fit your business for now. At a minimum, consider reporting your company's direct water footprint and any significant water risks on your company website.

If you have determined that your water use and risks are material, you may want to follow CDP's guidance for companies reporting on water, which you can access here: https://www.cdp.net/Documents/Guidance/2015/Water-reporting-guidance-2015.pdf. It asks the following questions:

- How does your business value the importance of water quality and quantity to its current and future business?
- Have you evaluated the potential impacts of water on your business's future growth?
- What are the negative impacts related to water to your business?
- What is the structure of your business water risk assessment, and which stakeholders and contexts are included in it?
- How are you engaging your supply chain?
- What are your business's water-related risks?
- What are your business's water-related opportunities?
- What is your business's total water use: consumption, withdrawals, recycling/reuse and discharge?
- What are your business's water-intensity metrics?
- What level of verification can your business provide on accounting figures?
- What are your business's water goals?
- What are your business's water-related capital and operational expenditures?

TIP: If this is the first time that your business is reporting its water footprint to CDP, then you might want to take some time to understand what the reporting guidelines are requiring. Then, gather all the information needed and prepare it in the requested format. The second year of reporting should be easier and faster. For example, in 2013 Intel reported their water data to CDP Water for the first time, and it took them ~18 hours total of work effort. Then, in 2014, when doing it for the second time, it took them ~12 hours total of work effort.

SPRINT APPROACH: While direct water use is not material for Sprint, we have come to realize that our indirect water use is material. That is why we chose to begin voluntarily reporting our footprint to CDP Water in 2014.

If you do report to CDP, here is what they require:

1. **Relevance:** Ensure your water use inventory appropriately reflects actual water use and serves decision-making needs of internal and external users.
2. **Completeness:** Account for and report on all water activities within chosen inventory boundary. Disclose and justify any specific exclusion(s).
3. **Consistency:** Use consistent methodologies to allow for meaningful comparisons of your use of water over time.
4. **Transparency:** Address all relevant issues in a factual and coherent manner, based on a clear audit trail. Disclose any relevant assumptions and make appropriate references to the accounting and calculation methodologies and data sources used. Transparently document any changes to the data, inventory boundary, methods, or any other relevant factors in the time series.
5. **Accuracy:** Ensure the quantification of water use is sufficiently accurate to enable users to make decisions with reasonable assurance as to the integrity of the reported information.[35]

TIP: Before answering questions covering water-related risks, you might consult with the financial, legal and/or compliance departments for advice on your organization's general approach and the risks to your direct operations and supply chains. (Informational guideline only)

TIP: When reporting, indicate your efforts on what is being done or is planned in order to mitigate risks found.

Baxter Example:

- In 2012 some of their facilities' risks were regulatory, including higher water prices and mandatory water efficiency, conservation, recycling or process standards. Baxter's risk management strategy was to minimize potential cost impact to the business through ongoing water conservation activities, use of water efficient process equipment, and build utility systems.
- In its 2013 disclosure to CDP Water, Baxter reported an increased exposure to physical risks of water stress or scarcity in 11 facilities globally. Their risk management strategy was to better understand potential water risks for their suppliers with operations in those facility countries.[36]

You may also choose to use a different water reporting standard or tool such as:

- **Global Reporting Initiative.** G4 Sustainability Reporting Guidelines. Reporting Principles and Standard Disclosures: https://www.globalreporting.org/resourcelibrary/GRIG4-Part1-Reporting-Principles-and-Standard-Disclosures.pdf
- **International Organization for Standardization 14046.** 2014 Environmental management Water footprint – Principles, requirements and guidelines: http://www.iso.org/iso/catalogue_detail?csnumber=43263
- **CEO Water Mandate.** Corporate Water Disclosure Guidelines: Toward a Common Approach to Reporting Water Issues. August 2012: http://ceowatermandate.org/files/Disclosure2014.pdf

2.6: Fulfilling Sprint's criteria

All Sprint suppliers are asked to measure and publicly report their direct, blue water footprint by July 31, 2016. If water is material to your business, you are also asked to develop and publish a plan to reduce your water footprint, including goals, by Dec. 31, 2016. In order to meet this timeline, you will need to collect all relevant 2015 activity data then determine what data you need, how you will collect it and who is responsible for collecting it. Most companies align their water reporting period with their fiscal year. If your reporting year is not the calendar year, you may adjust the timeline accordingly so that you complete and publish your first full year of water reporting six months after your 2015 fiscal year ends.

Chapter 3:

Setting and achieving a water reduction goal

CONTENTS:

3.1: Introduction

Now that you have measured and reported your water use and impacts, you are likely interested in reducing your water footprint and the impacts it might have. We have seen companies that are leaders in water conservation usually start with a high impact goal. In this chapter, you will get guidance on how to set your water conservation goals, how to adopt some of the best practices in water conservation to reach your goals, and see case studies from companies from various industries that are leaders in water conservation like Baxter, Black & Veatch, Gap Inc., General Motors, Intel and Nestlé Waters.

3.2: Set your water conservation goals

Based upon the profile of your business's sites, assess and prioritize the water risks and opportunities affecting each site.[37] Usually, it's best to start your efforts by focusing on sites that use the most water and/or are located in areas where water is scarce. Identify opportunities for water reduction, reuse, and offset in the same watershed by considering the key activities that contribute to your business water use. Conservation opportunities will range from simple, no-cost solutions (e.g., closing the water tap completely) to capital-intensive projects (e.g., installing water efficient heating and cooling systems). Start with simple projects and practices which will help create initial positive results and gain acceptance of program goals and initiatives.[38] You could also start with some mid-range projects that will help you monitor your progress (e.g., water metering at sub levels).

You can prioritize opportunities by developing a conservation road map that considers:

- Impact of opportunity
- Ease of implementation
- Cost of implementation, including analysis of return on investment
- Water quality and quantity

One suggestion is to start with a 2 to 3-year timeline for the road map and focus conservation efforts in the first year with quick wins and no-cost (or low-cost) opportunities. This will help motivate management and employees alike by demonstrating the company's commitment and showing results in short order. Goals also are an effective means to create momentum for positive change in your business. They turn aspirations into tangible objects which require time-bound commitment and action. They can also be used as benchmark to measure performance. An impactful goal creates transparent expectations that motivate and unite a team around a common purpose.

Things to consider when setting a goal:

- Identify water conservation initiatives and their potential impacts.
- Review goals of other companies (e.g., peers, customers, and industry leaders) to understand their approach.
- Decide whether to have an absolute goal (e.g., total reduction) or an intensity goal (e.g., water used per employee).
- Set a goal that reflects what you know you can achieve or a "stretch" goal to challenge and motivate employees.
- Ensure goals are measurable and achievable.
- Make sure you clearly express why you want to achieve a certain goal and what larger issue it will solve.
- Consult key internal and external stakeholders to get their feedback, buy-in and support.
- Communicate the goal and monitor progress.

According to the U.S. Environmental Protection Agency (EPA), examples of water goals include:

- Reducing water use by a certain percentage per year, for a period of years, for a total target percent reduction, or based upon the facility's established baseline for water use.
- Completing projects within a set timeframe.
- Making whole areas water-efficient, such as mechanical systems, restrooms or commercial kitchens.
- Establishing a leak detection program to identify and correct any water use that is unaccounted for and could be attributed to leaks.
- Using onsite alternative water sources to replace a certain percentage of potable water use.
- Participating in a program that encourages water use reduction within your business.
- Obtaining recognition for water reduction efforts from a federal, state or local program (e.g., California Green Business Program, Wisconsin Green Tier Program, or New Mexico Green Zia Leadership Program).
- Achieving facility certification, such as the U.S. Green Building Council's LEED rating system or ENERGY STAR.[39]

3.3: Communicate goals to employees

After measuring and reporting your water footprint, setting a water conservation goal, and identifying some promising water conservation initiatives, you should then fully engage employees. Focus on communicating to employees your water efforts and educating them on how they can help achieve the company's goal. Because much of a facility's internal water use can be attributed to employee behavior, including proper operation and maintenance of water-using products and equipment, employee education is important for water conservation programs to work. Furthermore, new procedures are most effective when employees know what the new technology or methods are. Be sure to provide training so maintenance personnel, operators and supervisors understand any new or revised procedures. Also, encourage relevant everyday water users, such as custodial, cleaning and maintenance personnel, to get engaged and contribute to the company's conservation efforts.[41] Many employees find this personally rewarding and are able to find opportunities that management might miss.

Intel Example:

Intel encourages employees to come forward with ideas of projects related to water quality and conservation and then matches the best ideas with a grant to develop them. Involving them can be a powerful motivator and contributing factor to the company's water conservation efforts. For example, an employee group earned the Intel Sustainability in Action (SIA) Grant in 2013 for a vegetation management project designed to increase water conservation and improve water quality in the Yun Qiao Wetland Ecosystem, which provides a large percentage of the drinking water in Chengdu, China.[40]

Baxter Example:

During the first week of June each year, Baxter holds World Environment Week with the theme of know your impact: energy, water and food.

You can periodically remind building occupants and employees of common tips they can follow to help conserve water:

- Look for and report leaky bathroom and kitchen fixtures, or other leaks, to the appropriate personnel.
- Sweep instead of rinsing off sidewalks, kitchen floors, or other areas.
- Report irrigation occurrences during less efficient times, including during the middle of the day or when it is raining.
- Report broken or improperly positioned irrigation sprinkler heads that spray water on sidewalks or pavement.[42]

3.4: How to achieve your water conservation goals

If you come up with several initiatives, start by implementing the ones that reduce cost the most. If you have several facilities, you may want to start by addressing the ones that are exposed to the highest risk. These are facilities that use water for business critical operations and/or are located in areas where water is scarce. It's easiest to focus initial efforts where you have operational control for water use. Once you have made significant progress in those sites, it may be beneficial to initiate conversations with your landlords if you have leased spaces.

As you embark on water conservation initiatives for your business, you may also want to look at local rebates programs to help finance them. Some examples include:

- U.S. Department of Agriculture Business and

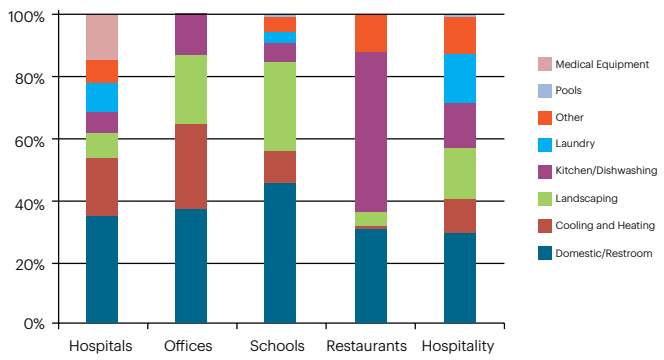
Industry Guaranteed Loan Program: Guarantees loans by local lenders to businesses in rural areas. The loan guarantee may be used for business and industrial acquisitions, construction, conversion, expansion, repair, modernization, or development costs; purchase of equipment, machinery or supplies; startup costs and working capital; processing and marketing facilities; pollution control and abatement; and refinancing for viable projects, under certain conditions.[43]

- Rebate Programs: Look locally, for instance, in your facility's city or local water districts, for water utilities offering conservation and rebate programs for water-saving fixtures and appliances.

3.4.1: Simple reduction steps for all businesses

Your business's water reductions can be done indoors and outdoors through improvements in equipment and operational practices. As mentioned in Chapter 2, manufacturing companies use the most water in material processing, cooling, cleaning, employee sanitation, and steam generation. Office buildings consume the most water in restrooms, heating and cooling, landscaping and kitchens. For example, sanitary fixtures and equipment in restrooms can account for nearly 50 percent of total water use within a facility.[44] As you'll see in Figure 10, each facility type has particular challenges to face and specific areas where the greatest reductions can be made.

Figure 10. End Uses of Water in Various Types of Facilities



Source: Environmental Protection Agency. WaterSense: An EPA Partnership Program. Types of Facilities: http://www3.epa.gov/watersense/commercial/types.html

Intel Example:

In Albuquerque, N.M., the Intel facility has reduced water use by 47 percent since 1994 by installing a high-recovery reverse osmosis water purification process, improving chip washing and rinsing techniques, and using more water-efficient landscaping.

This section gives you possible ways to reduce your water footprint in kitchens, restrooms and landscaping. If you do not own the facilities in which your business operates, work with your landlord to determine what can be done in relation to water conservation. It will be a benefit in costs savings for both.

In kitchens:

- Fill sinks and turn off the tap when washing dishes in community kitchen areas.
- Avoid tools that use a lot of water, such as dipper wells and wok stoves, because they tend to flow continuously.
- Scrape food waste into garbage before washing since pre-rinse spray valves – fixtures used to remove food particles prior to dishwashing – can have higher flow rates than necessary.
- Retrofit or replace existing water fixtures with high-efficiency models.[45]
- Turn off valves when not in use.
- Run only full loads in dishwasher.
- Inspect and maintain equipment to ensure proper operations.
- Use mops, sponges and squeegees to manually clean.[46]
- As appliances and equipment wear out, replace them with more water-efficient models.

In restrooms:

- Maintain building water pressure within the range needed for optimum system performance.[47]
- Replace or upgrade standard toilets, faucets, showerheads and urinals with new high-efficiency models or accessories. Most are at least 20 percent more water efficient. Those with the EPA's WaterSense label are tested and certified for performance.

  Toilets: Consider efficient toilets like dual-flush or composting toilets. The latter includes a system that can treat waste using little to no water.

  Urinals: Consider waterless urinals. They are designed to receive and convey only liquid waste through a trap seal into the gravity drainage system without the use of water.

  Faucets: Consider installing accessories or replacing with self-closing faucets. Faucet accessories that control the rate of water use include flow restrictors, flow regulators, aerators, and laminar flow devices. Self-closing faucets like the ones that operate with a spring-loaded knob automatically shut the water off when the user releases the knob.

Showerheads: Consider using single and low-flow showerheads. Periodically, inspect them for scale buildup to ensure flow is not being restricted. Also, provide a way for users to track showering time. Encourage users to take shorter showers by placing clocks or timers in or near the showers.[48]

Bathtubs: Consider substituting showers for bathtubs. Use low-volume bathtubs if bathtubs are used.[49]

In landscaping:

- Avoid wasting water due to evaporation, wind or runoff. Water-efficient irrigation products and practices could cut the amount of water lost outside by as much as 50 percent.[50]
- Use native plantings and other climate-appropriate landscape materials. They reduce irrigation water use, stand up better to drought, reduce drought loss or damage, take less time to maintain, and lower maintenance costs.
- Re-mulch areas annually to maintain soil coverage and prevent erosion.
- Maintain a sufficient quantity of good topsoil (e.g., four to six inches deep) to capture precipitation as it falls and release water back to plants over time.
- For areas that undergo regular foot or vehicular traffic, aerate the soil annually to help alleviate compaction and improve water absorption rates.
- Keep the landscape free of weeds so that water is available for the decorative landscaping. Pull weeds manually instead of using herbicides to prevent contamination of local water sources.
- Include shaded areas in the overall landscape design to decrease the water needed of surrounding plants. Consider planting additional trees and shrubbery to increase the amount of shaded area in the future.[51]
- Equip irrigation systems with rain or moisture sensors or other devices to review the irrigation needs of the vegetation. This technology supplies only the water necessary for plant health and do not supply water when sufficient moisture is available from natural sources.[52]
- Use in-line drip (also called subsurface) irrigation.

In cooling systems: Cooling towers are used in a variety of commercial and institutional applications. They recirculate significant amounts of water to dissipate excess heat and cool chillers, air conditioning equipment or other process equipment. These systems remove heat through evaporation. Any water added to the system to replace the evaporated water is called "make-up." Dissolved solids that get concentrated in the system when water evaporates need to be flushed out when levels get too high. The water lost when flushing the system is referred to as "blowdown." To maintain energy and water efficiency in these systems, consider the following:

- Implement measures to reduce the heat load to the tower. As the heat load is reduced, cooling tower water use will be commensurately reduced.
- Implement a comprehensive air handler coil maintenance program. Dirty coils can increase the load on the chilled water system used to maintain building temperatures. Increased load on the chilled water system will increase the load on the evaporative cooling process, requiring more make-up water for the cooling tower.
- Properly maintain and clean heat exchangers, condensers, and evaporator coils to prevent scale, biological growth, and sediment from building up in the tubes.
- Properly insulate all piping. Insulate chillers and storage tanks, if installed.

SPRINT APPROACH: On its headquarters campus in Overland Park, Kan., Sprint has chosen to use a computer-driven irrigation system. It pumps water from an eight-acre lake that collects stormwater runoff and then rations it based on calculated rainfall and evaporation to minimize usage. The water captured through Sprint's campus lake and seven acres of connected wetlands provides irrigation water for 39 landscaped acres, and fills portable watering trucks for the vegetation on campus. An even larger portion of the campus grounds (48 acres) is devoted to a native stand of prairie grass. This natural habitat flourishes without the assistance of man-made irrigation.

General Motors Example:

In Canada, GM's St. Catherine's powertrain plant reduced its water consumption by ~11.4 million gallons (43,000 m^3) by converting its water cooling system from city water supply to a new chiller water system, which is cooled by gravity-fed well and canal water.

SPRINT APPROACH: Sprint has chosen to pilot a new zero-blowdown technology in its operations. The solution uses a softener to significantly boost the solubility of recirculated water in the cooling tower system. This enables the system to operate efficiently even when levels of dissolved solids in the water are high.

- When cooling specific equipment using the cooling tower water loop or chilled water system, use the minimum flow rate required to cool the system recommended by the manufacturer. In addition, regularly check operation of the water control valve so that cooling water only flows when there is a heat load that needs to be removed.[53]

In heating systems: Boilers and steam generators are commonly used in large heating systems, institutional kitchens and facilities where large amounts of process steam are used. This equipment consumes varying amounts of water depending on the size of the system, the amount of steam used, and the amount of condensate returned.[54] Following the best practices below for maintaining boilers, steam lines, and steam traps in your heating systems can reduce your water consumption:

- Control cycles of concentration.
- Regularly check steam and hot water lines for leaks and make repairs promptly.
- Regularly clean and inspect boiler water and fire tubes.
- Develop and implement an annual boiler tune-up program.
- Provide proper insulation on piping and the central storage tank to conserve heat.
- Implement a steam trap inspection program for boiler systems with condensate recovery. When steam traps exceed condensate temperature, this inspection can reveal whether the trap is leaking condensation.
- Monitor temperature using an infrared temperature device.
- Repair leaking traps as soon as possible.
- Consider pre-treating boiler make-up water to remove impurities, which can increase the cycles of concentration the boiler can achieve.[55]

3.4.1.1: Leak detection and repair

Identifying leaks will help your business reduce its water consumption and costs in relation to water loss and make better use of limited water resources. This can be achieved by metering and/or daily visual inspections of mechanical rooms and corridors performed by staff. Any water use detected while operations are not going on can be attributed to leaks. Table 3 shows how much water can be typically lost through leaks and the estimated cost. For example, a leaking toilet may cause your business to lose $2,100 (USD) per year, or a stuck float valve in one of your cooling towers can result in a loss of approximately $21,000 (USD) per year.

Table 3. Potential losses from water leaks.

Malfunction	Leaking Flow Rate (gallons per minute)	Water Loss	Estimated Cost of Water Loss
Leaking Toilet	0.5 gpm	21,600 gallons per month	$2,100 per year
Drip Irrigation Malfunction	1.0 gpm	43,200 gallons per month	$4,300 per year
Unattended Water Hose at Night	10.0 gpm	5,400 gallons per day	$16,000 per year
Broken Distribution Line for:			
– One Day	15.0 gpm	21,600 gallons	Up to $64,000 per year
– One Week	15.0 gpm	151,200 gallons	
– One Month	15.0 gpm	648,000 gallons	
Tempering Water Line on a Steam Sterilizer Stuck in the On Position	2.0 gpm	86,400 gallons per month	$8,600 per year
Stuck Float Valve in a Cooling Tower	5.0 gpm	216,000 gallons per month	$21,000 per year

Source: Environmental Protection Agency. WaterSense at Work: Best Management Practices for Commercial and Institutional Facilities. 2012: http://www3.epa.gov/watersense/docs/ws-at-work_bmpcommercialandinstitutional_508.pdf

Another way to identify potential leaks is to track when water use rises above a base level of use for your operations. Once you suspect there may be a leak, take steps to locate and repair it. To help locate leaks:

- Conduct regular inspections of equipment or areas where leaks could occur (e.g., pipe-work joints, connections and fittings) with indication of dampness, rust marks or swelling boards. Significant leaks can often be detected by listening in the absence of other noise.
- For concealed or subsurface pipe-work, leakage detection companies can employ techniques such as pressure testing, flow monitoring and echo correlation.[56]

Establishing a comprehensive leak-detection and repair program can save water, money and time.[57] Make it easy to report leaks by setting up a user-friendly communication system such as a hotline. You also can record the average water consumption for company's facilities by reading water meters daily, weekly or monthly and incorporating it into your existing maintenance, security or cleaning routines.

3.4.2: Simple recycling steps for all businesses

Once you have taken steps to reduce water use and address any leaks, begin looking for opportunities to recycle water to increase your water conservation even further. This section of Chapter 3 will guide you through some basic steps on how to reuse/recycle your business facility's water in landscaping, in heating and cooling systems, as well as using alternative resources such as rainwater and stormwater.

Landscaping:

- Recirculate water when possible in decorative fountains, ponds and waterfalls. A single pass-through can waste significant amounts of water. Consider using non-potable water in these systems like rainwater.[60]
- Shut off landscaping recirculation features when possible to reduce evaporation losses.
- Check water recirculation systems annually for leaks and other damage.
- Inspect your irrigation system monthly. Note where adjustments and repairs are necessary, and make immediate corrections.
- Replace spray head nozzles with more efficient rotating, low-precipitation nozzles.

Heating systems: Water from air conditioners, dehumidifiers, and refrigeration units can provide businesses a steady supply of relatively pure water for reuse in many heating systems. Installing a condensate recovery system to capture and return condensate to the boiler for reuse reduces the amount of make-up water required, eliminates or significantly reduces the need to add tempering water to cool condensate before discharge, and reduces the frequency of blowdown.[61]

Cooling systems: Recycled water is an option for your company's cooling systems, too. Some best practices to consider include:

- Installing a closed-loop recirculation system that will reuse cooling water instead of discharging it right after its first use.
- Reusing water from an existing recirculating source.
- Installing an automatic control that stops water flow when the equipment is not in use or no heat load is present.
- Recycling the water flow or replacing it with wet cooling technologies that use less water, other liquids, air/dry cooling technologies, or hybrid wet/dry technologies.

Baxter Example:

Water reuse in heating and cooling systems at Baxter's facilities include:

- Reuse of reverse osmosis reject water as cooling tower make-up water.
- Reuse of sterilizer charge water as boiler make-up.
- Return and reuse of steam condensate to the boiler for use as boiler feedwater.
- Closed loop cooling tower systems.

General Motors Example:

General Motors' engine plant in Joinville, Brazil uses reverse osmosis - a process that pushes water through a filter to eliminate particles - to filter water from recycled treated wastewater for toilet flushing and industrial uses. It's the first application of its kind at an automotive facility and saves the plant the equivalent of nine Olympic-sized swimming pools – 22.9 million liters per year. GM's Ramos Arizpe Complex in the water-stressed region of northern Mexico features a three-acre artificial lagoon as a part of its filtration and purification system. In addition to recycling facility water, the lagoon serves as an important natural habitat for wildlife, providing wetland for migrating and local birds – including threatening species like the Muscovy duck.[58]

Nestlè Water Example:

Their facility in San Pellegrino, Italy, is saving more than 31 million gallons (119,000 m^3) per year by reusing water utilized for final rinsing of the bottles. After treatment, the water is reused for the washing of glass bottles and for the pasteurization stage of soft drinks.[59]

Rainwater and stormwater collection: Alternative sources of water like rainwater and stormwater runoff may decrease a business's demand for potable water, thus contributing to water conservation. Harvesting techniques are globally applicable and practical in regions with frequent precipitation. For example, if your business is in Wisconsin or Michigan,

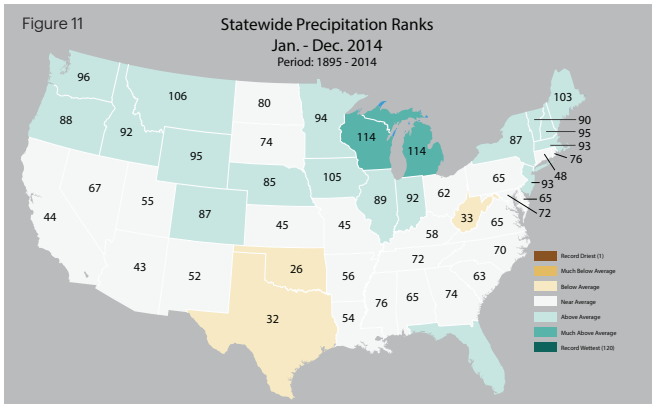
SPRINT APPROACH:

Sprint is capturing stormwater at our headquarters campus in Overland Park, Kan. An eight-acre lake and more than seven acres of connected wetlands on the company's 200-acre campus serve as catch basins for stormwater runoff and as the principal irrigation source for landscaping. This conserves and recycles millions of gallons of water annually. In 2014 Sprint recycled 9.5 million gallons (35,946 m^3) of rainwater – 4.1 percent of the total water it consumed, 242.8 million gallons (869,022 m^3).

this can be a very attractive option. Figure 11 shows U.S. statewide precipitation ranks from record driest to record wettest in 2014.

TIP:

Add sub-meters to measure the quantity of water being recycled or reused for later reporting.



Source: National Oceanic and Atmospheric Administration. National Climatic Data Center. Statewide Precipitation Ranks 2014: http://www.ncdc.noaa.gov/temp-and-precip/us-maps/12/201412?products[]=statewidepcpnrank

Rainwater harvesting is a low-cost technique that provides local solutions for conserving water for your business. It consists of collecting rainwater from impervious surfaces (e.g., rooftops) and storing it for later use.[62] Major components of rainwater collection systems include:

- Roofs or surfaces where rainwater can be collected
- Gutters and downspouts to transport the rainwater to storage
- Gutter screens to remove debris
- Storage tanks (e.g., cisterns)
- Conveyance systems to deliver stored water
- Water treatment, depending upon end use quality requirements[63]

More information about rainwater harvesting can be found by reading these U.S. EPA resources:

- WaterSense at Work: Best Management Practices for Commercial and Institutional Facilities. 2012. Section 8: Onsite Alternative Water Sources. P. 26: http://www3.epa.gov/watersense/docs/ws-at-work_bmpcommercialandinstitutional_508.pdf
- Rainwater Harvesting. Conservation, Credit, Codes, and Cost Literature Review and Case Studies. January 2013: http://water.epa.gov/polwaste/nps/upload/rainharvesting.pdf

Another alternative water source for your business is stormwater harvesting – the collection, treatment, storage and use of stormwater runoff from urban areas (grey water reuse). It differs from rainwater harvesting as the runoff is collected from drains or creeks, rather than roofs. Most stormwater harvesting schemes would have the following elements:

- Collection from a drain, creek or pond.
- Storage-like dams or tanks to balance supply and demand. Storages can be on-line (constructed on the creek or drain) or off-line constructed some distance from the creek or drain).
- Treatment of captured water to reduce pollution and the risks to public health and the environment, or to meet any additional requirements of end-users.
- Distribution of the treated stormwater to the area of use.[64]

More information on stormwater harvesting can be found by reading the following sources:

- WaterAid. Rainwater harvesting. Technical brief. January 2013: http://www.wateraid.org/~/media/Publications/Rainwater-harvesting.pdf
- Project WET Foundation and UN Habitat. Rainwater Harvesting. 2012: http://espanol.projectwet.org/system/files/materials/rw_harvesting_english.pdf

3.4.3: Water and energy relationship

When examining your company's operations, you may have noticed the strong connection between water and energy. They are tightly intertwined. Producing energy often requires large amounts of water which can become polluted if it's not carefully managed. Likewise, providing water requires large amounts of energy – from extracting, conveying and using it to treating the wastewater before returning it to the environment.

You might find it beneficial to consider the water and energy nexus when considering innovative approaches to your conservation efforts. For example, a new type of cooling that addresses the water and energy relationship is liquid submersion technology. It can help reduce by 50 percent the total cooling energy required in a data center by immersing servers in a non-toxic mineral oil with 1,200x more heat capacity by volume than air. The end results may also include a reduction of close to 90 percent of the water used for cooling in a data center.[65]

3.5: Where to go from here?

Once you have measured and reported your direct, blue water footprint and have taken steps to achieve your water conservation goals, there are additional steps you can take to increase your positive impact. For example, you may want to become water neutral; secure third-party assurance for your water footprint to enhance your business's credibility; partner with non-profit organizations, universities, other businesses or government to continuously improve your efforts; and/or encourage your suppliers to conserve water and reduce your indirect water footprint.

3.5.1: Become water neutral

You can be considered water neutral if you reduce your water footprint as much as possible, then offset your remaining water usage by investing in projects that improve sustainable, equitable and efficient water use within the affected environment and community (e.g., a river basin where your residual water footprint is located).[66] In other words, water depletion or pollution in one place cannot be offset in another area like it is for greenhouse gas emissions like CO^2. Consider investing in offsets in areas where water scarcity is highest first and replenish the local water supply by at least the amount of water that you use directly. The size of the offset should be proportional to the vulnerability of the region where the residual water footprint is located. The larger the business impact (pollution or water withdrawal), the larger your investment should be to achieve the offset. In order to be water neutral, make sure your investments are doing what they are meant to. Also, if you rely on a supply chain that is not water neutral, then your company cannot be considered water neutral, even if you have done everything you can to influence your suppliers.[67]

An example of a water-neutral certification you can secure is the Gold Standard's Water Benefit Standard (WBS): http://www.goldstandard.org/resources/water-requirements.

3.5.2: Consider third-party assurance

Assurance for your water footprint reporting involves providing your process and data to a third-party expert. They review it for accuracy and provide recommendations for improvement. If you have met the criteria they have in place, they will provide you with an Assurance Statement. The verification of water accounting data may have different objectives. The verifier and the commissioning company should agree on them beforehand. For example, the objectives may be to enhance stakeholder confidence and trust by increasing credibility of information and demonstrating progress toward targets; to increase senior management confidence in information used to make investments and set targets; to improve internal accounting and reporting practices; to facilitate learning and the transfer of knowledge within your company; and/or to prepare for mandatory verification requirements.[68]

There are many choices for getting your data assured with a significant variation in pricing. For example, Sprint's water consumption water data was independently assured by Det Norske Veritas U.S.A., Inc. (DNV GL) in 2015 by using the GRI G4 guidelines indicator protocol for water consumption.[69] Another example is Baxter, which engaged Bureau Veritas North America, Inc., to conduct an independent assurance of the Environmental, Health and Safety (EHS) information and Supply Chain/Product Transport information in its 2009, 2010, 2011 and 2012 Sustainability Reports. For each of these four years, this included an independent review and assurance of reported water use, water discharge information, and assessment of water stressed locations.[70]

3.5.3: Partner with others

You can go a step further by partnering with other businesses, government, non-governmental organizations (NGOs), etc. While the specific water solutions vary across locations depending upon the particular challenges, the interconnectedness of water demand around the globe challenges all users to address through a collective approach. Together with partners, you can identify common goals and leverage shared interests to solve water issues.[71] For example, you can partner with NGOs that focus on water conservation education to help create educational sessions for your employees and suppliers. Partner with others especially if you share basins because your business actions can affect and be affected by other company's water actions in one basin. For instance, even if you have the best water management plan, you can still face water-related risks if your basin neighbor is negatively affecting your water supply by extracting water in an unsustainable way or polluting it. Because water issues can bring shared risk due to its limited availability, collaborative water conservation efforts have a larger impact.

TIP:

When partnering with businesses, especially within the same industry, it is better if the parties involved look at it as a non-competitive opportunity for water conservation.

Intel Example:

Intel considers environmental issues to be non-competitive. They strive to identify and share best practices for water use and develop tools that provide better measurement. Intel works closely with competitors to benchmark and compare performance on water use and reuse. They have participated in environmental performance benchmarking activities with other members of the World Semiconductor Council, the Semiconductor Industry Association, and SEMATECH. Intel has also partnered with organizations such as the Global Environmental Management Initiative (GEMI) and Project WET on water-related tools and education.[72]

Baxter Example:

Baxter has established partnerships with local NGOs to implement projects that help protect vulnerable watersheds and provide communities with enhanced access to clean water and sanitation. For instance, in 2013, Baxter worked with the Philippine Center for Water and Sanitation (PCWS). Together, they improved the water, sanitation and hygiene conditions for nearly 1,500 inhabitants of Sitio Silangan, a community within walking distance of the company's manufacturing facility in Canlubank, Philippines, which is located in a water-scarce region.[73]

3.5.4: Ask your suppliers

Talk to your suppliers about water conservation and together you can have a larger impact. Because water use in a supply chain (indirect use) contributes significantly to the water footprint for many businesses, the greatest opportunities for conservation may be there, rather than in your own operations (direct use). You can engage your suppliers and encourage them to conserve water in the following ways:

- Ask them to measure and report their blue, direct water footprint on their company website as a first step (especially if water is material to their business). Provide incentives, recognition and/or financial support for the ones that do this, especially for the ones that help you meet your water efficiency goals.
- Partner with NGOs that focus on water conservation education to help create educational sessions for your employees and suppliers. Invite suppliers to participate in training and/or educational sessions or ask to attend ones you know they are hosting.
- Offer to share best practices and success stories of your water conservation efforts. For example, you may want to share this Supplier Guide on Water Conservation with your suppliers.
- Encourage them to research, engage and/or visit organizations that are already implementing water conservation efforts so that they can learn from them.
- Develop collaborative solutions with suppliers that are located in your watershed and/or in water-scarce areas, where reducing water consumption can have the greatest positive impact.
- Influence suppliers through your business's policies and programs. Evaluate procurement requirements, sourcing specifications, and how they affect the amount of water required to produce or transport products. You may also want to consider water-related performance in the selection of your suppliers, particularly in water-intensive parts of your supply chain.[75]

Baxter's Approach

Baxter chose to implement a Global Supplier Sustainability Program to procure products and services that help them and their suppliers reduce their environmental impact while maintaining continuity of supply and managing costs. This program includes 20 Green Supplier Criteria, including water management and conservation, which are capable of strengthening Baxter's global supply chain and motivating others to better manage their water use and implement additional water conservation initiatives. Baxter has also developed a global supplier water security strategy to provide a framework of awareness and greater understanding of the impact water scarcity may have on Baxter's supply chain. It will also help Baxter's suppliers become more aware of their water usage, water risks and possible water reduction opportunities.[74]

3.6: Industry-specific case studies

The amount of water use by business varies significantly based on both industry segment and product stage. The industries that use water the most and have the highest impact on water are apparel, high-tech/electronics, beverage, food/agriculture, biotech/pharmaceuticals, forest products, metals/mining, and electric power/energy. In this section, we provide several case studies from companies in these industries. They provide great examples of how leading businesses are implementing water conservation efforts.

Black & Veatch Case Study – Engineering

Changi NEWater Plant – Singapore| Water Treatment and Reuse

BACKGROUND ON BLACK & VEATCH:

- Black & Veatch is a leading global engineering, consulting and construction company. Major markets served by the company include energy, water, telecommunications, government services and management consulting.
- Founded in 1915, Black & Veatch has approximately 10,000 professionals working in more than 100 countries worldwide.

Challenge

After treatment, used water or wastewater effluent typically is directed back into the natural environment. That makes it wasted water, a lost opportunity, in Singapore's view. Singapore is a densely populated, highly urbanized city-state on a small tropical island in Southeast Asia. It has no natural aquifers or lakes, and has scarce land for water collection, storage and treatment. Minimizing waste, diversifying supply and managing demand to improve the efficiency of its limited water resources is a top priority. Reuse of wastewater effluent bolsters Singapore's ability to develop sufficient water supplies within the constraints of the island and meet the needs of its growing economy.

Solution

Since gaining independence in 1965, Singapore has invested in research, planning and technology in support of a national strategy called the Four National Taps. Water reuse is one of the taps, or sources. The others are catchment of rainfall and stormwater, desalination of seawater, and imported raw water. Through this strategy, Singapore has created a resilient and diverse water supply.

Practicing its mantra to "use each drop of water more than once," Singapore takes effluent from a typical wastewater treatment or water reclamation plant and subjects it to additional filtration, purification and disinfection technologies. Singapore calls this reclaimed used water "NEWater."The process can be applied practically anywhere, and it is helping the country significantly limit its water footprint.

NEWater is an example of planned, indirect potable reuse of wastewater. Indirect potable reuse refers to highly treated effluent that is taken from a wastewater or reclamation facility and discharged directly into groundwater or surface water sources, to augment those sources. It's a practice that has been around for as long as treated wastewater has been released into nature. However, advances in treatment technology have enabled the production of high-quality used water at increasingly reasonable costs and with less energy. This has allowed for planned, indirect potable reuse and applications such as NEWater.

Results

Reuse of wastewater streams has created a viable resource for Singapore to meet its water needs. NEWater currently meets up to 30 percent of Singapore's water requirements through serving industrial users and augmenting local water supply reservoirs. The country has plans to expand its capacity so that by 2060 NEWater meets 55 percent of demand, shrinking its water footprint even further.

Developed over the past 30 years, NEWater is one of Singapore's greatest successes. The country's first NEWater plant opened in 2003. Its fifth, the Changi NEWater Plant, is part of one of the largest water reclamation facilities in the world. Designed by Black & Veatch, it processes about 60 million gallons of water per day. This represents the average daily amount that a population of approximately 400,000 people uses for industrial, commercial and personal uses. The plant boasts other features and benefits, as well. It was among the first reuse plants of its size to implement energy recovery technology. Additionally, with the NEWater facilities designed to function literally on top of the existing Changi Water Reclamation Plant, its land use footprint is minimized.

Work at the Changi NEWater Plant is ongoing. It's being retrofitted with newer technology to enhance the efficiency and performance of the treatment process. A second NEWater plant at Changi also is in development. Singapore is continuing to work with Black & Veatch on the retrofits and new facilities.

General Motors Case Study – Automotive

San Luis Potosi Manufacturing Plant – Mexico | Reducing Impact on Water-stressed Areas

BACKGROUND ON GENERAL MOTORS:

- General Motors (GM) is one of the world's largest automakers and traces its roots in the U.S. back to 1908. Based in Detroit, Mich., GM employs more than 219,000 people in nearly 400 facilities across six continents.
- GM offers a comprehensive range of vehicles and services in more than 120 countries around the world.
- Along with its strategic partners, GM produces cars, trucks and crossovers, and sells and services these vehicles through the following brands: Chevrolet and Cadillac globally, and Baojun, Buick, GMC, Holden, Jiefang, Opel, Vauxhall and Wuling in certain regions or specific countries.

Challenge

- GM's manufacturing operations represent approximately 85 percent of its total water use.
- Approximately 18 percent of GM's operations (based upon vehicle production) are located in high water-stressed areas.
- GM's San Luis Potosi manufacturing facility in Mexico is located in an extremely water-stressed area. The San Luis Potosi Valley aquifer provides over 90 percent of the area's water.

Solution

GM assessed water risks for direct operations on a facility basis since the risk is at the local level. They use the Global Water tool from the World Business Council for Sustainable Development, the Aqueduct tool from the World Resources Institute, and local site analyses to quantify the level of water stress at each of their major manufacturing sites globally.

GM incorporates best practices for water minimization into building and process design, followed by continuous improvement once the facility becomes operational. Their major water use is in the painting process. Water conservation in this process is achieved through the reuse of high quality rinse water enabled through various treatment technologies and very efficient rinse operations. Other standard practices are low-flow showers and faucets as well as cooling tower controls to achieve maximum cycles of concentration. Successful water reduction efforts are shared globally and include employees increasing best practices in water conservation, process improvements for reuse and wastewater treatment, and investments in water efficiency.

To that end, GM established a global commitment to reduce by 2020 the water intensity on a per-vehicle-produced basis by 15 percent from a 2010 baseline. By 2014 GM had achieved a 11 percent reduction from 2010. The 2020 goal, rooted in GM's Environmental Principles, reflects a commitment to water conservation that has long been present in its global operations.

In areas where GM operates that are water-stressed, GM invests additional capital and op-ex expenditures for water conservation and industrial water reuse. For example, GM invested more than $10M (USD) at its San Luis Potosi (SLP) facility on technology such as air-cooled compressors and chillers versus water-cooled and treatment of process and sanitary wastewater for reuse as process water. Combined with overall process efficiency upgrades, GM has achieved zero liquid discharge at its SLP facility.

Results

GM's SLP plant is cleaning and reusing 90 percent of its wastewater in its plant operations. The only losses are through evaporation during the water treatment process, and they are looking at ways to minimize these losses as well. Achieving zero liquid discharge has significantly reduced the amount of groundwater used, saving roughly 264 gallons of water per vehicle built. These savings will grow as GM increases the production at the plant and reduces the risks to their business associated with operating in a water-stressed area. Furthermore, providing jobs in a water-stressed area while minimizing impact on the aquifer can generate positive local, regional and global recognition of GM's conservation efforts and lead to increased market share. A one percent increase in market share in Mexico for GM would represent a potential increase in revenue of $30 million (USD).

Nestlé Waters Case Study – Beverage

Sustainable Water Management of Spring Sources | Business Continuity

BACKGROUND ON NESTLÉ WATERS:

- Nestlé Waters North America is a division of Paris-based Nestlé Waters, the world's largest bottled water company. Nestlé Waters, which serves customers in 130 countries, with 75 well-known bottled water brands, is a subsidiary of the world's largest food company, Nestlé, S.A, based in Vevey, Switzerland.
- Nestlé Waters is committed to water stewardship and to be best-in-class in water resource management. In fact, as the world's bottled water leader, Nestlé Waters has made sustainable water use a top priority.
- As the third largest non-alcoholic beverage company by volume in the U.S., Nestlé Waters North America provides customers with an unrivaled portfolio of water as healthy hydration. Among its bottled regional spring water brands are Poland Spring®, Deer Park® and Arrowhead®. Its national purified water brand is Nestlé® Pure Life®. International brands include Perrier® and S.Pellegrino®. The company's line of ready-to-drink teas now includes Nestea®, Sweet Leaf® and Tradewinds®. Based in Stamford, Conn., with 7,500 employees nationwide, Nestlé Waters North America strives to reduce its environmental footprint, improve bottle recycling rates in North America, and create shared value in those communities where it has operations.
- Nestlé Waters North America's operations amount to only 0.0009 percent of worldwide estimated freshwater withdrawals.

Challenge

As a beverage company, Nestlé Waters is entirely dependent upon a secured supply of water in sufficient quantity and consistent quality. They recognize that sustainable water management practices are essential to protecting resources and ensuring the long-term supply of fresh water. Long-term management and monitoring of their water resources is a primary business interest.

Solution

To ensure its springs remain sustainable, high-quality sources of water, a field staff of 10 natural resource managers (NRMs) is charged with carefully selecting and monitoring Nestlé Waters North America's springs. These NRMs, professionally trained geologists, hydrogeologists and engineers, follow a rigorous monitoring process that includes four key elements: water recharge, water levels, water flows and water use. Nestlé Waters North America has met its commitment to make publicly available its process for managing and monitoring its spring sites. Each spring requires a tailored approach because of its differing geologic and climatic conditions. The sites are visited and observed regularly, and local environmental surveys are conducted at least every five years to monitor the long-term health of the habitats around the springs. The goal is to ensure Nestlé Waters North America's withdrawals do not exceed natural renewal levels over the long-term.

Results

Many of Nestlé Waters North America's brands have been in existence for decades, including Poland Spring® (since 1845), Arrowhead® (since 1894) and Deer Park® (since 1873). Additionally, their springs have been in operation as water sources for years. This highlights the acumen and expertise the company has accumulated in sustainable water management. Nestlé Waters North America currently manages 40 spring sites in North America. The company also spends millions of dollars each year maintaining those sites and more than 14,000 acres of open space watershed land to help safeguard the local ecosystems.

Intel Case Study – Semiconductor Products & Services

Ocotillo Campus Site – Chandler, Arizona | Treatment of Recycled Water for Reuse and Safe Return to Sources through Partnerships

BACKGROUND ON INTEL:

- Intel designs and manufactures advanced microprocessors and chips, hardware, software and services that are used in PCs, desktops, servers, tablets, smartphones, automobile infotainment systems, automated factory systems and medical devices.
- At the end of 2014, Intel had 107,600 employees in more than 60 countries.
- Clean water is critical to Intel's manufacturing operations. It takes ~20 gallons of water to manufacture a typical chip.
- In 2010, Intel published a comprehensive Corporate Water Policy that is consistent with its commitment to environmental responsibility and respect for the human right to water.
- Intel has spent more than $220M (USD) on water conservation projects, including a mid-1990s joint-partnership with the city of Chandler, Ariz. to build an EPA-award-winning Reverse Osmosis facility (CHRO).
- Intel continues to incorporate water conservation elements into the design of their facilities.

Challenge

- Intel operates a chip-manufacturing facility in arid Chandler, Ariz., where ultra-clean water is extremely valuable.
- Tap water in this region has high hardness (e.g., high calcium and magnesium) and other contaminants (e.g., silica, boron). Even though the water is potable for humans, it must undergo additional purification before being used to make semiconductor chips.
- The purification process generates large volumes of "industrial brine" that must be carefully managed to prevent it from entering the sanitary and storm sewers as well as groundwater supplies.
- There was not enough capacity or infrastructure at Intel or within the city of Chandler's existing operations to effectively and economically manage the industrial brine or to extract and reclaim the valuable water from the industrial brine.

To address these challenges, Intel looked beyond its fence line to partner with the city of Chandler, Ariz.

Solution

- Instead of building additional industrial brine management infrastructure at their Ocotillo Campus site, Intel partnered with the city of Chandler on a $75M project at their existing Reverse Osmosis facility (CHRO).
- The successful project involved a number of CHRO facility upgrades and new construction to include:
  - Upgrading the CHRO facility water treatment membranes and adding additional water softening capabilities.
  - Reusing Intel's existing and under-used brine concentrator at the CHRO facility. The brine concentrator further evaporates the water from the industrial brine resulting in less solids to manage and more water to reclaim.
  - Improving the solids handling infrastructure as well as treatment chemical placement and optimization.

Results

Since 1998, Intel has saved over 46 billion gallons of water, which is enough to cover the annual use of ~430,000 U.S. homes for one year. Over time, Intel has been able to decrease the amount of water required to create the "ultra-pure water" used to clean silicon wafers during fabrication of semiconductors and microchips. In 2013 they internally recycled approximately 2.1 billion gallons of water, which is equivalent to 24 percent of their total water withdrawals for the year.

The Intel/Chandler project resulted in:

- Increased CHRO membrane efficiency (i.e., more water recovered) from 70 percent to ~95 percent after the upgrade.
- Significantly reduced industrial brine volumes from 1970 to 70 gallons per minute (gpm).
- Enhanced infrastructure to allow Intel's Ocotillo Campus site to eventually offset fresh city water consumption by ~2,000 gpm, resulting in a net fresh water savings of almost 1 billion gallons per year.

This project is an example of Intel's commitment to water efficiency and conservation. It also showcases Intel's eagerness to collaborate with municipal partners to create "win-win" solutions that are best for the community.

Baxter Case Study – Pharmaceutical and Biotechnology

Lean Energy Program Led to Water Recovery and Reuse

BACKGROUND ON BAXTER INTERNATIONAL INC.:

- Baxter International Inc. provides a broad portfolio of essential renal and hospital products, including home, acute and in-center dialysis; sterile IV solutions; infusion systems and devices; parenteral nutrition; biosurgery products and anesthetics; and pharmacy automation, software and services.
- Sustainability is a core element of the company's vision to build a truly great company by providing sustainable value for all stakeholders.
- Water is integral to many of Baxter's products, such as intravenous and renal solutions, and is an important resource in the manufacturing processes. Therefore, conservation, reuse and management are key focus areas.

Challenge

Baxter saw a link between water and energy. They realized that by saving water, energy could be saved, too. Because of the strong link between producing high-purity water for its production processes and products and its related energy requirements, Baxter looked to develop a broader management strategy designed to reduce energy consumption across the company that would recover and reuse water.

Solution

Baxter began integrating lean manufacturing principles and tools, such as value stream mapping, with water management to help facilities identify and prioritize opportunities for water conservation. In 2007, Baxter launched a Lean Energy Program for the company's principal manufacturing facilities. Through that program, it sought opportunities to optimize water systems when conducting the company's facility energy assessments. Baxter hosts local training forums or regional workshops for individuals managing water and energy at Baxter facilities.

Results

As part of the Lean Energy Program, Baxter has implemented a number of water recovery and reuse projects at several facilities to improve operating efficiency and performance. Following are examples of these projects and their results:

- **China –** Product sterilization processes are often water- and energy-intensive. Baxter's Tianjin facility implemented a system to recover heated water from the sterilization process and reuse it in the site's boilers. This project decreased water consumption by 6,000 cubic meters (m^3) on an annualized basis while saving energy.
- **Ireland –** Baxter's facility in Castlebar implemented several water conservation projects such as improving use of meters in water-intensive operations, optimizing water used during sanitization processes, and reducing water used for toilets. These efforts reduced water consumption by approximately 18,500 m^3 annually.
- **United States –** Baxter's manufacturing facility in Round Lake, Ill., developed software to monitor water usage and installed alarms to alert facility personnel if valves remain open longer than intended. The facility also completed projects to recover water from various processes for reuse in boilers and cooling towers. Combined, these projects reduced water usage by 7,600 m^3 annually.

Gap Inc. Case Study – Apparel

Water Quality Program (WQP) | Safe Discharge through Wastewater Quality Monitoring

BACKGROUND ON GAP INC.:

- Gap Inc. is a leading global retailer offering clothing, accessories and personal care products for men, women and children under the Gap, Banana Republic, Old Navy, Athleta and Intermix brands.
- Founded in 1969 by Doris and Don Fisher.
- Headquarters in San Francisco, Calif.

Challenge

Apparel manufacturing uses large amounts of water, and protecting this vital resource is a top priority for Gap Inc. As part of an apparel industry working group, the company identified third-party denim laundry vendors as a major source of potential water pollution in its global supply chain. Gap Inc. sought to ensure that untreated wastewater from these laundries was not being released into surrounding communities.

Solution

Gap Inc. launched its Water Quality Program (WQP) for denim laundries in 2004 and made participation a mandatory requirement for all facilities supplying any of Gap Inc.'s brands in 2010. Wastewater from laundries is tested annually against strict industry guidelines, composed of 17 parameters, including temperature, color, pH and chemical makeup. To pass the test, each laundry must have an accredited laboratory collect and test a water sample, which must comply with either local water quality law or Gap Inc.'s WQP standard, whichever is more stringent.

Gap Inc.'s Global Sustainability team currently monitors water quality in over 60 third-party laundries in 14 countries to prevent health and environmental risks to workers and surrounding communities. If any problems are found, the team works with the factory to identify the source and remediate the issue. In addition to protecting water quality, the WQP is designed to benefit laundries by improving worker safety, reducing the likelihood of government citations, and reducing costs through improved water efficiency.

The WQP has become the foundation for Gap Inc.'s water programs for production facilities and surrounding communities. Other initiatives include the Mill Sustainability Program and membership in the cross-industry working group, Zero Discharge of Hazardous Chemicals (ZDHC).

Results

The percentage of Gap Inc. third-party laundries that meet the WQP standards has been improving over time:

- In 2011, 83 percent of laundries passed all parameters of the test.
- In 2012, 90 percent of laundries passed all parameters of the test.
- In 2013, 97 percent of laundries passed all parameters of the test.

The WQP results impact Gap Inc.'s sourcing decisions: laundries that fail one or more parameter are given a chance to improve their water quality. However, laundries that fail repeatedly will be deactivated.

APPENDIX A

Glossary

This appendix includes definitions of key terms used throughout the guide.

Best practice: A method or technique that has consistently shown results superior to those achieved with other means and that can be used as a benchmark. Source: Alliance for Water Stewardship Standard.

Blowdown: Draining of the water in cooling or heating systems to avoid the buildup of excess dissolved solids. *Source: Environmental Protection Agency. Lean & Water Toolkit: Achieving Process Excellence through Water Efficiency.*

Blue water footprint: Refers to the consumption of surface and groundwater resources (e.g. rivers, lakes, aquifers) along the supply chain of a product. *Source: Water Footprint Network. The Water Footprint Assessment Manual: Setting the Global Standard.*

Business water footprint: Also referred as a corporate or organizational water footprint. It is defined as the total volume of water used directly and indirectly to run and support a business. The water footprint of a business consists of two components: the direct water use by the producer (for producing/manufacturing or for supporting activities) and the indirect water use (the water use in the producer's supply chain). *Source: Water Footprint Network. The Water Footprint Assessment Manual: Setting the Global Standard.*

Business water risk: Refers to the probability of a business experiencing a detrimental water event, regardless of whether that event occurs in their direct or indirect operations. *Source: CEO Water Mandate. Corporate Water Disclosure Guidelines.*

Direct water use: Refers to the water consumption and pollution with operations/production/manufacturing and/or for supporting activities of a business. For example, water may be used within products like beverages, in the process such as for extracting minerals during mining, cleaning products like food and clothing, cooling purposes like data centers or power plants, and for consumption and hygiene use by employees. In other words, it is the amount of water used in and around a business throughout the day for producing goods and services, as well as maintaining functionality of the business. This includes the water used directly in offices, kitchens, toilets, landscaping, etc., as well as from internal supply chains within the organization and between business units. *Source: World Business Council for Sustainable Development. Water Valuation: Building the Business Case. 2012 (Adapted)*

Green water footprint: Refers to consumption of rainwater during the production process. This is particularly relevant for agricultural and forestry products (products based on crops or wood). Source: Water Footprint Network. The Water Footprint Assessment Manual: Setting the Global Standard.

Grey water footprint: Refers to the freshwater pollution that can be associated with the production of a product over its full supply chain. *Source: Water Footprint Network. The Water Footprint Assessment Manual: Setting the Global Standard.*

Groundwater: Water that occurs below the surface of the Earth, where it occupies spaces in the soil. *Source: Carbon Disclosure Project. Guidance for companies reporting on water on behalf of investors & supply chain members 2014: Water Questionnaire 2014.*

Indirect water use: Refers to the water consumption and pollution associated with external inputs to the company's operations such as materials, components, consumable inputs and services. In other words, indirect water use is the water used in the producer's supply chain for creating the product for sale. You may not drink, feel or see this water, but it may make up the majority of your water footprint though your business' supply chain. *Source: Water Footprint Network website. Water Footprint Glossary.*

Makeup water: Fresh water introduced into a cooling or heating system to replace water lost to evaporation and blowdown. *Source: Environmental Protection Agency. Lean & Water Toolkit: Achieving Process Excellence through Water Efficiency.*

Meter: Measures the quantity and/or quality of water being supplied to a facility. *Source: Environmental Protection Agency. Lean & Water Toolkit: Achieving Process Excellence through Water Efficiency.*

Physical risk: Present when a business has too little or too much water, when the water is unfit for use, or when a business does not have access to water. *Source: Carbon Disclosure Project. Guidance for companies reporting on water on behalf of investors & supply chain members 2014: Water Questionnaire 2014.*

Rainwater harvesting: It consists of collecting rainwater from impervious surfaces (often roofs) and storing it for later use. *Source: Environmental Protection Agency. Managing Wet Weather with Green Infrastructure. Municipal Handbook. Rainwater Harvesting Policies.*

Recycled water: The act of processing used water through another cycle before discharging to final treatment and/or discharging to the environment. *Source: Carbon Disclosure Project. Guidance for companies reporting on water on behalf of investors & supply chain members 2014: Water Questionnaire 2014.*

Regulatory risk: Occurs when public water policies and/or regulations are changing, ineffective, poorly-implemented or lack transparency. A change in law or regulation could be a risk to the company by increasing the costs of operating a business, reducing the opportunities of an investment, or changing the competitive landscape in which the company operates. *Source: Carbon Disclosure Project. Guidance for companies reporting on water on behalf of investors & supply chain members 2014: Water Questionnaire 2014.*

Reputational risks: Occurs when stakeholders perceive that your company does not conduct business in a sustainable or responsible fashion. Reputational risks could arise from litigation, product risks from changes in consumer behavior and risks that may impact decisions made by investors, consumers and current or potential employees concerning a company. *Source: Carbon Disclosure Project. Guidance for companies reporting on water on behalf of investors & supply chain members 2014: Water Questionnaire 2014.*

Reverse osmosis: A process to remove dissolved solids, usually salts, from water. Salty water is forced through membranes at high pressure, producing pure water and a highly concentrated brine. *Source: Environmental Protection Agency. Lean & Water Toolkit: Achieving Process Excellence through Water Efficiency.*

River basin: Area having a common outlet for its surface runoff. *Source: CEO Water Mandate. Corporate Water Disclosure Guidelines.*

Stormwater harvesting: The collection, treatment, storage and use of stormwater runoff. It differs from rainwater harvesting as the runoff is collected from drains or creeks, rather than roofs. *Source: New South Wales. Department of Environment and Conservation. Managing Urban Stormwater. Harvesting and Reuse. Stormwater Trust.*

Sub-meter: Measures usage and/or quality for specific activities within a facility, such as cooling towers, process use, or landscape water use. *Source: Environmental Protection Agency. Lean & Water Toolkit: Achieving Process Excellence through Water Efficiency.*

Supply-chain water footprint of a business: The supply-chain (or indirect) water footprint of a business is the volume of freshwater consumed or polluted to produce all the goods and services that form the input of production of a business. *Source: Water Footprint Network. The Water Footprint Assessment Manual: Setting the Global Standard.*

Water audit: An on-site survey of facility water use to measure equipment and management efficiency and generate recommendations to improve efficiency. *Source: Environmental Protection Agency. Lean & Water Toolkit: Achieving Process Excellence through Water Efficiency.*

Water availability: Includes the network of water resources (e.g., rivers, lakes, groundwater) minus the flow of water that is required to sustain freshwater and estuarine ecosystems and the human livelihoods that depend on these ecosystems (e.g., irrigation and industrial applications). *Source: Carbon Disclosure Project. Guidance for companies reporting on water on behalf of investors & supply chain members 2014: Water Questionnaire 2014.*

Water conservation:

1. Any beneficial reduction in water loss, waste or use.
2. A reduction in water use accomplished by implementation of water conservation or water-efficiency measures.
3. Improved water management practices that reduce or enhance the beneficial use of water.

Source: Environmental Protection Agency. Lean & Water Toolkit: Achieving Process Excellence through Water Efficiency.

Water consumption: In their definition, Ceres Aqua Gauge recognizes that the term 'water consumption' is not consistently defined or used. For the purpose of this guide, Sprint uses CDP's and Ceres's definition of water consumption as an "amount of water that is used but not returned to its original source." This includes water that has evaporated, transpired, has been incorporated into products, crops, waste, consumed by man or livestock or otherwise removed from the local source. *Source: Carbon Disclosure Project. Guidance for companies reporting on water on behalf of investors & supply chain members 2014: Water Questionnaire 2014.*

Water discharge: The sum of water effluents discharged to subsurface waters, surface waters, sewers that lead to rivers, oceans, lakes, wetlands, treatment facilities, and ground water either through a defined discharge point, over land in a dispersed or undefined manner, or via truck. Discharge of collected rainwater and domestic sewage is not regarded as water discharge. *Source: Carbon Disclosure Project. Guidance for companies reporting on water on behalf of investors & supply chain members 2014: Water Questionnaire 2014.*

Water efficiency: A measure of the amount of water used versus the minimum amount required to perform a task. *Source: Environmental Protection Agency. Lean & Water Toolkit: Achieving Process Excellence through Water Efficiency.*

Water footprint: Total amount of water used directly and indirectly by a person, household, business, institution or country. In this guide, we focus on the business water footprint. *Source: Water Footprint Network. The Water Footprint Assessment Manual: Setting the Global Standard.*

Water footprint assessment: Refers to the full range of activities to:

1. Quantify and locate the water footprint of a process, product, producer or consumer or to quantify in space and time the water footprint in a specified geographic area.
2. Assess the environmental, social and economic sustainability of this water footprint.
3. Formulate a response strategy.

Source: Water Footprint Network. The Water Footprint Assessment Manual: Setting the Global Standard.

Water intensity: Refers to the amount of water a company withdraws per a specific product unit or financial output. *Source: CEO Water Mandate. Corporate Water Disclosure Guidelines.*

Water neutral: A process, product, consumer, community or business is water neutral when:

1. Its water footprint has been reduced where possible, particularly in places with a high degree of water scarcity or pollution.
2. When the negative environmental, social and economic externalities of the remaining water footprint have been offset (compensated).

Source: Water Footprint Network. The Water Footprint Assessment Manual: Setting the Global Standard.

Water quality: Refers to the physical, chemical, biological and taste-related properties of water. *Source: CEO Water Mandate. Corporate Water Disclosure Guidelines.*

Water risks: Refers to the probability of an entity experiencing a detrimental water-related event. Water is felt differently by every sector of society and the organizations within them. Thus risk is defined and interpreted differently. Water risks can be grouped into three general categories: physical risks, regulatory risks, and reputational risks. *Source: Carbon Disclosure Project. Guidance for companies reporting on water on behalf of investors & supply chain members 2014: Water Questionnaire 2014.*

Water scarcity: Refers to the abundance, or lack thereof, of water supply. This is typically calculated as a ratio of human water consumption to available water supply in a given area. Water scarcity can be measured consistently across regions and over time. Water scarcity reflects the physical abundance of fresh water, rather than its availability for specific needs. For instance, a region may have abundant water supplies (and thus not be considered water scarce), but have such severe pollution that those supplies are unfit for human or ecological uses. *Source: Carbon Disclosure Project. Guidance for companies reporting on water on behalf of investors & supply chain members 2014: Water Questionnaire 2014.*

Water stewardship for business: Is a progression of increased improvement of water use and a reduction in water-related impacts of internal and value chain operations. It is a commitment to the sustainable management of shared water resources in the public interest through collective action with other business, governments, NGOs, and committees. *Source: World Wildlife Fund Brief. Water Stewardship. Perspectives on Business Risks and responses to water challenges.*

Water stress: Refers to the ability, or lack thereof, to meet human and ecological demand for water. It considers several physical aspects related to water resources, including water scarcity, but also water quality, environmental flows and accessibility (i.e., whether people are able to make use of available water supplies, which is often a function of infrastructure and the affordability of water, among other things). There are a variety of physical pressures related to water, such as flooding and aquatic habitat degradation, that are not included in the notion of water stress. Water stress has subjective elements and is assessed differently depending on societal values. For example, societies may have different thresholds for what constitutes sufficiently clean drinking water and thus assess stress differently. *Source: Carbon Disclosure Project. Guidance for companies reporting on water on behalf of investors & supply chain members 2014: Water Questionnaire 2014.*

Water usage: Use of water by human activity. *Source: International Organization for Standardization 14046: 2014: Water footprint – Principles, requirements, and guidelines.*

Water withdrawals: The sum of all water drawn into the boundaries of the company from all sources for any use over the course of a period. *Source: Carbon Disclosure Project. Guidance for companies reporting on water on behalf of investors & supply chain members 2014: Water Questionnaire 2014.*

APPENDIX B

Water assessment tools

This appendix lists several tools that are available for free to the public online that you may want to consider using for assessing your organization's water use. The WBCSD Global Water tool is one of the most commonly used by companies. It has been downloaded over 10,000 times and used by approximately 300 companies. It has been endorsed by the Global Reporting Initiative (GRI) and applauded by the Carbon Disclosure Project for its ability to assess corporate water-related risks, improve decision-making, shape water management plans, and strengthen communications with internal and external stakeholders on water issues.

Listed in alphabetical order:

Tool	Purpose	Characteristics	Output	Where to find
Alliance for Water Stewardship's (AWS) International Water Stewardship Standard (The Standard)	To help water users understand a site's exposure to water risk and develop a meaningful water stewardship strategy to mitigate them	A six-step continual improvement framework that enables sites to commit to, understand, plan, implement, evaluate and communicate water stewardship actions.	Customized and verifiable corporate water stewardship strategy that helps companies to: • Mitigate their water risks, • Address their shared water challenges in the catchment, and • Ensure that responsible water stewardship actions are in place to minimize negative impacts and maximize positive impacts for everyone.	http://allianceforwaterstewardship.org/aws-standard-system.html#aws-standard
Ceres Aqua Gauge	To identify steps to address risk effectively at a corporate level.	Comprehensive Excel-based assessment tool that evaluates an existing water strategy.	Holistic picture of existing strengths and weaknesses of company's water management approach.	http://www.ceres.org/issues/water/corporate-water-stewardship/aqua-gauge/downloads/aqua-gauge-tool/view
Ecolab and Trucost Water Risk Monetizer	To estimate water-related risks to your business in financial terms.	Looks at the amount of water available at a specific location, the amount of water used/needed by a facility, additional demands on the supply of water and the impact of a facility's water use on the watershed.	Water risk premium.	http://waterriskmonetizer.com/
Environmental Defense Fund (EDF) and Global Environmental Management Institute (GEMI) WaterMAPP	To build your own program to reduce water and energy use in buildings (e.g. cooling) and save money in the process.	Multi-tabbed, Excel-based spreadsheet with a Water Scorecard, Water Efficiency Calculator, and Cycles of Concentration Estimator.	• Water Scorecard: Assesses your water efficiency and creates visibility for water performance. • Water Efficiency Calculator: Estimates water and financial savings from cooling tower or free-air cooling improvements. • Cycles of Concentration Estimator: Looks at water quality and estimates recommended maximum Cycles of Concentration (COC - key indicator of cooling tower efficiency, when using chemicals to treat water), and identifies appropriate non-chemical water treatment options to increase the potential COC.	http://business.edf.org/projects/featured/water-efficiency-and-att/water-efficiency-toolkit-2/

Tool	Purpose	Characteristics	Output	Where to find
Global Environmental Management Initiatives (GEMI) Local Water Tool	To develop local water management plans.	• Evaluates your impacts, risks, opportunities and management plans related to water use and discharge at a specific site or operation. • Compatible with the WBCSD Global Water Tool.	A uniform approach between site assessments with a set of tools that you can use to sustainably manage water in your operations.	http://www.gemi.org/localwatertool/
Water Footprint Network (WFN) Water Footprint Assessment Tool	• To do a geographic and a production assessment. • To calculate your water footprint, impacts and risks. • To identify water-reduction opportunities.	• Geographic assessment: Focuses on the water footprint of a river basin or a country. • Production assessment: Focuses on a specific product for one or more facilities or for your entire company and supply chain.	Maps and tables that vary depending on which assessment is used.	http://www.waterfootprint.org/tool/home/
World Business Council for Sustainable Development (WBCSD) Global Water Tool	To identify facilities and suppliers in water-stressed river basins.	Mapping tool and a module that looks at water use, wastewater discharge, and facility information with validated watershed and country-level data based on ~30 external datasets.	Assessment of water stress related to water resource availability.	http://www.wbcsd.org/work-program/sector-projects/water/global-water-tool.aspx
World Resources Institute (WRI) Water Risk Atlas	To identify regions subject to water-related risks and opportunities.	Uses 12 local-level water risk indicators in a mapping tool for nine water-intense industries: agriculture, food and beverage, chemicals, electric power, semiconductor, oil and gas, mining, construction materials, and textiles.	High-resolution, customizable global maps of water risk.	http://www.wri.org/resources/maps/aqueduct-water-risk-atlas
World Resources Institute (WRI) Aqueduct Global Flood Analyzer	To estimate flood risks and to project climate and socioeconomic change impact for a specific geographic unit.	Measures river flood impacts by urban damage, affected GDP and affected population at the country, state and river basin scale across the globe.	Web-based interactive platform.	http://floods.wri.org
World Wildlife Fund (WWF) and KFW DEG Water Risk Filter	To quantify the potential water-related risks to your business.	Considers the risks to your business operations based on the river basins in which your facilities are located in around the world and your water management	Matrix of all basins and company/commodity risks for all the assessed facilities/commodities of your company. More granular assessment provided when you use the associated questionnaire to refine the inputs.	http://waterriskfilter.panda.org/

APPENDIX C

Other helpful tools

In this appendix, you will find the following resources:

A: Template you can use to do a water audit at your facilities

B: Guidance on how to read your water and sewer bills

C: Table you can use to identify possible ways to reuse water to meet the water quality and quantity needs of processes

D: Checklist you can use for tracking your water efficiency practices and identify opportunities

E: Table with recommendations of which sub-meters to get depending on their end use

F: Table that could be helpful when doing unit conversions

A: Sample Water Audit Template.

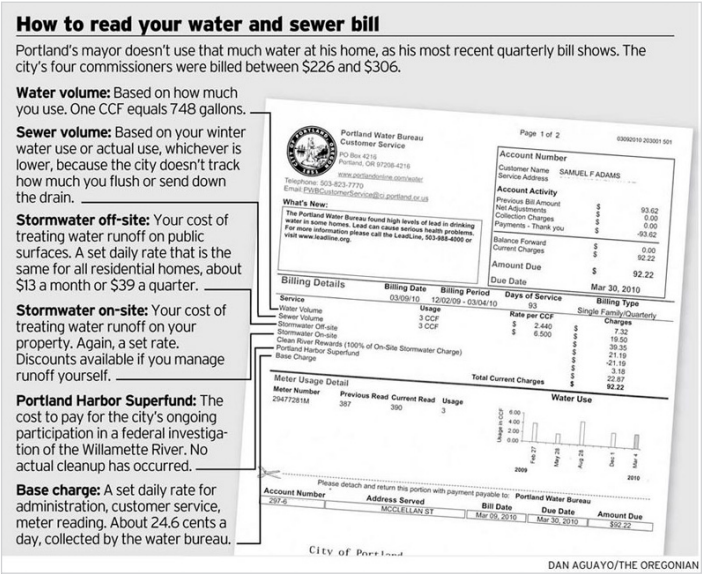
Environmental Defense Fund (EDF): http://business.edf.org/files/2014/03/Sample-Water-Audit-Forms.pdf

B: How to Read Your Water and Sewer Bill

An invoice for water and sewer use shows the volume of water coming in and going out of your business facility using the infrastructure provided by the local utility and/or municipality. Even though they don't measure the same thing, they are often included in the same bill. Figure 1 is a representation of a typical water and sewer bill. It shows common items you would find on your water statement. Further, explanation of specific items on your water bill can be found on the back of the water bill statement or on additional forms included with your water bill statement.

Source: Oregon Live. The Oregonian. Portland sewer, water rates lack third-party check. March 27th, 2010: http://media.oregonlive.com/portland_impact/photo/sewer1jpg-e89c7041e42c9af6.jpg

Figure 1. Water and sewer bill example



C. Table - Evaluating Water Reuse Potential

Process/ Operation	Water Need		Water Discharge	
	Volume	Quality	Volume	Quality
Cooling				
Boilers				
Restrooms				
Kitchen				
Landscape				
Process A				
Process B				
Process C				

Source: Environmental Protection Agency. Lean & Water Toolkit: Achieving Process Excellence through Water Efficiency. http://www2.epa.gov/lean-government/lean-water-toolkit

D. Water Efficiency Opportunity Checklist

Water Efficiency Opportunity Checklist	
Facility/Building:	**Date Prepared:**
Prepared by:	**Reviewed by:**

Water Efficiency Practice	Yes	No
1. Organizational Water Efficiency Practices		
a. Have you set water use reduction goals and targets for your facility?		
b. Are water meters installed on high water using processes, and are they working properly?		
c. Do you have easy ways for employees to suggest ideas for water efficiency improvements (e.g., suggestion boxes)?		
2. Cooling and Heating		
a. Has once-through cooling water been eliminated with the use of chillers, cooling towers, or air-cooled equipment?		
b. Has blow-down/bleed-off control on cooling towers and boilers been optimized?		
c. Is condensate being reused?		
d. Is treated wastewater (or other sources of water for cooling tower make-up) reused where possible?		
e. Are cycles of concentration for cooling towers maximized through efficient water treatment?		
f. Is a conductivity controller installed on each cooling tower?		
g. Have cooling towers been equipped with overflow alarms?		
h. Are high-efficiency drift eliminators in use?		
3. Restrooms and Kitchens		
a. Are water-efficient fixtures installed (e.g., WaterSense labeled faucets, toilets, urinals, and showerheads)? Are there signs on dual-flush toilets showing people how to use them?		
b. Have you installed metered or spring-loaded faucets, or faucets with sensors?		

Water Efficiency Practice	Yes	No
c. Have you adjusted plumbing to use the minimum amount of water that is functional?		
4. Process Use		
a. Have you installed timers to automatically shut off water flow when water is not required, such as at the end of a production cycle?		
b. Are solenoids and automatic shut-off valves checked regularly to ensure that they are working properly?		
c. Is equipment set to the minimum flow rates recommended by the manufacturer?		
d. Have pressure-reducing devices been installed on equipment that does not require high pressure?		
e. Can process equipment reuse water (closed loop) or use reclaimed water from other parts of the facility?		
f. Have you replaced water-based transportation with either waterless techniques or recycled water?		
g. Are signs posted near equipment encouraging employee awareness of water use, and discouraging tampering with equipment flow rate?		
5. Cleaning and Sanitation		
a. Are all hoses equipped with an automatic shut-off nozzle?		
b. Has process cleaning or facility cleaning been replaced with waterless techniques (i.e., using pressurized air to clean products or containers, sweeping debris off the floor) where possible?		
c. Are improved rinsing techniques used (counter-current systems, sequential use from high to lower quality needs, conductivity flow controls, improved spray nozzles/pressure rinsing, fog rinsing, etc.)?		
d. Is spent rinse-water being reclaimed and reused for lower-grade processes or for other facility applications?		
e. Have steps been taken to reduce the water used by steam sterilizers, such as jacket and chamber condensate cooling modification?		

Water Efficiency Practice	Yes	No
f. Are you using detergents that can easily be removed with little water?		
6. Landscaping and Irrigation		
a. Are low-flow sprinklers, trickle/drip irrigation, and optimized watering schedules in use?		
b. Are preventive maintenance techniques in place?		
c. Has your facility designed its landscape to consider the local climate and grouped plants by similar watering needs?		
d. Is grass planted only in places where it will provide optimal functional and aesthetic benefits?		
e. Are systems in place to capture and reuse rain water and storm water for landscaping, or for other uses (e.g., cooling tower make-up, process water, or dust suppression)?		
7. Leaks		
a. Are you conducting regular leak inspections?		
b. Are leaky faucets, faulty fittings, and broken pipes and hoses identified and repaired promptly?		
c. Are employees (including custodial crews) educated and empowered to identify leaks and point them out for repair?		
d. Is there a user-friendly method to report leaks?		

8. Comments:

9. Recommended Follow-Up Actions:[34]

Source: Environmental Protection Agency. Lean & Water Toolkit: Achieving Process Excellence through Water Efficiency: http://www2.epa.gov/lean-government/lean-water-toolkit

E. Table - Sub-metering Recommendations from EPA

Submeter Application	Recommendation
Tenant Spaces	Meter all tenant spaces individually.
Cooling Towers	Meter cooling tower make-up water and blowdown water supply lines. A single make-up meter and a single blowdown meter can record flows for multiple cooling towers if they are controlled with the same system. Separately controlled cooling towers should have separate make-up and blowdown water meters.
Heating, Ventilating, and Air Conditioning (HVAC) Systems	Individually or collectively meter HVAC systems with aggregate annual water use of 100,000 gallons or more or if the facility has 50,000 square feet or more of conditioned space. Metered systems should include evaporative coolers, humidifiers, mist cooling devices, and recirculating water systems with a fill water connection, such as chilled water, hot water, and dual temperature systems.
Steam Boilers	Meter the make-up water supply line to steam boilers with a rating of 500,000 British thermal units per hour (Btu/h) or greater. A single make-up meter can record flows for multiple boilers.
Single-Pass Cooling Systems	Meter any systems or equipment that use single-pass cooling water and do not use a chilled water system or closed-loop recirculation.
Irrigation	Meter irrigation systems that are automatically controlled.
Roof Spray Systems	Meter roof spray systems for irrigating vegetated roofs or thermal conditioning.
Ornamental Water Features	Meter make-up water supply lines for ornamental water features with a permanently installed water supply.
Pools and Spas	Meter make-up water supply lines for indoor and outdoor pools and spas.
Industrial Processes	Individually meter industrial processes consuming more than 1,000 gallons per day on average.
Alternative Water Sources	Meter water use from alternative water sources, such as gray water, rainwater, air handler or boiler condensate, or other sources discussed in *Section 8: Onsite Alternative Water Sources*.
Other Processes	Meter any other process with a projected annual water use of 100,000 gallons or more.

Source: Environmental Protection Agency. WaterSense at Work: Best Management Practices for Commercial and Institutional Facilities. 2012: http://www3.epa.gov/watersense/docs/ws-at-work_bmpcommercialandinstitutional_508.pdf

F. Table - Water Unit Conversions

Volume Unit Conversions					
Units	**Equivalent**				
	Liters (IL)	**Gallons (gal)**	**Cubic Feet (ft^3)**	**Cubic Meters (m^3)**	**Acre-Feet (ac-ft)**
Liters	1	0.2642	3.531×10^{-2}	0.0001	8.106×10^{-7}
Gallons	3.785	1	0.1337	3.785×10^{-3}	3.068×10^{-6}
Cubic Feet	28.32	7.481	1	2.832×10^{-3}	2.296×10^{-5}
Cubic Meters	1.000	264.2	35.31	1	8.106×10^{-4}
Acre-Feet	1.233×10^{6}	3.259×10^{5}	4.356×10^{4}	1,233	1

Source: Environmental Protection Agency. Lean & Water Toolkit: Achieving Process Excellence through Water Efficiency. http://www2.epa.gov/lean-government/lean-water-toolkit

APPENDIX D:

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