WATER RISK ASSESSMENT & STRATEGY

CLIENT: LENOVO GROUP LTD.

By: Dennis Lee and Felipe Raby Amadori

Academic Advisors: Dr. Deborah Gallagher and Dr. Lauren Patterson

April 24, 2020

Masters project submitted in partial fulfillment of the
requirements for the Master of Environmental Management degree in
the Nicholas School of the Environment of
Duke University

Table of Contents

Executive Summary

Access to high quality, reliable water is predicted to become more difficult in the coming decades. Increases in global water demand will only strain current water sources and exacerbate water scarcity. Therefore, it is critical for businesses to assess their water risks and implement better management practices. The objective of this project is to understand Lenovo's current water risk at the facility, supply chain, and regional management scale, and identify strategies to improve water risk management and disclosure practices.

Traditionally, businesses have focused on addressing water-related issues by managing internal use by adopting technologies and policies that improve water use efficiencies, yet risk varies by facility location and their water needs. Therefore, identifying the types of water risk a facility, and by extension, a company, may experience is critical for more effective and efficient management and planning. Lenovo's water risks were assessed using data from Lenovo's environmental data tracking tool, publicly available water risk assessment tools, and gathering all the data in a Tableau Dashboard to interactively visualize and explore risks at facilities. In FY 18/19, evaluations rated water consumption as a significant environmental aspect for the company; hence, Lenovo established an objective to maintain water withdrawal and wastewater generation variation within 5% of the previous year's usage at facility level. We found that Lenovo has made clear progress on reducing global water withdrawal and discharge per employee across their manufacturing and research and development facilities; nevertheless, there are facilities surpassing the 5% objective that require careful attention. Lenovo's facilities are spread throughout the globe and face different external risks to water security. Looking at external risk, the types of risks that facilities face varies considerably. Finally, we created four risk matrices to classify facilities for management prioritization by combining internal and external risks. Nine facilities were classified as High Priority in one or more of the risk matrices - seven in China, one in India, and one in Mexico.

We then sought to understand what options Lenovo has taken to mitigate risks at the facility and corporate level, as well as explore industry best-practices that may enhance risk mitigation. Industry best practices were identified by collecting and consolidating data from publicly available documents such as CDP reports, corporate sustainability reports, and environmental and water policies from industry peers. We found that many companies had similar water management practices. However, top performers such as HP Inc. and Samsung Electronics go beyond typical management practices such as reducing water use with water efficient fixtures and smart meters, by collaborating with other stakeholders within shared watersheds, such as municipal utilities, local communities, and NGOs.

One of Lenovo’s primary goals is to improve their CDP score. Historically their CDP score has varied from a B in 2017 to a C in 2018, which was upgraded to a B- in 2019. Our analysis of water disclosure practices concluded that Lenovo could improve their CDP score from a B- to a B without spending any additional resources by following the scoring criteria for each question provided by CDP.

However, after finding that Lenovo can maintain a B-/B score with its current practices, we aimed to further improve their CDP score. Analyzing current risks and practices in conjunction with CDP’s Scoring Methodology, opportunities to improve their score to an A-/A were revealed. Our analysis found that large capital expenditure was not required to attain a top score, rather improvements in monitoring and collaborating more closely with stakeholders and their supply chain would place Lenovo closer to a more favorable score. Additionally, improvements in practices such as estimating financial impacts, implementing board-level oversight, and developing a water policy would allow Lenovo to stand out to be a leader in water stewardship with minimal additional costs.

1 Introduction

Clean and reliable water sources are vital for industries and communities. The availability and accessibility of high-quality water varies over time and across the landscape. Water scarcity, where water demand exceeds physical water availability, affects five billion people at least one month of the year, with half a billion living in severe conditions yearlong (Mekonnen and Hoekstra, 2016).

Access to high quality, reliable water is predicted to become more difficult in the coming decades as global water demand increases, exacerbating scarcity. As stated by the Organization for Economic Co-operation and Development (OECD), water demand will rise by 55 percent, driven by the manufacturing sector (+400 percent), electricity generation (+140 percent), and domestic use (+130 percent) from 2000 to 2050. Billions more could experience water scarcity by 2025 (World Resources Institute, 2019) and the World Economic Forum in 2016 identified the water supply crisis as the greatest risk to society over the next decade.

Water scarcity fits under the broader umbrella of water stress, which considers availability, as well as whether the quality of the water is fit-for purpose and whether an entity has access to water. Not only is access to high quality, reliable water going to become increasingly challenging, new areas will struggle with flooding and sea level rise. Climate change coupled with inadequate urban planning concentrating valuable assets and cities on flood plains and unprotected coastlines, will increase the population at risk of floods from 1.2 billion to 1.6 billion between 2010 and 2050 (OECD, 2012).

With growing water scarcity and climate change predicted to only exacerbate water stress, it is vital for private sector organizations to understand water risk and pursue sustainable water practices (Hoekstra, 2014). For companies, increasing water scarcity alone could limit growth and have an impact in all levels of operations, especially companies in water-intensive sectors, or with operations, markets, and/or supply chains in water-stressed areas (Reig et al., 2013). Companies must consider for long-term planning and must make strategic decisions to ensure their water security and account for risks. There are three broad categories of water risk:

- **Physical**: The inability to use water due to quality characteristics or availability.
- **Regulatory**: Legal frameworks or governance policies that may lead to disruptions in water access.
- **Reputational**: Negative perceptions from customers and stakeholders due to real or perceived water management practices.

Traditionally, businesses have focused on addressing water-related issues by managing internal use by adopting technologies and policies that improve water use efficiencies. However, water risk at a location is a product of all the activity that occurs within a watershed or aquifer, much of it outside the control of any single business. Businesses would benefit from increased awareness of broader regional water activities and governance. Moreover, for many companies, most of their water use is embedded in their supply chain, which may be located throughout the world. Good water stewardship should not only consider internal operations but also expand to include evaluating and implementing plans across the entire supply chain (Hoekstra, 2014), including the health of water and sanitation utilities providing services to the business.

Since water risk is location-based, risk varies by facility location and their particular water needs. Therefore, identifying the types of water risk a facility, and by extension, a company, may experience is critical for more effective and efficient management and planning. Here, we took a comprehensive approach to assessing the risks, and potential management solutions, for Lenovo Group Ltd. based on the location of their facilities and supply chain.

2 Objectives

Lenovo Group Ltd. is a Chinese multinational technology company that sells products in 160 countries and has operations in more than 60 countries (Lenovo, n.d.). In 2016, a group of graduate students from Duke University's Nicholas School of the Environment assessed water risk associated with Lenovo's facilities and developed a water-management strategy. This project expands on the previous team's work by (1) further refining their methodology to explore water risk and (2) develop options to improve Lenovo's standing in corporate water stewardship as listed by their CDP (formerly known as Carbon Disclosure Project) score.

CDP is a global disclosure system that lets companies, cities, and states to measure and manage their environmental impacts. Companies that are transparent and/or make green investments can lower investor risk perception and are viewed more favorably by customers (Sciarelli et al., 2019; Accenture Strategy, 2018). As of 2010, CDP expanded beyond carbon disclosure to include water. The number of participating companies has grown from 174 in 2014 to 2,114 in 2018.

Objective 1: Water Risk Assessment

The goal is to determine the types of water risks and their locations to prioritize mitigation efforts. In doing so, we explored the following questions:

- **Is Lenovo's water demand changing and are they meeting current internal water management goals?** Lenovo has initiated internal water management policies and goals. Here, we explore how water demand has changed by facility over time and whether facilities are consistently meeting internal management goals (Section 5.2).
- **What are the external water risks for Lenovo?** Lenovo facilities and their supply chain face different types of risk based on their location. Here, we explore the physical, regulatory, and reputational risks at facility locations and across the supply chain (Section 5.3).

Objective 2: Improve Lenovo's water risk management and disclosure practices

- **Has Lenovo adopted industry best practices for water management?** Lenovo is seeking to continuously improve their water management and here we explore additional best management practices for water adopted by industry peers (Section 6).
- **How can Lenovo improve their CDP score?** Lenovo seeks to improve their CDP score to accurately reflect current practices. To do so, we provide step-by-step guidance, recommendations, and optimal example answers to effectively maximize Lenovo's CDP score (Section 7.2).

3 Data and Methods

3.1 Data

Lenovo provided facility level data from April 2014 to March 2019 that included: name (usually based on location), type – manufacturing (MFG), research & development (RD), large offices, small offices, and retail stores, number of employees, number and type of units produced, water withdrawal, water discharge, recycled water volume, water withdrawal cost, and water discharge cost. Data are organized by fiscal years (FY) that run from April to March. We refer to years based on the start of the FY, such that the FY running from April 2018 to March 2019 is simply referred to as 2018. Lenovo's supply chain list was obtained from Lenovo's website and corroborated by Lenovo, and the data from suppliers was obtained from each supplier's corporate website.

For benchmarking purposes, information on industry practices were collected and consolidated from publicly available documents such as CDP reports, corporate sustainability reports, and environmental and water policies from key competitors and partners. Other relevant information was obtained from Lenovo on operations, supply chain, and water management practices.

3.2 Methods

Total and per facility change in water-use were examined to understand changes and stability in water demand. When looking at more than one facility, the volumes of water use of the selected facilities were added and compared with the previous year. When comparing periods of more than one year, the total variation ((Volume_2 – Volume_1)/Volume_1) and the yearly average (total variation / (Year_2 – Year_1)) were determined.

Most of Lenovo's water usage is for domestic and/or irrigation purposes. We found that Lenovo's facilities water use is strongly correlated with the number of employees (Appendix C). As such, we normalized water withdrawals and discharge within facilities by the number of employees. When looking at more than one facility, the volumes of water withdrawal or discharge of the selected facilities were added and then divided by the total number of employees of those facilities. When comparing between years, the total variation per employee ((Volume_2 per employee – Volume_1 per employee)/Volume_1 per employee) and the yearly average (total variation per employee / (Year2 – Year1)) were determined.

Lenovo's MFG and RD facilities have higher water withdrawals and water use per employee, number of employees, and greater variability than other facility types (Figure 1 and Appendix A). Furthermore, Lenovo reports that office and retail water data are difficult to obtain due to shared meters and other metering issues. As such, we focused the analysis on MFG and RD facilities.

Water usage, consumption and production patterns, efficiency, and sustainability goals are a relevant part of a company's water management practices. However, effective water risk assessment and water management designs must consider the local context of each facility (Orr et al., 2011). There are several publicly available tools that estimate basin-level water risks. The most used water risk tools are the World Business Council for Sustainable Development's (WBCSD) Global Water Tool, the World Resources Institute's (WRI) Aqueduct tool, and the Worldwide Wildlife Fund-

German Investment and Development Corporation's (WWF-DEG) Water Risk Filter (South Pole Group 2017). The WBCSD Global Water Tool was not used because they decommissioned the tool in 2019 due to more advanced GIS-based public tools such as the WRI Aqueduct and the WWF Water Risk Filter (WBCSD, 2019). Thus, to assess water-related risks we used the WRI Aqueduct 3.0 tool and the WWF Water Risk Filter 5.0.

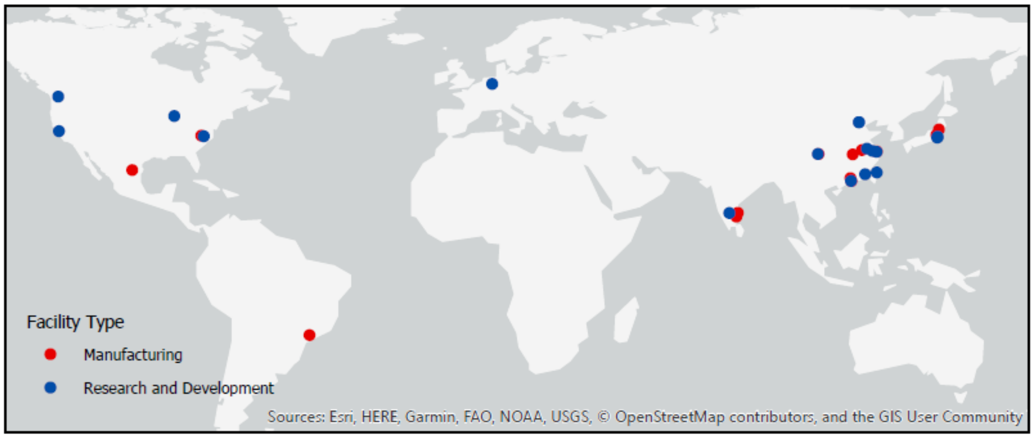


Figure 1 -2018 Lenovo MFG and RD facilities

The WRI Aqueduct 3.0 was introduced in 2011, and it is an online water risk mapping tool that utilizes a strong, peer reviewed methodology to estimate risk and is regularly updated with new data (Hofste et al., 2019). The WWF Water Risk Filter 5.0., launched in 2012, is an online tool developed by WWF and the German Development Finance Institution DEG to assess water-related risks across the globe using state-of-the-art water risk reports, maps, and basin information (Water Risk Filter, 2019).

WRI Aqueduct is the most used water risk tool for CDP reporting (South Pole Group, 2017) and is endorsed by CDP (Baghestani, 2017); therefore, it has become a primary tool for assessing water risk. WWF's Water Risk Filter indicators were used to complement information provided by WRI Aqueduct. Table 1 shows the indicators used to assess physical, regulatory, and reputational risk. Details on how all the indicators are calculated are provided in Appendix D.

Not only did we want to consider current risk, but future risk stemming from projected climate change and economic developments. We considered WRI Aqueduct's 2030's business as usual and pessimistic change in water stress, in addition to 2030's business as usual and pessimistic change in seasonal variability (Appendix D). WWF's Water Risk Filter's 2050 Projected Change in Drought Occurrence and 2050 Projected Change in Flood Occurrence are also described in Appendix D.

Finally, we considered, from WRI Aqueduct 3.0, the Aggregated Quantity, Quality, and Reputational and Regulatory indicators in addition to the Overall Water Risk Indicator.

Table 1 - Indicators used to assess Water Risk

Category	**Source**	**Indicator**
Physical – Quantity	WRI	Baseline water stress Baseline water depletion Inter-annual and seasonal variability Riverine and coastal flood risk Drought risk
	WWF	Estimated flood occurrence
Physical – Quality	WRI	Untreated connected wastewater Eutrophication potential risk
	WWF	Surface water contamination index
Regulatory	WRI	Peak RepRisk Country ESG
	WWF	Enabling Environment index Institutions and governance index Management instruments index Financing for water resource development and management index
Reputational	WRI	Unimproved/No Drinking Water index Unimproved/no sanitation index
	WWF	Biodiversity importance index Media scrutiny index Trust & conflict index

Lenovo reports that it currently works with 57 suppliers and 251 locations distributed across nine countries: six in North America, one in South America, and fifty in Asia. To analyze the water risk embedded in their supply chain, it is crucial that companies map the water risk of their suppliers to know whether they are relying on products or services that come from watersheds or regions with high water risk (WWF, 2015). To identify Lenovo's suppliers that are in water-stressed locations, we used the Overall Water Risk Indicator of the WRI Aqueduct 3.0 tool to map water risks in Lenovo's physical supply chain.

The aggregation of the Water Risk Indicators is done by the WRI Aqueduct 3.0 tool by taking a weighted average of the indices that belong to each subgroup. WRI Aqueduct considers a default set of indicator weights, which was determined by staff water experts based on intensive questionnaires combined with controlled opinion feedback, and industry-specific weighting schemes that considers how specific industries are exposed to different aspects of water risk (Hofste et al., 2019). Lenovo primarily uses water for domestic purposes since its operations do not include any wet processes; therefore, we assigned the Default Weight configuration for their facilities. For their supply chain, we utilized the Semiconductor Industry Weight configuration, which considers the relative importance water quality has in the semiconductor industry, especially when water is used for manufacturing processes (Appendix D).

3.2.1 Data Dashboard

A user-friendly interactive dashboard was created using Tableau 2020.1 to visualize internal demand management and external water risk results for facilities and the supply chain (Appendix B). The dashboard includes only the data from the thirty MFG and RD facilities active in 2018 to provide consistent and meaningful comparison of changes in water withdrawal and discharge over time. The dashboard contains five tabs:

- Water Usage: Explores withdrawal and discharge volume and variation data for a given year.
- Water Usage Time Series: Explores the evolution water usage for a selected period.
- Recycled Water Time Series: Explores the evolution of recycled water data.
- Water Risk Result: Presents the results of the Water Risk Tools Indices for Lenovo's facilities.
- Suppliers Water Risk Results: Presents the results of the Overall Water Risk Index for Lenovo's suppliers.

4 Lenovo’s Current Water Management Practices

4.1 Internal Water Management

Lenovo recognizes water quality and availability as an important environmental public policy issue and is committed to proactively protect the environment and conserve natural resources. As part of their environmental policy, Lenovo instructs all employees and contractors to conserve natural resources and proactively protect the environment by adopting sustainable management practices (Lenovo, 2016). This policy applies to all Lenovo operations and is the foundation of Lenovo’s Environmental Management System (EMS).

High quality freshwater is vital for Lenovo’s internal operations and the operations of its supply chain; thus, water management, risks, and opportunities are evaluated annually as part of Lenovo’s Enterprise Risk Management evaluation and International Organization for Standardization (ISO) 14001 EMS evaluations. Lenovo's Chief Corporate Responsibility Officer reports to the Board twice annually on climate and other Environmental, Social and Governance issues. However, water issues are not specifically reported to the Board, though they are informed of water performance when reviewing their Sustainability Report.

In FY 18/19, evaluations rated water consumption as a significant environmental aspect for the company; hence, Lenovo established an objective to maintain water withdrawal and wastewater generation variation within 5% of the previous year’s usage at each MFG, RD, and Large Office facilities. Lenovo’s facilities obtain water only from municipal utilities primarily for employee consumption, heating, ventilating, and air conditioning (HVAC) systems, and landscape irrigation. Several of Lenovo’s facilities must comply periodically with local municipal water restrictions, in addition to water laws and regulations.

Lenovo factories, research & development sites, and offices have adequate water supply, sanitation, and hygiene for their employees. Water quality and supply is audited internally and externally as part of Lenovo's ISO 14001 EMS. Water management for each facility is included in their operational controls and procedures, including prevention plans and water conservation measures. Moreover, water conserving features and green building certification projects are included in Lenovo's evaluation of potential real estate projects.

None of Lenovo's operations have any wet processes, allowing Lenovo to discharge wastewater through local sewage utilities. Each Lenovo facility has local controls and procedures to prevent accidental or unauthorized discharges or spills to wastewater systems or water bodies. The company currently tracks water withdrawal, discharge, and recycled water for 100% of MFG facilities, 100% of RD facilities, 69% of large offices, 7.2% of small offices, and 100% of retail stores.

4.1.1 Current Global Water Usage

In 2018, Lenovo had 170 facilities operating in 6 continents, 50 countries, and 109 cities, withdrawing 1.39 million cubic meters (Mm^3) of water. This was a 0.45% increase compared to 2017, meeting their 5% global withdrawal objective. MFG and RD facilities accounted for 94% of withdrawals. These facilities increased withdrawals by 1.47% from 2017-2018, while the remainder of other facilities decreased withdrawals by 13.5% (Figure 2).

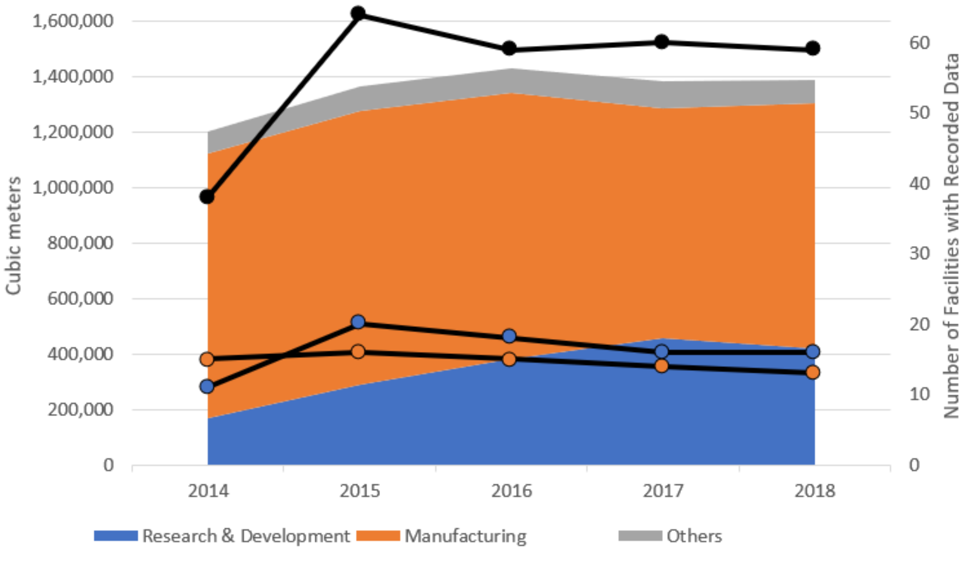


Figure 2 - Lenovo global water withdrawal

4.1.2 Facility Level Analysis

The results for each facility and analysis can be explored and visually engaged using the Dashboard.

In 2018, three facilities in China (MFG 13, MFG 3, and RD 2) accounted for more than 60% total withdrawals and discharge of MFG and RD facilities. Nineteen facilities (63%) met Lenovo's water withdrawal annual variation goal of 5% between 2017 and 2018. Nine facilities, five MFG and four RD, exceeded the 5% goal

From 2014 to 2018, the twelve MFG facilities active on that period increased their total water withdrawal and discharge by 21.1% and 16.1% respectively (yearly average of 5.3% and 4.01% respectively). The seven RD facilities operating from 2014 to 2018 had an increase of 32.3% in withdrawals and 27.2% in discharge (yearly average of 8.1% and 6.8% respectively).

Normalized by the number of employees, the facilities with the biggest water withdrawal and discharge were MFG 7 in Japan, and the MFG 11, MFG 10, and RD 16 in China (Dashboard, Water Usage Tab). Globally, water withdrawal and discharge per employee remained relatively constant from 2014-2018 with a total increase of 4.6% and 2.3% respectively (yearly average increase of 1.2% and 0.6% respectively). However, there was large variation within facilities. Ten facilities exceeded the water withdrawal variation goal of 5% from 2017 to 2018, while nine facilities exceeded the 5% goal for discharge per employee (Figure 3).

Lenovo has made clear progress on reducing global water withdrawal and discharge per employee across their MFG and RD facilities. Nevertheless, there are facilities that are not meeting the 5% increase threshold that require careful attention. A detailed analysis of why this is happening should be conducted. One of the many reasons could be that there are inconsistencies in the data. For example, the RD 15 site has had relatively constant water withdrawal amounts in the order of 11 m^3/employee/year during three out of the four registered periods. Yet, in period 2017, the facility reported a water withdrawal per employee of approximately 50% of the other periods, resulting in a water withdrawal variation around 100% between 2017 and 2018 (Dashboard, Water Usage Tab). Discharge per employee shows similar data. Another example of data inconsistency is seen at the MFG 12 site. Between the period 2017 and 2018, there is a significant increase in water withdrawal but at the same time a considerable decrease in water discharge per employee (Dashboard, Water Usage Time Series Tab).

© 2020 Mapbox © OpenStreetMap

Figure 3 - Map of Water Withdrawal per Employee Variation from 2017 to 2018. Green facilities meet 5% variation goal. Red facilities do not meet 5% variation goal.

There are several facilities that are recycling water for irrigation and HVAC systems. This is an important water efficiency measure that can reduce water withdrawal amounts and generate financial savings. Water data from 2014 to 2018 shows an increase in recycled water use from one facility (RD 8) with 18.5 m^3/yr. in 2014 to a peak of 39.035 m^3/yr in 2017 distributed among four facilities. The proportion of water recycled per facility has varied from 0.14% (RD 8) to as much as 80% (MFG 2). Again, data quality remains a challenge for interpreting trends. In 2016, RD 3 and MFG 5 stopped reporting recycled water and RD 2 stopped reporting in 2017. We could not tell if this is a data error or because they are no longer using recycled water. Similarly, RD 1 facility reported recycling 170% of its water withdrawal from 2015 to 2018, which could be a data error as well (Dashboard, Recycled Water Time Series Tab).

4.1.3 Supply Chain Management

Lenovo maintains a minimal supply chain with the objective of controlling procurement spending and concentrating on corporate social responsibility efforts. Lenovo's suppliers participate in validation programs to ensure strong and industry-standard sustainability programs and reporting. Suppliers' performance is integrated in Lenovo's Supplier Sustainability Scorecard to promote and encourage suppliers' compliance within their operations. Lenovo evaluates supplier performance, provides regular feedback, and engages suppliers in quarterly business reviews and several events, meetings, and conferences. Evaluations and activities are used as the basis of business relationships improvement, standards compliance, and determining future business volume variation. Suppliers are requested to inform their environmental impact data through the Responsible Business Alliance (RBA) or the Carbon Disclosure Project (CDP) reporting platforms. Within Lenovo's list of suppliers, 80% have public water and discharge reduction goals, 92% are ISO 14001 certified, 72% formally disclose to CDP, and Lenovo reported an increase of over 200% in water recycling within their entire supply chain.

5 Water Risk Assessment

5.2 Lenovo Water Risk Assessment

5.2.1 Aggregated Water Risk Scores

The WRI Aqueduct 3.0 Tool considers three indicators that are the aggregation of all its indices: Physical Risk Quantity, Physical Risk Quality, and Regulatory and Reputational Risk. Moreover, it includes an Overall Water Risk Index which is a weighted average of the aggregated indices. Aggregate scores depend on the weighting scheme selected and are meant to serve as an initial approach to assessing water risk at each facility. Careful analysis of all indices under each category for every facility is critical for acquiring information needed when planning water management programs at each facility.

Nine facilities in three countries were labeled as High or Extremely High overall water risk (India, China, and Mexico) and eight facilities (seven in China and one in Brazil) were labeled as Medium-High risk (Table 2).

Table 2 - Aggregated Water Risk Indices

Country or Region	Minor Basin (WRI Aqueduct3.0)	Facility	Overall Water Risk	Quality Risk	Quantity Risk	Regulatory and Reputational Risk
Brazil	Tiete 2	MFG 5	🟨	🟨	🟨	🟧
China	Bai He	RD 2	🟥	🟨	🟥	🟨
		RD 3	🟥	🟨	🟥	🟨
	Chang Jiang	RD 9	🟨	🟧	🟨	🟨
	Chao Hu	MFG 3	🟧	🟧	🟧	🟨
	China Coast 7	MFG 11	🟨	🟨	🟨	🟨
		RD 12	🟨	🟨	🟨	🟨
	China Coast 9	MFG 4	🟨	🟧	🟢	🟧
	Dongting Hu	MFG 13	🟨	🟧	🟢	🟧
	Jinlong Jiang	RD 16	🟨	🟧	🟢	🟨
	Lake Tail Hu	MFG 10	🟨	🟨	🟧	🟨
		RD 11	🟧	🟨	🟧	🟨
		RD 15	🟧	🟨	🟧	🟨
	Min Jiang 2	RD 4	🟢	🟧	🟩	🟨
	Tuo Jiang	MFG 1	🟢	🟧	🟩	🟧
Germany	Rhine 1	RD 7	🟩	🟩	🟢	🟩
India	India East Coast	MFG 2	🟥	🟥	🟥	🟧
	Ponnaivar	MFG 9	🟥	🟥	🟥	🟧
		RD 1	🟥	🟥	🟥	🟧
Japan	Ara-kawa / Tama-gawa	RD 14	🟢	🟢	🟧	🟩
	Mogami-gawa	MFG 8	🟩	🟩	🟨	🟩
	Sagami-gawa	RD 17	🟢	🟢	🟧	🟩
	Watarase-gawa / Tone-gawa	MFG 7	🟢	🟩	🟧	🟩
Mexico	Bravo / San Juan	MFG 6	🟧	🟢	🟥	🟢
Taiwan	Tamsui River	RD 13	🟢	🟨	🟨	🟩
United States	Chicago	RD 5	🟢	🟢	🟨	🟩
	Coyote	RD 10	🟩	🟢	🟢	🟩
	Haw	MFG 12	🟢	🟩	🟧	🟢
	Lake Washington	RD 6	🟢	🟢	🟨	🟩
	Upper Neuse	RD 8	🟢	🟩	🟧	🟢

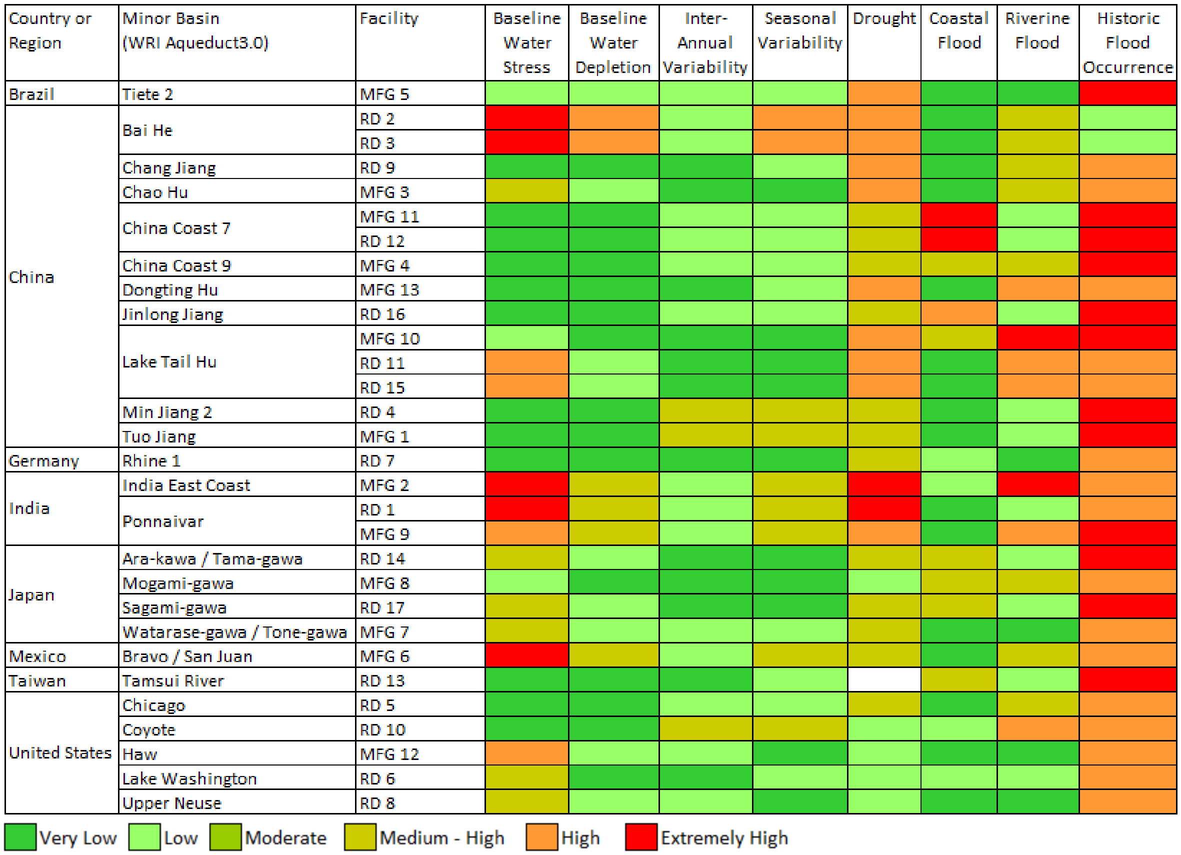
🟩 Very Low 🟢 Low ▨ Moderate 🟨 Medium - High 🟧 High 🟥 Extremely High

The aggregated scores show that water quantity tends to be the greatest risk factor for most facilities, with the exception of two facilities in Chengdu, where water quality was the highest risk factor (Table 2).

5.2.2 Physical Quantity Risk

Baseline Water Stress, Drought, and Historic Flood Occurrence where the highest scoring physical quantity risks among Lenovo’s facilities (Table 3). The Beijing facilities were labeled High or Extremely High risk in four of the eight quantity indices. Three facilities in India were considered with relatively higher quantity risk scores. 93% of the facilities were labeled as High or Very High risk in WWF – Historic Flood Occurrence. This index is based on historical and geographical context indicator, while WRI models risk on the specific location of each facility. Both provide useful and complementing information about the impact of floods on the facility and the area where it is operating. Aside from Historic Flood Occurrence, drought was the most widespread quantity risk among facilities.

Table 3 - Physical Quantity Risk Indices



Country or Region	Minor Basin (WRI Aqueduct3.0)	Facility	Baseline Water Stress	Baseline Water Depletion	Inter-Annual Variability	Seasonal Variability	Drought	Coastal Flood	Riverine Flood	Historic Flood Occurrence
Brazil	Tiete 2	MFG 5	🟢	🟢	🟢	🟢	🟧	🟩	🟩	🟥
China	Bai He	RD 2	🟥	🟧	🟢	🟧	🟧	🟩	🟨	🟢
		RD 3	🟥	🟧	🟢	🟧	🟧	🟩	🟨	🟢
	Chang Jiang	RD 9	🟩	🟩	🟩	🟢	🟧	🟩	🟨	🟧
	Chao Hu	MFG 3	🟨	🟢	🟩	🟩	🟧	🟩	🟨	🟧
	China Coast 7	MFG 11	🟩	🟩	🟢	🟢	🟨	🟥	🟢	🟥
		RD 12	🟩	🟩	🟢	🟢	🟨	🟥	🟢	🟥
	China Coast 9	MFG 4	🟩	🟩	🟢	🟢	🟨	🟨	🟨	🟥
	Dongting Hu	MFG 13	🟩	🟩	🟩	🟢	🟧	🟩	🟧	🟧
	Jinlong Jiang	RD 16	🟩	🟩	🟢	🟢	🟨	🟧	🟢	🟥
	Lake Tail Hu	MFG 10	🟢	🟩	🟩	🟩	🟧	🟨	🟥	🟥
		RD 11	🟧	🟢	🟩	🟩	🟧	🟩	🟧	🟧
		RD 15	🟧	🟢	🟩	🟩	🟧	🟩	🟧	🟧
	Min Jiang 2	RD 4	🟩	🟩	🟨	🟨	🟨	🟩	🟢	🟥
	Tuo Jiang	MFG 1	🟩	🟩	🟨	🟨	🟨	🟩	🟢	🟥
Germany	Rhine 1	RD 7	🟩	🟩	🟩	🟩	🟨	🟢	🟩	🟧
India	India East Coast	MFG 2	🟥	🟨	🟢	🟨	🟥	🟢	🟥	🟧
	Ponnaivar	RD 1	🟥	🟨	🟢	🟨	🟥	🟩	🟢	🟧
		MFG 9	🟧	🟨	🟢	🟨	🟧	🟩	🟧	🟥
Japan	Ara-kawa / Tama-gawa	RD 14	🟨	🟢	🟩	🟩	🟨	🟨	🟢	🟥
	Mogami-gawa	MFG 8	🟢	🟩	🟩	🟩	🟢	🟨	🟨	🟧
	Sagami-gawa	RD 17	🟨	🟢	🟩	🟩	🟨	🟨	🟢	🟥
	Watarase-gawa / Tone-gawa	MFG 7	🟨	🟢	🟢	🟢	🟨	🟩	🟩	🟧
Mexico	Bravo / San Juan	MFG 6	🟥	🟨	🟢	🟨	🟨	🟩	🟨	🟧
Taiwan	Tamsui River	RD 13	🟩	🟩	🟩	🟢		🟨	🟢	🟥
United States	Chicago	RD 5	🟩	🟩	🟢	🟢	🟨	🟩	🟨	🟧
	Coyote	RD 10	🟩	🟩	🟨	🟨	🟢	🟢	🟧	🟧
	Haw	MFG 12	🟧	🟢	🟢	🟩	🟢	🟩	🟩	🟧
	Lake Washington	RD 6	🟨	🟩	🟩	🟢	🟢	🟢	🟢	🟧
	Upper Neuse	RD 8	🟨	🟢	🟢	🟩	🟢	🟩	🟩	🟧

🟩 Very Low 🟢 Low ▨ Moderate 🟨 Medium - High 🟧 High 🟥 Extremely High

5.2.3 Physical Quality Risk

All facilities scored High or Extremely High on at least one indicator (Table 4). Facilities in China and India all had High or Extremely High risk for untreated wastewater in streams and rivers; whereas, facilities in Germany, Japan, Taiwan, and the US were labeled as Low risk. The Eutrophication Potential is a more widespread risk with seventeen sites in six countries deemed as High or Extremely High risk. The same was observed in the Surface Water Contamination index where only five sites were deemed Low or Moderate risk.

Table 4 - Physical Quality Risk Indices

Country or Region	Minor Basin (WRI Aqueduct3.0)	Facility	Untreated Connected Wastewater	Coastal Eutrophication Potential	Surface Water Contamination
Brazil	Tiete 2	MFG 5	🟨	🟢	🟧
China	Bai He	RD 2	🟧	🟢	🟧
		RD 3	🟧	🟢	🟧
	Chang Jiang	RD 9	🟧	🟧	🟧
	Chao Hu	MFG 3	🟧	🟧	🟥
	China Coast 7	MFG 11	🟧	🟩	🟡
		RD 12	🟧	🟩	🟡
	China Coast 9	MFG 4	🟧	🟧	🟡
	Dongting Hu	MFG 13	🟧	🟧	🟧
	Jinlong Jiang	RD 16	🟧	🟧	🟧
	Lake Tail Hu	MFG 10	🟧	🟢	🟧
		RD 11	🟧	🟢	🟧
		RD 15	🟧	🟢	🟧
	Min Jiang 2	RD 4	🟧	🟧	🟧
	Tuo Jiang	MFG 1	🟧	🟧	🟧
Germany	Rhine 1	RD 7	🟩	🟧	🟧
India	India East Coast	MFG 2	🟥	🟥	🟡
	Ponnaivar	RD 1	🟥	🟧	🟥
		MFG 9	🟥	🟧	🟧
Japan	Ara-kawa / Tama-gawa	RD 14	🟢	🟥	🟧
	Mogami-gawa	MFG 8	🟢	🟩	🟧
	Sagami-gawa	RD 17	🟢	🟥	🟧
	Watarase-gawa / Tone-gawa	MFG 7	🟢	🟩	🟧
Mexico	Bravo / San Juan	MFG 6	🟢	🟨	🟥
Taiwan	Tamsui River	RD 13	🟢	🟥	🟧
United States	Chicago	RD 5	🟩	🟧	🟥
	Coyote	RD 10	🟩	🟥	🟧
	Haw	MFG 12	🟩	🟢	🟧
	Lake Washington	RD 6	🟩	🟧	🟢
	Upper Neuse	RD 8	🟩	🟢	🟧

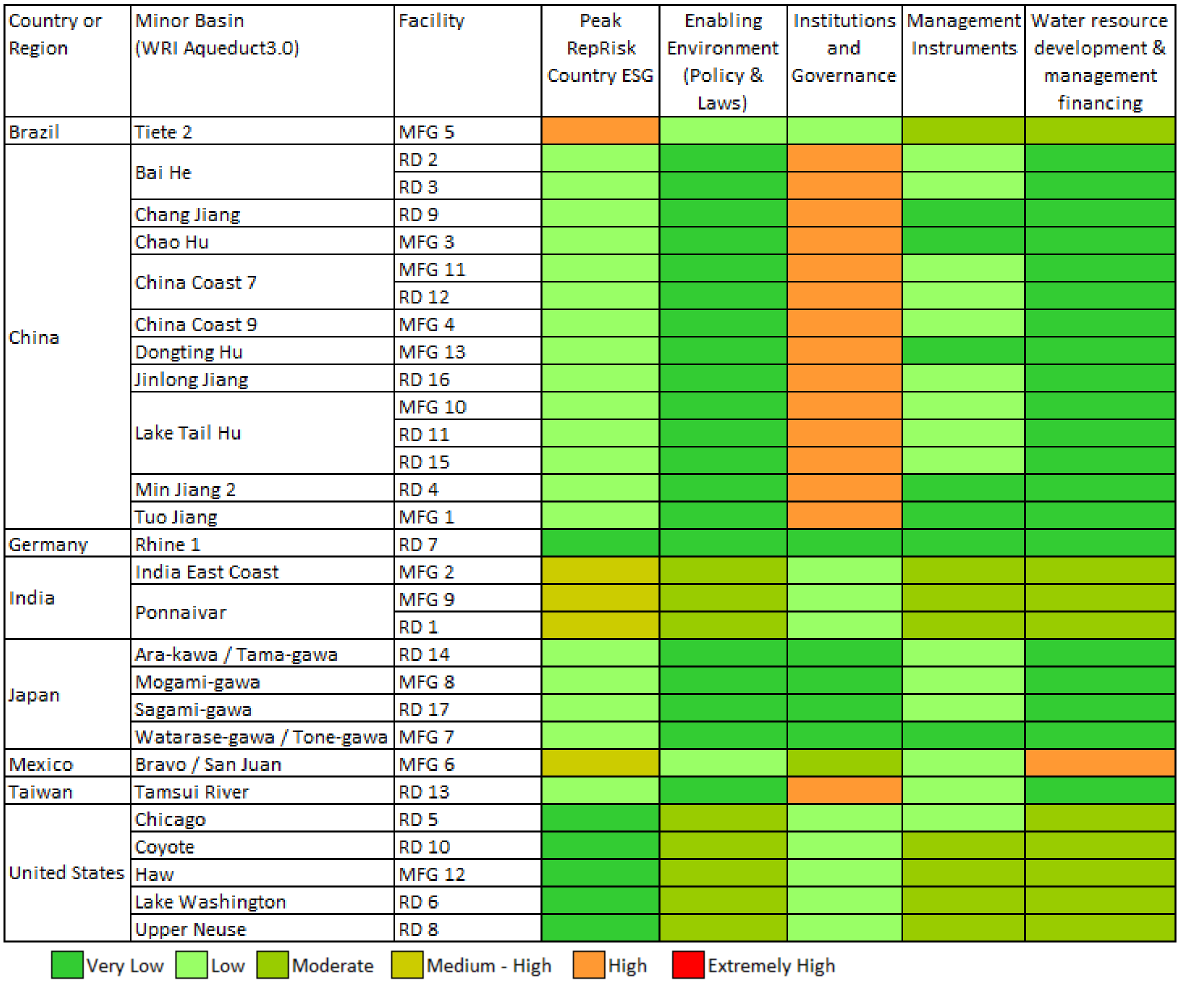
🟩 Very Low 🟢 Low 🟡 Moderate 🟨 Medium - High 🟧 High 🟥 Extremely High

5.2.4 Regulatory Risk

Facilities in Taiwan and China scored high risk in the Institutions and Governance Index. In the other four indices, Lenovo's facilities were at low to moderate risk except for MFG 5 (Brazil) in the

Peak RepRisk Country ESG index and MFG 6 (Mexico) in the Water resource development and management financing index. (Table 5).

Table 5 - Regulatory Risk Indices



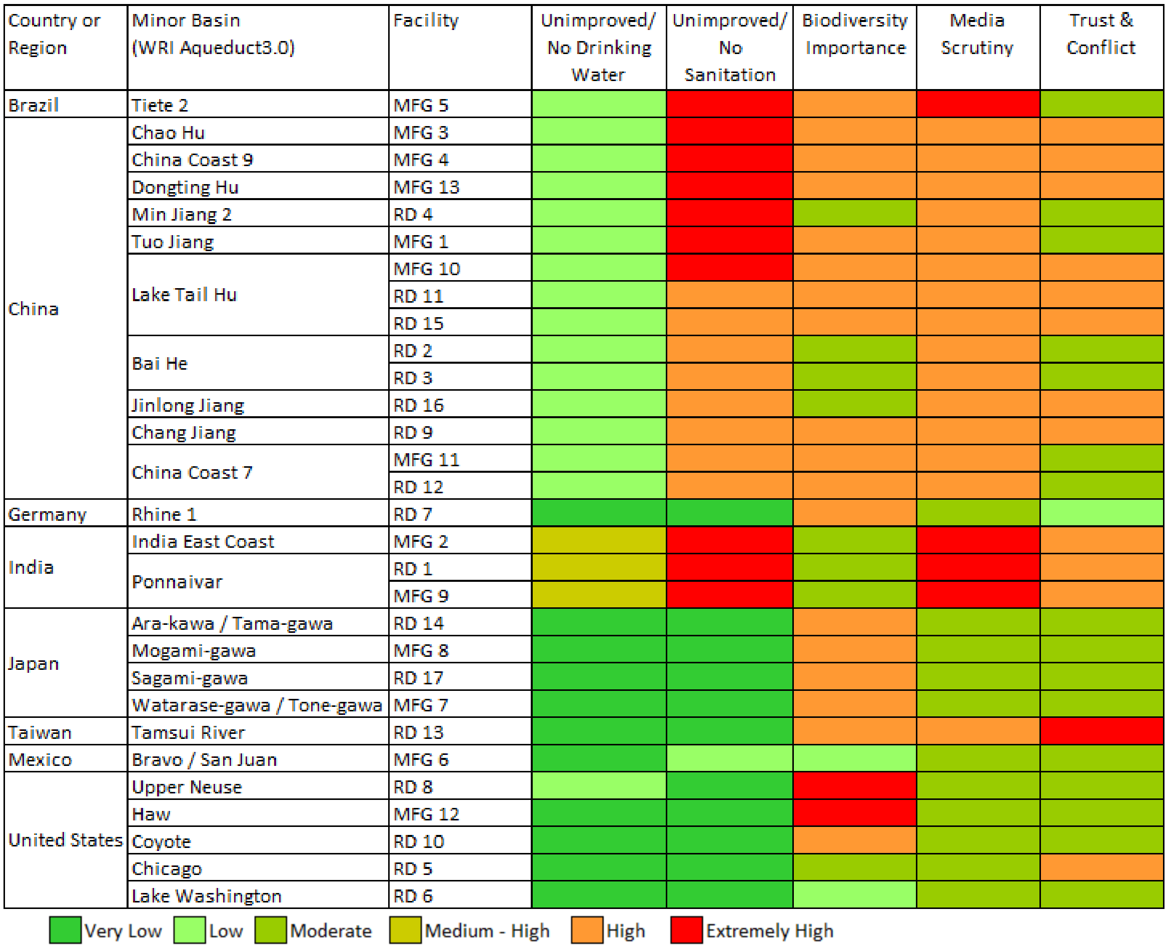
Country or Region	Minor Basin (WRI Aqueduct3.0)	Facility	Peak RepRisk Country ESG	Enabling Environment (Policy & Laws)	Institutions and Governance	Management Instruments	Water resource development & management financing
Brazil	Tiete 2	MFG 5	High	Low	Low	Moderate	Moderate
China	Bai He	RD 2	Low	Very Low	High	Low	Very Low
		RD 3	Low	Very Low	High	Low	Very Low
	Chang Jiang	RD 9	Low	Very Low	High	Very Low	Very Low
	Chao Hu	MFG 3	Low	Very Low	High	Very Low	Very Low
	China Coast 7	MFG 11	Low	Very Low	High	Low	Very Low
		RD 12	Low	Very Low	High	Low	Very Low
	China Coast 9	MFG 4	Low	Very Low	High	Low	Very Low
	Dongting Hu	MFG 13	Low	Very Low	High	Very Low	Very Low
	Jinlong Jiang	RD 16	Low	Very Low	High	Low	Very Low
	Lake Tail Hu	MFG 10	Low	Very Low	High	Low	Very Low
		RD 11	Low	Very Low	High	Low	Very Low
		RD 15	Low	Very Low	High	Low	Very Low
	Min Jiang 2	RD 4	Low	Very Low	High	Very Low	Very Low
	Tuo Jiang	MFG 1	Low	Very Low	High	Very Low	Very Low
Germany	Rhine 1	RD 7	Very Low	Very Low	Very Low	Very Low	Very Low
India	India East Coast	MFG 2	Medium - High	Moderate	Low	Moderate	Moderate
	Ponnaivar	MFG 9	Medium - High	Moderate	Low	Moderate	Moderate
		RD 1	Medium - High	Moderate	Low	Moderate	Moderate
Japan	Ara-kawa / Tama-gawa	RD 14	Low	Very Low	Very Low	Low	Very Low
	Mogami-gawa	MFG 8	Low	Very Low	Very Low	Low	Very Low
	Sagami-gawa	RD 17	Low	Very Low	Very Low	Low	Very Low
	Watarase-gawa / Tone-gawa	MFG 7	Low	Very Low	Very Low	Very Low	Very Low
Mexico	Bravo / San Juan	MFG 6	Medium - High	Low	Moderate	Low	High
Taiwan	Tamsui River	RD 13	Low	Very Low	High	Low	Very Low
United States	Chicago	RD 5	Very Low	Moderate	Low	Low	Moderate
	Coyote	RD 10	Very Low	Moderate	Low	Moderate	Moderate
	Haw	MFG 12	Very Low	Moderate	Low	Moderate	Moderate
	Lake Washington	RD 6	Very Low	Moderate	Low	Moderate	Moderate
	Upper Neuse	RD 8	Very Low	Moderate	Low	Moderate	Moderate

Very Low Low Moderate Medium - High High Extremely High

5.2.5 Reputational Risk

Four of the five reputational indices have at least 43% of the facilities labeled as High or Extremely High risk. Brazil, China, Taiwan, and India have the most facilities labeled as High or Extremely High Reputational risk. The Biodiversity Importance index is the most widespread High risk among Lenovo's facilities (Table 6).

Table 6 - Reputational Risk Indices



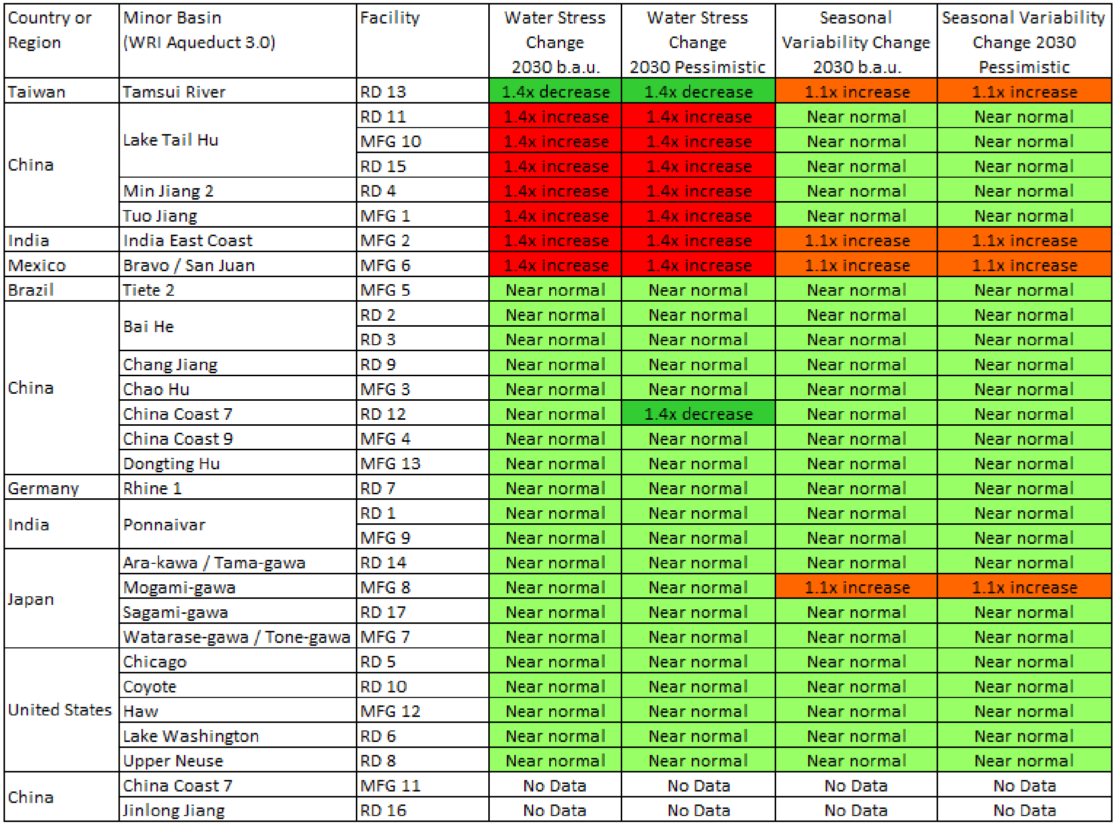
Country or Region	Minor Basin (WRI Aqueduct3.0)	Facility	Unimproved/ No Drinking Water	Unimproved/ No Sanitation	Biodiversity Importance	Media Scrutiny	Trust & Conflict
Brazil	Tiete 2	MFG 5	🟢	🟥	🟧	🟥	🟡
China	Chao Hu	MFG 3	🟢	🟥	🟧	🟧	🟧
	China Coast 9	MFG 4	🟢	🟥	🟧	🟧	🟧
	Dongting Hu	MFG 13	🟢	🟥	🟧	🟧	🟧
	Min Jiang 2	RD 4	🟢	🟥	🟡	🟧	🟡
	Tuo Jiang	MFG 1	🟢	🟥	🟧	🟧	🟡
	Lake Tail Hu	MFG 10	🟢	🟥	🟧	🟧	🟧
		RD 11	🟢	🟧	🟧	🟧	🟧
		RD 15	🟢	🟧	🟧	🟧	🟧
	Bai He	RD 2	🟢	🟧	🟡	🟧	🟡
		RD 3	🟢	🟧	🟡	🟧	🟡
	Jinlong Jiang	RD 16	🟢	🟧	🟡	🟧	🟧
	Chang Jiang	RD 9	🟢	🟧	🟧	🟧	🟧
	China Coast 7	MFG 11	🟢	🟧	🟧	🟧	🟡
		RD 12	🟢	🟧	🟧	🟧	🟡
Germany	Rhine 1	RD 7	🟩	🟩	🟧	🟡	🟢
India	India East Coast	MFG 2	🟨	🟥	🟡	🟥	🟧
	Ponnaivar	RD 1	🟨	🟥	🟡	🟥	🟧
		MFG 9	🟨	🟥	🟡	🟥	🟧
Japan	Ara-kawa / Tama-gawa	RD 14	🟩	🟩	🟧	🟡	🟡
	Mogami-gawa	MFG 8	🟩	🟩	🟧	🟡	🟡
	Sagami-gawa	RD 17	🟩	🟩	🟧	🟡	🟡
	Watarase-gawa / Tone-gawa	MFG 7	🟩	🟩	🟧	🟡	🟡
Taiwan	Tamsui River	RD 13	🟩	🟩	🟧	🟧	🟥
Mexico	Bravo / San Juan	MFG 6	🟩	🟢	🟢	🟡	🟡
United States	Upper Neuse	RD 8	🟢	🟩	🟥	🟡	🟡
	Haw	MFG 12	🟩	🟩	🟥	🟡	🟡
	Coyote	RD 10	🟩	🟩	🟧	🟡	🟡
	Chicago	RD 5	🟩	🟩	🟡	🟡	🟧
	Lake Washington	RD 6	🟩	🟩	🟢	🟡	🟡

🟩 Very Low 🟢 Low 🟡 Moderate 🟨 Medium - High 🟧 High 🟥 Extremely High

5.2.6 Water Risk Projections

Considering the WRI indicators, there is no significant difference between business as usual (b.a.u.) and pessimistic scenarios with most metrics remaining similar to today. There are five facilities in China, one in India, and one in Mexico predicted to experience an increase in water stress by the year 2030. This is most problematic for India's MFG 2 because it is already labeled as Extremely High Risk under the Water Stress Index, and for RD 11 and RD 15 sites, which were labeled as High Water Stress Risk (Table 3, Table 7). With regard to WWF indicators, most sites are projected to experience an increase in drought and flood occurrence probability due to climate change, agreeing with climate change predictions that water distribution will become more extreme in a warming climate.

Table 7 - WRI Aqueduct 3.0 - Projected Change in Water Stress and Seasonal Variability for 2030.



Country or Region	Minor Basin (WRI Aqueduct 3.0)	Facility	Water Stress Change 2030 b.a.u.	Water Stress Change 2030 Pessimistic	Seasonal Variability Change 2030 b.a.u.	Seasonal Variability Change 2030 Pessimistic
Taiwan	Tamsui River	RD 13	1.4x decrease	1.4x decrease	1.1x increase	1.1x increase
China	Lake Tail Hu	RD 11	1.4x increase	1.4x increase	Near normal	Near normal
		MFG 10	1.4x increase	1.4x increase	Near normal	Near normal
		RD 15	1.4x increase	1.4x increase	Near normal	Near normal
	Min Jiang 2	RD 4	1.4x increase	1.4x increase	Near normal	Near normal
	Tuo Jiang	MFG 1	1.4x increase	1.4x increase	Near normal	Near normal
India	India East Coast	MFG 2	1.4x increase	1.4x increase	1.1x increase	1.1x increase
Mexico	Bravo / San Juan	MFG 6	1.4x increase	1.4x increase	1.1x increase	1.1x increase
Brazil	Tiete 2	MFG 5	Near normal	Near normal	Near normal	Near normal
China	Bai He	RD 2	Near normal	Near normal	Near normal	Near normal
		RD 3	Near normal	Near normal	Near normal	Near normal
	Chang Jiang	RD 9	Near normal	Near normal	Near normal	Near normal
	Chao Hu	MFG 3	Near normal	Near normal	Near normal	Near normal
	China Coast 7	RD 12	Near normal	1.4x decrease	Near normal	Near normal
	China Coast 9	MFG 4	Near normal	Near normal	Near normal	Near normal
	Dongting Hu	MFG 13	Near normal	Near normal	Near normal	Near normal
Germany	Rhine 1	RD 7	Near normal	Near normal	Near normal	Near normal
India	Ponnaivar	RD 1	Near normal	Near normal	Near normal	Near normal
		MFG 9	Near normal	Near normal	Near normal	Near normal
Japan	Ara-kawa / Tama-gawa	RD 14	Near normal	Near normal	Near normal	Near normal
	Mogami-gawa	MFG 8	Near normal	Near normal	1.1x increase	1.1x increase
	Sagami-gawa	RD 17	Near normal	Near normal	Near normal	Near normal
	Watarase-gawa / Tone-gawa	MFG 7	Near normal	Near normal	Near normal	Near normal
United States	Chicago	RD 5	Near normal	Near normal	Near normal	Near normal
	Coyote	RD 10	Near normal	Near normal	Near normal	Near normal
	Haw	MFG 12	Near normal	Near normal	Near normal	Near normal
	Lake Washington	RD 6	Near normal	Near normal	Near normal	Near normal
	Upper Neuse	RD 8	Near normal	Near normal	Near normal	Near normal
China	China Coast 7	MFG 11	No Data	No Data	No Data	No Data
	Jinlong Jiang	RD 16	No Data	No Data	No Data	No Data

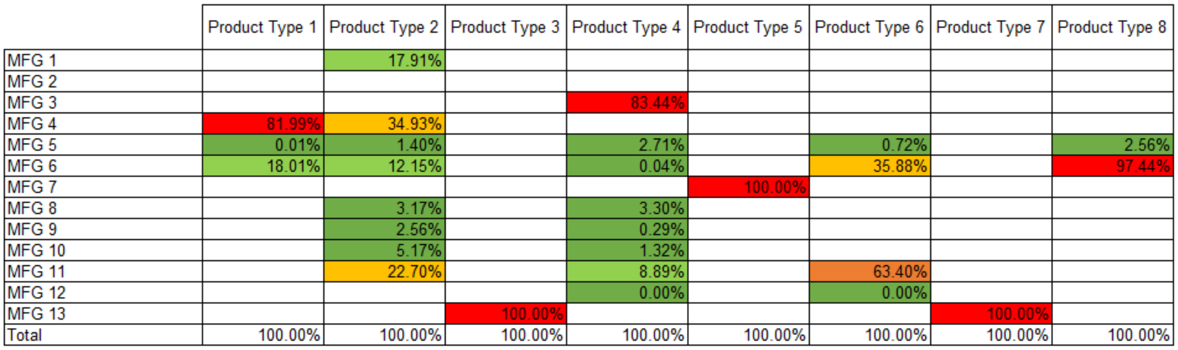
5.3 Supply Chain Water Risk Mapping

WRI Aqueduct's Overall Water Risk Index was applied to Lenovo's 57 suppliers at 251 locations. Approximately 11% had High Overall Water Risk, 14% Medium-High risk, and the remaining 75% Medium to Low risk. The only supplier with Extremely High Overall Water Risk was Qorvo Co., Ltd. in Dezhou, China. Most high-risk sites were located in China and Southwest U.S. (Dashboard, Suppliers Water Risk Results Tab). Lenovo's supply chain facilities are exposed to less water risk than its own facilities; nevertheless, this information should be used to work together with suppliers to implement risk mitigation practices.

5.4 Analysis of Manufacturing Facilities' Relative Importance to Lenovo Operations

We assessed the potential impact of the facilities' water risk to Lenovo's operations based on the production percentage of the eight units or services included in the environmental data tracking tool. The percentage of units produced in each facility are a proxy of the relevance of that manufacturing facility to Lenovo's operations. There are five primary facilities (facilities with 80-100% of production across Lenovo) responsible for six of the eight products or services. The production data of MFG 2 was not provided in the reported data (Table 8).

Table 8 - Percentage of total number of units produced in each Manufacturing Facility in 2018. Red indicates the contributions greater than 80%, orange/yellow contributions between 20% and 79%, and green contributions between 0% and 19%.



	Product Type 1	Product Type 2	Product Type 3	Product Type 4	Product Type 5	Product Type 6	Product Type 7	Product Type 8
MFG 1		17.91%						
MFG 2								
MFG 3				83.44%				
MFG 4	81.99%	34.93%						
MFG 5	0.01%	1.40%		2.71%		0.72%		2.56%
MFG 6	18.01%	12.15%		0.04%		35.88%		97.44%
MFG 7					100.00%			
MFG 8		3.17%		3.30%				
MFG 9		2.56%		0.29%				
MFG 10		5.17%		1.32%				
MFG 11		22.70%		8.89%		63.40%		
MFG 12				0.00%		0.00%		
MFG 13			100.00%				100.00%	
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

5.5 Integration of Internal and External Risk Analysis

We created a series of matrices to explore internal water demand management ((a) withdrawal, (b) withdrawal per employee, (c) withdrawal per employee variation from 2017-2018) and (d) unit production with the WRI – Overall Water Risk Index as a rubric to classify facilities for management prioritization. The rubrics are organized such that those facilities in the bottom left are of lowest priority, while those in the top right are of highest priority.

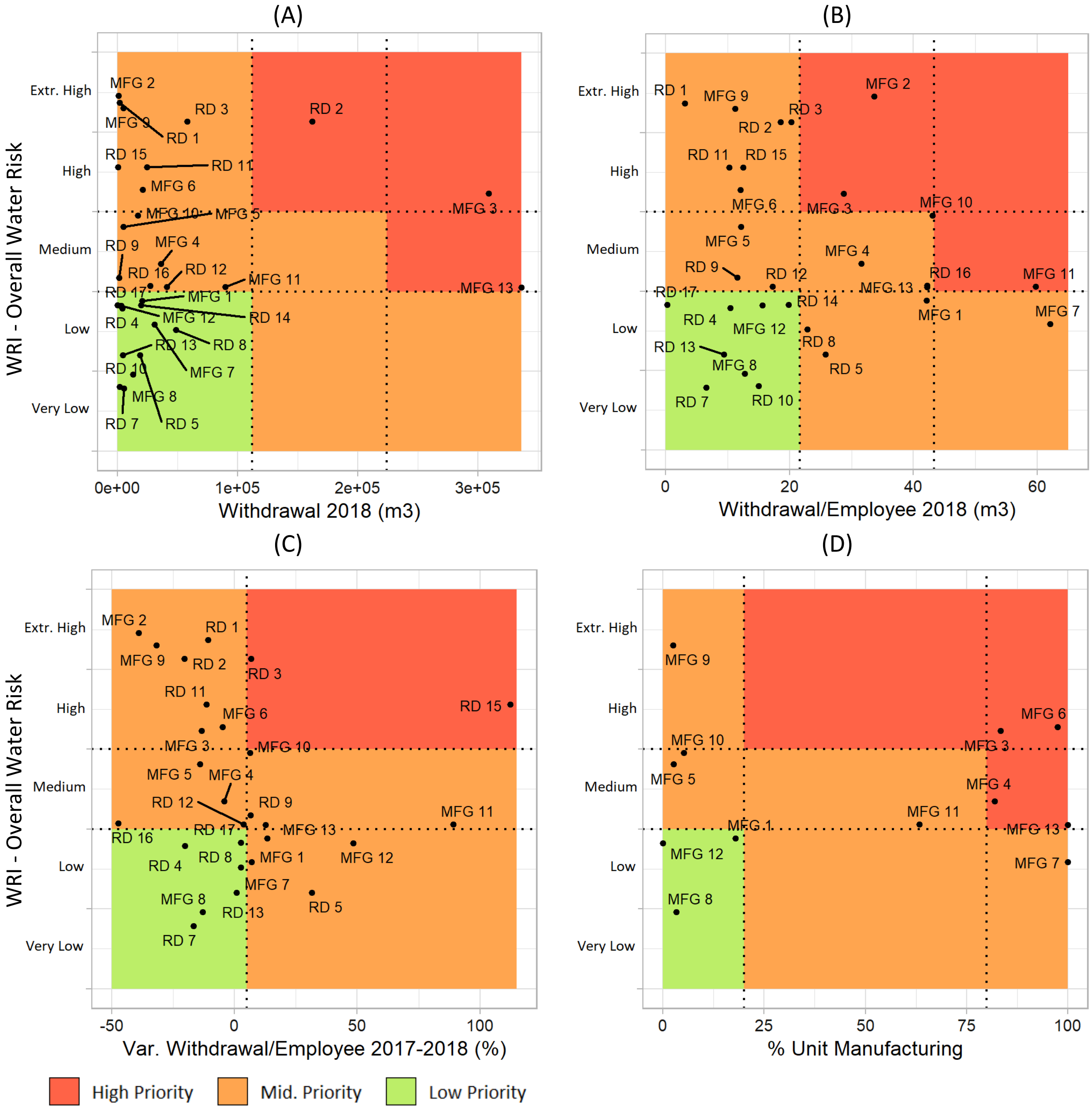


Figure 4 – Risk Matrices

The external overall water risk score is on the y-axis and ranges from: Very Low to Extremely High Risk. Internal scores are on the x-axis from low to high water usage. Since there are not specified thresholds, usage was classified by three equal intervals between 0 and maximum values (Figure 4A and Figure 4B). The variation in withdrawals per employee was classified as achieving the 5% variation goal or exceeding the goal (Figure 4C). The Production Percentage values per manufacturing facility were classified using the same criteria that was used in Table 8 (Figure 4D).

Nine facilities were classified as High Priority in one or more of the risk matrices - seven in China, MFG 2, India, and MFG 6, Mexico (Figure 4). The MFG 3 facility was deemed High Priority in three of the four matrices. This facility is located in a High Overall water risk area, has relatively high water withdrawal and withdrawal per employee, and manufactured approximately 84% of Lenovo's notebooks in 2018 (Figure 4).

The MFG 13 facility was labeled High Priority in two matrices because it located in a Medium-High Overall water risk basin, had the highest total water withdrawals, and manufactured 100% of Lenovo's Mobile Devices and Tablets in 2018 (Figure 4). RD 2 is the RD facility with the highest water withdrawal, exceeded the 5% threshold from 2017-2018, and is located in a basin with Extremely High Overall water risk (Figure 4A). Similarly, RD 15 is located in a High Overall water risk area and exceeded the 5% management goal (however it is unclear if this is related to a data error).

6 Water Risk Management: Best Practices

The external water risk assessment showed several facilities are located in water stressed areas, and water stress will likely increase with population growth (Orr et al., 2009) and climate change. Global companies, such as Lenovo, will inevitably be exposed to and suffer from water-related problems in their facilities and/or supply chain no matter where they are located. Water stress is not avoidable. Therefore, Lenovo should understand and prepare to address risks specific to their facilities and supply chain to make them more resilient. According to the U.S. National Infrastructure Advisory Council (2009), water resilience is having the capacity to diminish the size, extent, and/or duration of negative events. How resilient a company is, depends on its capability to anticipate, adapt to, learn and/or recover from a disruptive event.

Water risk responses can be classified into two types of actions: Inside the Fence (ITF) and Beyond the Fence (BTF) (South Pole Group, 2017). ITF actions are all the activities performed to improve water consumption in a company's facilities, such as employees' safe access to water, sanitation, and hygiene (WASH), water efficiency, consumption goals, and discharge treatment. They are the first actions companies consider in water risk and management planning. BTF actions are water management efforts made outside the facilities and are usually aimed to address the source of water risks. BTF actions are most commonly part of a collective water risk management effort with other stakeholders such as policy makers, local communities, regulators, NGO's, academic institutions, customers, and other companies (WWF, 2015; Ceres, 2015; South Pole Group, 2017).

For a proper water management plan, companies must acknowledge that water is a shared resource and that water safety is mostly determined by external factors (South Pole Group, 2017). Working closely with other stakeholders allows strategic external engagement and enables finding common ground and interests. As part of a company's overall water strategy, they should engage with local watershed and community organizations through activities such as roundtables, river basin committees, or participating in common research studies or projects (Larson, 2012 and South Pole Group, 2017). In watersheds where collaborative platforms do not exist, companies should invest in creating them (Orr et al. 2011). Being recognized as a stakeholder that cares about and invests in management, conservation, and restoration of watersheds is extremely important especially for regulatory and reputational aspects.

The results from the water risk assessment allows Lenovo to evaluate each type of risk across their facilities. This information should be used to establish priorities and design water management procedures for each facility that include ITF and BTF actions. Water use efficiency and consumption sustainability goals, such as the ones Lenovo already has in place, are a great starting point. However, considering that Lenovo's MFG and RD facilities' water withdrawal and discharge variability strongly correlates with the number of employees, **we suggest that the current metric/key performance indicator (KPI) that applies to all facilities to maintain total global water withdrawal and total wastewater generation at +/- 5%, change its units to total water withdrawal and total wastewater generation per employee**.

Next, we describe additional actions Lenovo can take to address different types of water risk using ITF and BTF strategies adopted by industry peers.

6.1 Physical Quantity Risk

ITF Actions

- **Reduce, recycle, and reuse water**. When economically and physically possible, improving water efficiency should be considered with highest priority (Larson, 2012; Kellogg, 2018).
- **High performers set an objective water reduction target, not a variation target**. For example, HP Inc. aims to reduce potable water consumption in their global operations by 15% by 2025 compared to 2015 (HP Inc., 2018). A specific target enables benchmarking progress.
- **Invest in water efficient indoor fixtures and irrigation systems, smart water meters, and leak detection devices**. With smart meters a facility can stratify and analyze water use for irrigation or other specific uses. Leak detection devices can quickly pinpoint leaks to be addresses immediately.

- **Recycle/reuse sewage treatment plant water and capture rainwater for landscape and indoor plumbing use**. HP Inc. recycled/reused 415,000 m^3 of water, which included 407,000 m^3 of NEWater[1] and 8,000 m^3 of sewage treatment plant water (HP Inc., 2018).
- **Create governance and accountability structures, policies, standards, and performance goals with board awareness, commitment, and oversight**; by integrating water into business decisions such as future facility locations, capital expenditures, budgets, mergers and acquisitions, and strategic planning (Ceres, 2015). Intel, HP Inc., Samsung Electronics, and Microsoft all integrate water-related issues into their long-term strategic business plans with board oversight (CDP Intel Corp., 2019; CDP HP Inc., 2019; CDP Samsung Electronics, 2019; CDP Microsoft, 2019).
- **Training and awareness programs for employees about water risks including communication of water risk mitigation procedures, goals, and results**. In Singapore, HP educated their employees on water conservation practices and plans to expand these sessions to facilities with highest water use (HP Inc., 2018).
- **Water storage infrastructure as a short term back up** This is especially useful for facilities located in watersheds with seasonal risks. Samsung reduces their water risk by securing dual water supply pathways and installing water storage tanks at their facilities (Samsung Electronics, 2019).

6.2 Physical Quality Risk

BTF Actions

Lenovo's facilities get their water only from municipal sources. Considering the high number and percentage of Lenovo's sites that are in high water quality risk areas, Lenovo should consider

---

[1] NEWater is one of Singapore's four national taps. It is reclaimed water made from treated wastewater that is further purified making it ultra-clean and safe to drink.

collaborating with municipal water utilities, checking their status and water treatment procedures to ensure adequate water quality for their operations.

6.3 Regulatory and Reputational Risk

Regulatory and reputational water risk mitigation procedures may not have direct impact on increasing water availability; nevertheless, they can improve the company's political position and public perception in the watershed, which could potentially improve the likelihood of receiving its corresponding water allocation (Larson, 2012).

ITF Actions

- **Include water utilities in water risk assessments**. This is important to Lenovo because all water comes from municipal sources. It is critical to analyze a utility's current and future water needs and its ability to meet those needs, non-revenue water loss (relating to aging infrastructure), redundancy / emergency back-up options, seniority of water rights, drinking water quality violations, financial health. HP convened a session in Singapore inviting industry water experts and municipal utilities to develop creative approaches to address water challenges (HP Inc., 2018).

BTF Actions

- **Engage and establish relationships with other stakeholders in the watershed**. Establishing relationships are a fundamental process to support and ensure adequate watershed planning and decrease water risk (Larson, 2012). Companies with high CDP scores usually assume a leadership role in their watershed, characterized by inclusive and diverse BTF engagement that goes beyond policy makers and includes local communities, NGO's, and other businesses (South Pole Group, 2017). For example, HP addressed local community concerns over irrigation practices by working with the city to implement a smart water irrigation system, resulting in the reduction of water by 300,000 m^3 annually (HP Inc., 2018).

- **Engage in local watershed projects**. This provides an opportunity of cooperation and collective action between stakeholders to improve the sustainability of the local water management practices (WWF, 2015; Larson, 2012).
- **Communicate internal physical quantity water risk mitigation practices, goals, and accomplishments among other watershed stakeholders**. This can have various reputational benefits and can be achieved by applying for water use sustainability certifications. For instance, HP's Boise and Corvallis sites are certified using the US Green Business Council Sustainable SITES Initiative v2 rating system, which certifies the design, development, and maintenance of sustainable landscapes (HP Inc., 2018).

6.4 Supply Chain Risk

It is essential to work together with suppliers to implement risk mitigation practices (WWF, 2015). A risk assessment of a company's supply chain (Section 5.3) allows identification of high-risk suppliers and development of mitigations actions tailored for each case (Larson, 2012).

Examples of best practices in engaging the supply chain include:

- **Develop water efficiency and risk reduction specific strategies and offer support for key and/or risky suppliers**. Companies can share lessons learned in their own operations to partners and suppliers (Larson, 2012; WWF, 2015). To reduce risk in supply chains, Dell Technologies requires their top direct material suppliers in water-stressed regions to submit a five-year water risk mitigation plan (Dell, 2019)
- **Verify suppliers are in compliance with local laws and/or regulations**. In countries with weak regulations and institutions, compliance may not be enough because standards may be too low to address negative impacts. Weak institutions may also not be capable to enforce regulatory compliance; therefore, additional support and guidance is required (WWF, 2015). Thus, a company should explicitly state in the Terms of Engagement or

contract with suppliers that they must comply with the more stringent policies between local regulations and company standards/policy.

- **Support and continue business with suppliers that are proactively reducing water risks by placing incentives and procurement standards**. For procurement, Lenovo already requires direct and independent validation of compliance (Lenovo, 2019).
- **Supplier Code of Conduct**. Samsung utilizes agreements such as the Supplier Code of Conduct to incentivize/require suppliers to take actions toward better water management practices.
- **Promote water conservation practices among suppliers, such as water efficient technologies and treating/recycling water for reuse**. The semiconductor industry in particular is a large water user requiring ultra-purified water for fabrication plants. Intel and Taiwan Semiconductor Manufacturing Company fabrication plants achieved large reductions in water consumption with proper investments in water saving technologies; thereby, reducing usage and company costs (Frost and Hua, 2019). Practices to reduce water withdrawals can also be achieved through reclamation of ultra-pure water for landscape and plumbing (Den et al., 2018).
- **Reduce supply chain's impact on water resources through reduction of indirect water use (electricity generation) and attaining higher energy efficiency**. Water is a main component for power plants to produce electricity. In addition, electricity is needed to power treatment plants to treat and distribute water. Therefore, it is important to consider the water-energy nexus to reduce water consumption. While the semiconductor industry is known to consume large amounts of water for its fabrication plants, one study has shown that the most efficient way to reduce a fabrication plant's overall water use is through reducing electricity use (Frost and Hua, 2019).

7 Water Risk Management: Disclosure

Collection and assessment of a company's water use and risk data are essential in working towards water security and stewardship. Understanding which facilities lie in at-risk regions help the company prioritize actions. Therefore, it is essential to collect and monitor data across all operations to disclose properly and develop effective management practices.

As Lenovo engages in good water stewardship, they want to be recognized as a leader among their peers, as listed by the CDP. Lenovo scored a B- in their most recent CDP survey; however, simple changes in response to CDP Water Security Questionnaire will improve Lenovo's score to a Band more accurately reflect their leadership in water management without any additional investments. Minimal investments to improve monitoring across direct and indirect operations and addressing some of the aforementioned water-related issues, Lenovo can improve their score to an A and stand out as a leader in water stewardship.

7.1 CDP Scoring Methodology

CDP assesses a company's progress towards environmental stewardship based on responses to a questionnaire. Their level of detail in a response, awareness of issues, management practices, and progress towards environmental stewardship are all assessed against a scoring rubric. Stressing the importance of transparency, not only for responders but for CDP as well, their scoring methodology (CDP Water Security Scoring Methodology, 2020) in addition to a guideline for their questionnaires (CDP Water Security Reporting Guidance, 2020) are provided online annually. The scoring structure should be seen as a roadmap for companies in developing best practices in environmental management and stewardship.

7.1.1 Understanding the Scoring Methodology

The scoring framework is based on a series of performance levels. These levels represent steps that a company must climb up in reaching environmental stewardship (Figure 5). In responding to questions, points are allocated to these four levels providing a framework to assess a company's progress towards environmental stewardship. The four levels are:

- **Disclosure**: This measures the transparency of a company. Company transparency is characterized by visibility and accessibility of information. Disclosure points are awarded simply by providing responses to questions.
- **Awareness**: This measures the comprehensiveness of a company's evaluation and assessment of how environmental issues intersect with its business. At this level a company has not taken any actions to address or mitigate environmental issues beyond initial screening or assessments.
- **Management**: This measures evidence of actions taken by a company to address environmental issues. In order for a company to decide on which actions to take in reducing/mitigating negative environmental impacts, proper assessments and evaluations (Awareness category) are necessary.
- **Leadership**: This measures best practices in advancing environmental stewardship. Companies in this category have implemented procedures effectively to assess water-related risks in addition to evaluating their impacts. Water management is integrated into their business strategy with clear targets and goals.

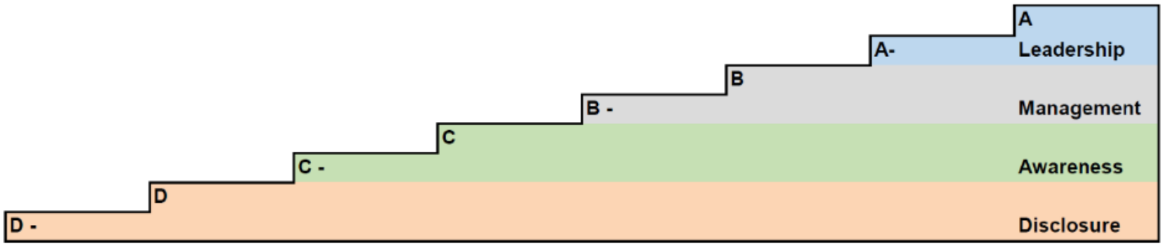


Figure 5 - CDP Point Allocation Levels. Source: CDP Scoring Introduction 2019

Disclosure is the first level of scoring followed by Awareness, Management, and Leadership. At the end of scoring a company's responses, the total points awarded for Disclosure and Awareness are divided by the maximum points that could have been awarded for each category; this fraction is then multiplied by 100 to provide a percentage.

To progress toward the next level, a minimum score must be achieved in the prior level. For example, to achieve a B score in the Water Security questionnaire, a company would need to receive at least 80% in Disclosure, at least 80% in Awareness, and score within 45-79% in Management (Table 2). However, if a company were to score an 80% in Disclosure, 78% in Awareness, and a 44% in Management, the company would not be eligible for a Management score (B-/B) and instead receive a C.

Certain questions may include criteria for more than one level. All questions are scored at the Disclosure level (unless stated otherwise), and certain questions may or may not have Awareness, Management, or Leadership level scoring. The scoring criteria for each question is disclosed in CDP's Scoring Methodology document (CDP Water Security Scoring Methodology, 2020). It is **highly advised to review the Scoring Methodology document in preparing for questionnaire responses** since **point allocation varies on a question-by-question basis**.

Table 9 - CDP Score Band

Level	Water	Score
Disclosure	0-44%	D-
	45-79%	D
Awareness	0-44%	C-
	45-79%	C
Management	0-44%	B-
	45-79%	B
Leadership	0-79%	A-
	80-100%	A

- Disclosure score of at least 80% is required to be eligible for a C-/C score.
- Awareness score of at least 80% is required to to be eligible for a B-/B score.
- Management score of at least 80% is required to to be eligible for a A-/A score.

7.1.2 Providing Information as Requested

Although there are no “right” or “wrong” answers when disclosing information, an incorrect answer is awarded if a company fails to provide information explicitly requested by CDP. Incorrect answers include responses that (a) do not support or contradict selections made from drop-down menus or (b) fail to provide specific information requested in the scoring methodology document, even if that information is provided in other sections of the survey.

Explanations should answer questions such as “why?” and/or “how?”. Providing a simple answer may result in losing points. For example, CDP does not consider “This is not relevant to our business” as a good explanation because it does not explain why or how the topic is not relevant. A better answer would be: “As our operations do not have any wet processes, we are not a significant user of water. In addition, our operations withdraw only from municipal sources. Therefore, brackish surface water/seawater is not relevant to our business”.

Also, points are awarded for “company-specific explanations” throughout the questionnaire. These explanations should provide specific references to a company’s activities, programs, products, services, etc., that are unique to the company. To better answer such questions, the *Situation-Task-Action-Response* (STAR) framework is helpful when constructing a response. A breakdown of the STAR framework is as follows:

- **Situation**: what was the context or background?
- **Task**: what was the issue that needed to be solved? what needed to be done?
- **Action**: what was the course of action taken?
- **Result**: what was the final outcome or course of action?

7.1.3 Becoming a Leader: A-List Company

A-List companies greatly benefit from global recognition through CDP’s reports. Therefore, CDP ensures that scores are justified by going through a formal and robust review process. First, a company must include the following items ***within*** their CDP response: (1) no significant relevant exclusions present (W0.6), (2) obtain minimum Leadership points, and (3) submit a public response to the investor request. ***After*** responses are submitted, there are a series of checks conducted by CDP as outlined below. Companies that do not pass each check would not receive an A but an A- at best.

- **Manual Question Review Check**

  CDP scoring team reviews all responses to confirm that they are clear in meaning, answer with relevant information, and provide adequate details. If any significant exclusions are identified, the company would be ineligible for a Leadership score (A-/A).

- **RepRisk Verification Check**

  RepRisk screens data from over 80,000 sources through the lenses of 28 Environmental, Social, and Governance (ESG) issues. Potential A-List companies are reviewed against RepRisk's database according to issues relevant to CDP.

- **Local CDP Offices Check**

  Local CDP offices have local knowledge and insight about companies' reputations. Local offices can recommend downgrading a company if they believe including them in the A-List could damage CDP's credibility.

- **Scoring Steering Committee Check**

  The final step of CDP's check and verification process is information consolidation. The scoring team provides a recommendation to the Steering Committee, which makes the final decision of which companies keep their A-List status or are downgraded to an A-.

7.2 How to Improve CDP Score

For a company to improve their CDP score, they must understand why they received their current score. By examining the Score Report provided by CDP, a company can assess their strengths and weaknesses to identify areas of improvement.

7.2.1 Lenovo's Current Score

CDP provides participating companies with a score report each year that includes their final score benchmarked with sector, regional, and global average scores. CDP has thirteen categories for their water score: water-related risk exposure, water-related opportunities, water risk assessment, water policies, water accounting, value chain engagement, targets and goals, integrated approaches, governance, business strategy, and business impacts. Categories are applied with weights at the Management and Leadership levels only, reflecting the relative importance of each category. Appendix E shows each category and their weights.

Lenovo received a B- for its 2019 Water Security questionnaire, which is an improvement from their C score in 2018. While Lenovo received a B in half of the categories, they received a C in water-related opportunities, water risk assessment, water policies, governance, and business strategy. To be eligible for A status, Lenovo should prioritize raising C-scores to B-scores.

Although the score report provides information on which categories Lenovo needs to improve on, it does not provide any information on where Lenovo lost points, and therefore how Lenovo can improve in specific categories. To identify each question with their respective categories, this study included an in-depth assessment of CDP's documents and Lenovo's responses in which we developed a template identifying areas of improvement for specific categories and questions.

7.2.2 Improving Lenovo's Score with Close-to-Zero Costs

Lenovo can increase their score from a B- to a B without any major administrative or management changes. The most significant finding in reviewing and analyzing their responses was that a large portion of responses did not provide information CDP ***explicitly*** requested in the Scoring Methodology, resulting in loss of points.

For example, Table 10 shows parts of Lenovo's response to CDP's Water Security question W1.2. Although the question was completed with relevant information, when scored against the scoring criteria (Table 11), Lenovo did not receive any Management points. By not providing any information on the frequency of measuring water - whether it be monthly, quarterly or annually - Lenovo received 0/6 Management points. In addition to not receiving a minimum of 4 Management points, Lenovo was not eligible to receive any Leadership points even if the answer was provided.

Table 10 - Lenovo's W1.2 Response

Across all your operations, what proportion of the following water aspects are regularly measured and monitored?	
Water withdrawals – total volumes	
% of sites/facilities/operations	76-99
Please explain	Most water is obtained through municipal sources. In leased office spaces where water is provided by the landlord, Lenovo estimates our own water consumption. Lenovo tracks water use and discharge for most sites through our corporate site environmental data tracking tool. It is tracked to ensure we are not adversely impacting the environment since water use and discharge has been identified as a significant environmental aspect for Lenovo.
Water discharges – total volumes	
% of sites/facilities/operations	76-99
Please explain	Water discharges- total volumes 76-100 Lenovo's only water discharge is through domestic sewage and collected rain/storm water discharge. Lenovo tracks water use and discharge for most sites through our corporate site environmental data tracking tool. It is tracked to ensure we are not adversely impacting the environment since water use and discharge has been identified as a significant environmental aspect for Lenovo.
Water consumption – total volume	
% of sites/facilities/operations	76-99
Please explain	Most water is obtained through municipal sources. In leased office spaces where water is provided by the landlord, Lenovo estimates our own water consumption.
Water recycled/reused	
% of sites/facilities/operations	76-99
Please explain	This is tracked for Lenovo's operations, not suppliers.
The provision of fully-functioning, safely managed WASH services to all workers	
% of sites/facilities/operations	76-99

Please explain	Lenovo factories, research & development locations, offices, etc. all have adequate water supply, adequate sanitation, and hygiene for our employees.

Table 11 - Scoring Methodology W1.2 Scoring Criteria

Management scoring criteria

Full Awareness points must have been awarded to be eligible for Management points.
Management points will be awarded as follows:
- Where the value in the "% of sites…" column has been completed with a selection greater than 75%, **0.5 points will be awarded for each relevant explanation which includes the frequency and method for measurement of each water aspect in the "Please explain" column**.

Leadership scoring criteria

At least 4 Management points must have been awarded to be eligible for Leadership points.
If 0/0 Management points were awarded, 0/0 Leadership points will be awarded for this row.
0.1 Leadership points will be awarded per row where "% of sites…" column as monitored at 100% of facilities.

By reviewing all CDP documents, each question was matched to their corresponding categories mentioned in Section 7.2.1. An in-depth assessment of Lenovo's responses against the scoring methodology produced a score similar to what CDP awarded (Appendix F, Table F1). By duplicating their score, it is highly probable that our recommendations will result in a better CDP score.

Minor adjustments for responses such as those discussed above are found throughout the first half of Lenovo's Water Security questionnaire. In total, there were 15 responses that could be improved in accordance to CDP's Scoring Methodology. Appendix F, Table F3 shows how Lenovo's score could differ by preparing answers in conjunction with the scoring criteria. Responses (highlighted in orange) may be improved by providing information explicitly requested in the Scoring Methodology to increase Lenovo's current Management score of a B- (44%) to a B (62%) with zero costs.

With Lenovo's current state of water management practices, a Water Security score in the Management level (B-/B) can be maintained simply by providing information explicitly requested from the Scoring Methodology.

7.2.3 Improving Lenovo’s Score to Leadership

Large capital expenditure in on-site water treatment plants is not required to improve Lenovo’s progress towards water stewardship. To attain a Leadership score (A-/A), we recommend Lenovo to follow five main points (Appendix F, Table F5 showcases how Lenovo’s score could potentially further improve if additional steps outlined below are taken).

First, refer to CDP’s scoring methodology provided on their website when preparing responses. The scoring methodology not only tells companies what information is needed to be awarded full points but can also act as a guideline towards water stewardship. Categories such as water accounting, water risk assessment, governance, and business strategy outline what needs to be done for each issue. There may responses that cannot be immediately delivered with Lenovo’s current practices, but the scoring criteria can inform Lenovo on how to prepare going forward.

Second, water should be fully tracked/monitored in both direct and indirect operations. In tackling any issue, a full understanding of the issue is necessary - the same applies to water risk management. Investments in meters may be beneficial in fully monitoring water usage accurately. In addition, multiple responses in the Water Security questionnaire require full (100%) monitoring to acquire full points. **Third, calculate or estimate potential financial impacts from water risks and opportunities**. Providing financial impact estimates for risks and opportunities such as supply chain disruptions or cost savings (Appendix F, Table F5: W4.2, W4.2a, W4.3a) will increase Management and Leadership scores up to 10 and 14 percentage points, respectively. **Fourth, have board-level oversight of water-related issues**. Lenovo’s Chief Sustainability Officer (CSO), the highest management-level officer with responsibility over water-related issues, should report to the Board about water-related issues along with climate and other ESG issues. Including Board oversight with scheduled meetings over water-related issues can increase Lenovo’s Management and Leadership percentages up to 10 and 8 percentage points respectively (Appendix F, Table F5: W6.2 - W6.3).

Lastly, develop a comprehensive corporate water policy. Having a water policy would significantly improve progress towards water stewardship and CDP score. Although Lenovo operations are "dry" it is highly advised to have a water policy not only for internal use but also as a baseline for their supply chain. It may be possible that certain suppliers do not have a water policy. Therefore, having a water policy for suppliers to follow is essential. Lenovo's Supplier Code of Conduct requires its supply chain to meet or exceed legal requirements, standards, or voluntary commitments to which Lenovo subscribes (Lenovo Supplier Code of Conduct, 2018). However, without a water policy that goes beyond regulatory requirements, Lenovo is indirectly stating that they do not take water stewardship seriously. Retrieved from CDP's scoring criteria (CDP Water Security Scoring Methodology, 2020), **a comprehensive water policy that can be incorporated in both Lenovo's and their supply chain's operations would include**:

- Description of business dependency on water,
- Description of business impact on water,
- Description of water-related performance standards for direct operations,
- Description of water-related standards for procurement,
- Reference of international standards and widely-recognize water initiatives (GRI),
- Company water targets and goals,
- Commitment to align with public policy initiatives (SDGs),
- Commitments beyond regulatory compliance,
- Commitment to water-related innovation,
- Commitment to stakeholder awareness and education,
- Commitment to water stewardship and/or collective action,
- Acknowledgement of the human right to water and sanitation,
- Recognition of the environmental linkages, for example, due to climate change.

Developing a policy with these points will lead to an 8-percentage point increase in both Management and Leadership scores (Appendix F, Table F5: W6.1a).

By estimating financial impacts, implementing board-level oversight, and developing a water policy, Lenovo can effectively raise their Management and Leadership scores up to 28 and 30 percentage points, respectively. Building from the changes shown in Appendix , **this increase would make Lenovo eligible for an A- score**. Appendix F, Table F5 displays in detail which responses/issues (highlighted in green) should be addressed to attain Leadership / A-List status. Lenovo should focus on categories such as water accounting, water risk assessment, water-related risks exposure, water-related opportunity, water policy, and governance.

8 Conclusion

By understanding an operation's exposure to water risk and identifying possible strategies to improve water management and disclosure practices, Lenovo can truly commit to proactively protecting the environment and conserving natural resources. While Lenovo has an internal water goal of maintaining a specific variation of water use and tracks water in their Manufacturing and RD facilities, further steps could be taken to further reduce impacts on water resources.

This study saw a strong correlations of water withdrawals and discharges to the number of employees, which may be attributed to the nature of water use in facilities. Therefore, it is more appropriate to set current metric/KPI to total water withdrawal and total wastewater generation per employee. Overall, Lenovo has made progress in reducing global water withdrawal and discharge per employee across its Manufacturing and R&D facilities. However, there are facilities not meeting the 5% increase threshold, requiring Lenovo's attention.

Nine Lenovo facilities in China, India, and Mexico have considerable overall water risk. Most high-risk supplier sites are in China and Southwest U.S. Historic Flood Occurrence and Drought are the most widespread quantity risk among facilities. Almost all sites are projected to experience an increase in drought and flood occurrence probability due to climate change. Drought is anticipated to become a greater risk for 28 Lenovo sites across the world.

Continuous monitoring and careful planning over water use both internally and externally is essential. Although risks for water quantity is inherent in some locations, Lenovo's facilities scored satisfactorily in regulatory risk indices with the exception of facilities in Brazil, China, Taiwan, and Mexico in one of the five regulatory indices. Through our risk matrices, nine facilities (seven in China; Chennai, India; and Monterrey, Mexico) have been identified as High Priority. It is recommended to establish priorities and design water management procedures, which include ITF and BTF actions, for each facility.

A limitation of the analyses was that it only includes MFG and RD facilities. Although other types of facilities have fewer employees and use less water, water-related information for other facilities should be included for future studies. Moreover, there was a small number of Manufacturing and RD facilities that did not have withdrawal, discharge, or production data for certain periods, or there were signs that made us doubt about the quality of the data.

With the goal to improve water stewardship and CDP score, it is possible for Lenovo to be awarded a Leadership score without large capital expenditure. Such actions are unwarranted due to water being used mainly for employee consumption. Rather, steps in fully tracking, monitoring, and understanding water use across direct and indirect operations will serve as the foundation towards higher CDP scores.

This study's in-depth look at Lenovo's current practices and CDP's documents show that by fully monitoring and disclosing water-related issues across all operations, estimating financial impacts, including board oversight, developing a water policy, and most importantly - following CDP's Scoring Methodology - Lenovo can be eligible to achieve a Leadership score.

9 References

Accenture Strategy. (2018). To Affinity and Beyond: From Me to We, The Rise of the Purpose-Led Brand. Retrieved from https://www.accenture.com/t20181205T121039Z__w__/us-en/_acnmedia/Thought-Leadership-Assets/PDF/Accenture-CompetitiveAgility-GCPR-POV.pdf

Baghestani, S. Fishman, B. Maruti, S. & Usmani, S. (2017). Developing a Sustainable Business Model for WRI's Aqueduct. Report. Washington, DC: World Resources Institute.

Brooks, B. W., Lazorchak, J. M., Howard, M. D.A., Johnson, M.-V. V., Morton, S. L., Perkins, D. A.K., Reavie, E. D., Scott, G. I., Smith, S. A. & Steevens, J. A. (2016). Are harmful algal blooms becoming the greatest inland water quality threat to public health and aquatic ecosystems? *Environ Toxicol Chem*, 35: 6–13. doi:10.1002/etc.3220

BGR and UNESCO (Bundesanstalt für Geowissenschaften und Rohstoffe and United Nations Educational, Scientific, and Cultural Organization). (2018). Groundwater Resources of the World. Retrieved from https://www.whymap.org/whymap/EN/Maps_Data/Gwrw/gwrw_node_en.html

Carrão, H., G. Naumann, & P. Barbosa. (2016). Mapping Global Patterns of Drought Risk: An Empirical Framework Based on Sub-national Estimates of Hazard, Exposure and Vulnerability. *Global Environmental Change*, 39 (July): 108-24. doi: 10.1016/j.gloenvcha.2016.04.012.

CDP. (2019). HP Inc. – Water Security 2019. Retrieved from https://www.cdp.net/en/formatted_responses/responses?campaign_id=66213497&discloser_id=821085&locale=en&organization_name=HP+Inc&organization_number=58858&program=Water&project_year=2019&redirect=https%3A%2F%2Fcdp.credit360.com%2Fsurveys%2F99r80q4r%2F58871&survey_id=65670926

CDP. (2019). Intel Corporation – Water Security 2019. Retrieved from https://www.cdp.net/en/formatted_responses/responses?campaign_id=66213497&discloser_id=823187&locale=en&organization_name=Intel+Corporation&organization_number=9298&program=Water&project_year=2019&redirect=https%3A%2F%2Fcdp.credit360.com%2Fsurveys%2F99r80q4r%2F57948&survey_id=65670926

CDP. (2019). Water Security 2019: General Scoring Methodology Category Weightings. Retrieved from http://b8f65cb373b1b7b15feb-c70d8ead6ced550b4d987d7c03fcdd1d.r81.cf3.rackcdn.com/cms/guidance_docs/pdfs/000/000/460/original/CDP-water-security-score-category-weightings.pdf?1524221094

CDP. (2019). Samsung Electronics – Water Security 2019. Retrieved from https://www.cdp.net/en/formatted_responses/responses?campaign_id=66213497&discloser_id=831525&locale=en&organization_name=Samsung+Electronics&organization_number=161

91&program=Water&project_year=2019&redirect=https%3A%2F%2Fcdp.credit360.com%2Fsurveys%2F99r80q4r%2F59450&survey_id=65670926

CDP. (2019). Microsoft – Water Security 2019. Retrieved from https://www.cdp.net/en/formatted_responses/responses?campaign_id=66213497&discloser_id=830332&locale=en&organization_name=Microsoft+Corporation&organization_number=11930&program=Water&project_year=2019&redirect=https%3A%2F%2Fcdp.credit360.com%2Fsurveys%2F99r80q4r%2F59071&survey_id=65670926

CDP. (2020). Scoring Introduction 2020: An introduction to 2020 scoring. Retrieved from https://6fefcbb86e61af1b2fc4c70d8ead6ced550b4d987d7c03fcdd1d.ssl.cf3.rackcdn.com/cms/guidance_docs/pdfs/000/000/233/original/Scoring-Introduction.pdf?

CDP. (2020). CDP Water Security Reporting Guidance. Retrieved from https://guidance.cdp.net/en/guidance?cid=15&ctype=theme&idtype=ThemeID&incchild=1&microsite=0&otype=Guidance&tags=TAG-646%2CTAG-607%2CTAG-599

CDP. (2020). CDP 2020 Water Security Scoring Methodology. Retrieved from https://guidance.cdp.net/en/guidance?cid=15&ctype=theme&idtype=ThemeID&incchild=1&microsite=0&otype=ScoringMethodology&tags=TAG-599%2CTAG-607%2CTAG-646

Ceres. (2015). An Investor Handbook for Water Risk Integration Practices & Ideas Shared by 35 Global Investors. Retrieved from https://www.ceres.org/resources/reports/investor-handbook-waterintegration.

Dell Technologies. (2019). FY19 Corporate Social Responsibility Report. Retrieved from https://corporate.delltechnologies.com/en-us/social-impact/reporting/fy19-csr-report.htm

Den, W., Chen, C.H., & Luo, Y.C. (2018). Revisiting the Water-Use Efficiency Performance for Microelectronics Manufacturing Facilities: Using Taiwan’s Science Parks as a Case Study. *Water-Energy Nexus*, 1(2): 116–133. doi:10.1016/j.wen.2018.12.002.

Farinosi, F., Giupponi, C., Reynaud, A., Ceccherini, G., Carmona-Moreno, C., De Roo, A., ... & Bidoglio, G. (2018). An innovative approach to the assessment of hydro-political risk: A spatially explicit, data driven indicator of hydro-political issues. *Global Environmental Change*, 52, 286-313.

Frost, K., & Hua, I. (2019). Quantifying spatiotemporal impacts of the interaction of water scarcity and water use by the global semiconductor manufacturing industry. *Water Resources and Industry*, 22, 100115. doi: 10.1016/j.wri.2019.100115

GEMI. (2019). GEMI Local Water Tool. Retrieved from http://gemi.org/localwatertool/

Georg Kell (United Nations Global Compact). (2014). Five Trends that Show Corporate Responsibility is Here to Stay. *The Guardian*, 13 August 2014 (page visited on 28 January 2018).

HP Inc. (2018). Sustainable Impact Report. Retrieved from https://www8.hp.com/h20195/v2/getpdf.aspx/c06293935.pdf

Hofste, Rutger, Samantha Kuzma, Paul Reig, Sara Walker, Edwin H. Sutanudjaja, Marc F. P. Bierkens, M Kuijpers-Linde, et al. (2019). Aqueduct 3.0: Updated Decision-Relevant Global Water Risk Indicators. Technical Note. Washington, DC: World Resources Institute.

Kellogg. (2018). Global Water Risk Assessment. http://crreport.kelloggcompany.com/download/2018+Water+Risk+Assessment+Methodology.pdf

Larson, Wendy & Freedman, Paul & Grubb, Edward & Adriaens, Peter. (2012). Mitigating Corporate Water Risk: Financial Market Tools and Supply Management Strategies. Water Alternatives. 5. 582. 10.2139/ssrn.2159370.

Lenovo. (2016). Sustainability: Environmental Affairs Policy. Retrieved from https://www.lenovo.com/us/en/social_responsibility/environmental_policy

Lenovo. (2019). 2018/2019 Sustainability Report: Sustaining Intelligent Transformation. Retrieved from https://www.lenovo.com/us/en/social_responsibility/2018-19_Sustainability_Report.pdf

Luck, M. Landis, M. & Gassert, F. (2015). Aqueduct Water Stress Projections: Decadal Projections of Water Supply and Demand Using CMIP5 GCMs. Technical Note. Washington, DC: World Resources Institute.

Margat, J. & van der Gun, J. (2013). Groundwater Around the World: A Geographic Synopsis. *CRC Press*.

Orr, S. Cartwright, A., & Tickner, D. (2009). Understanding Water Risks. World Wildlife Fund.

Orr, S. et al. (2011). Assessing Water Risk: A Practical Approach for Financial Institutions (WWF & DEG KFW Bankengruppe, 2011).

Reig, Paul, Tien Shiao, & Francis Gassert. (2013). Aqueduct Water Risk Framework. Working Paper. Washington, DC: World Resources Institute.

RepRisk. (2019). About US. Retrieved from https://www.reprisk.com/about-reprisk

Sciarelli, M., Landi, C. G., Turriziani, L., & Tani, M. (2019). Corporate Sustainability Assessment and Risk Perception: Empirical Evidences from Standard & Poor's Index. *American International Journal of Contemporary Research*, 9(1): 11-21. doi:10.30845/aijcr.v9n1p2

Samsung Electronics. (2019). Samsung Electronics Sustainability Report 2019. Retrieved from https://images.samsung.com/is/content/samsung/p5/global/ir/docs/sustainability_report_2019_en.pdf

South Pole Group. (2017). Water Risk Tools - Corporate Water Stewardship Initiative in Colombia. Industry Benchmark Report South Pole Carbon Asset Management Ltd. Retrieved from https://www.shareweb.ch/site/Suiz-Agua-Colombia/Documents/170314_Water Risk Tools-Benchmark Report_EN.pdf

The Nature Conservancy. (2019). Urban Water Blueprint. Retrieved from https://water.nature.org./waterblueprint

TYPSA Group. (2019). Who We Are. Retrieved from https://www.typsa.com/en/corporate-information/typsa-group/

U.S. National Infrastructure Advisory Council. (2009). Critical Infrastructure Resilience: Final Report and Recommendations, National Infrastructure Advisory Committee, Washington DC.

UN Environment. (2018). Progress on Integrated Water Resources Management. Global Baseline for SDG 6 Indicator 6.5.1: Degree of IWRM Implementation. Retrieved from https://www.unwater.org/ publications/progress-on-integrated-water-resources-management-651

Vörösmarty, C. J., McIntyre, P. B., Gessner, M. O., Dudgeon, D., Prusevich, A., Green, P., ... & Davies, P. M. (2010). Global threats to human water security and river biodiversity. *Nature*, 467(7315): 555.

Water Risk Filter. (2019). Tool & Team. Retrieved from https://waterriskfilter.panda.org/en/About/ToolAndTeam

World Business Council for Sustainable Development (WBCSD). 2019. Global Water Tool. Retrieved from https://www.wbcsd.org/Programs/Food-Land-Water/Water/Resources/Global-Water-Tool

World Resources Institute (WRI). (2019). Water Mapping, measuring, and mitigating global water challenges. Retrieved from https://www.wri.org/our-work/topics/water

World Wildlife Fund for Nature (WWF). (2015). From Risk to Resilience: Does Your Business Know Its Water Risk? Surrey: World Wildlife Fund for Nature. Retrieved from http://assets.wwf.org.uk/downloads/wwf020_from_risk__to_resilience_1.pdf?_ga=1.128746634.76498599.14%2049135345

World Wildlife Fund for Nature (WWF). (2019). Water Risk Filter 5.0 Water Risk Assessment Methodology. Technical Note.

10 Appendix A

In Figure A1, Figure A2, and Figure A3are presented boxplots with the number of employees, total withdrawals, and withdrawals per employee per facility type respectively, for the 2018 period. Considering the central tendency of the different groups of data, it can be seen that MFG and RD facilities have highest mean for every category; moreover, the range of MFG and RD facilities is considerably bigger than the other types of facilities, especially considering number of employees and withdrawals.

The number of employees in Offices and Retail store is relatively less relevant for the company compared to what MFG and RD facilities represent. Also, Lenovo's MFG and RD facilities represent the most significant water usage. Lenovo reports that for small offices, water use is quite small, and the data is difficult to obtain (e.g. shared water meters with other offices). The latter happens for some specific large offices as well. For this reason, Lenovo has not been able to track water withdrawal, discharge, and recycling for all their Large and Small Offices.

Because of their relatively higher values and variability of water use, MFG and RD facilities are more exposed to water issues and are strategically more relevant for Lenovo's operations. Therefore, considering the characteristics of each type of facility, the fact that MFG and RD facilities accounted for 94% of global withdrawals, and that Large Offices, Small Offices, and Retail Stores do not contain complete information about withdrawal and discharges, the MFG and RD facilities where selected for the risk assessment.

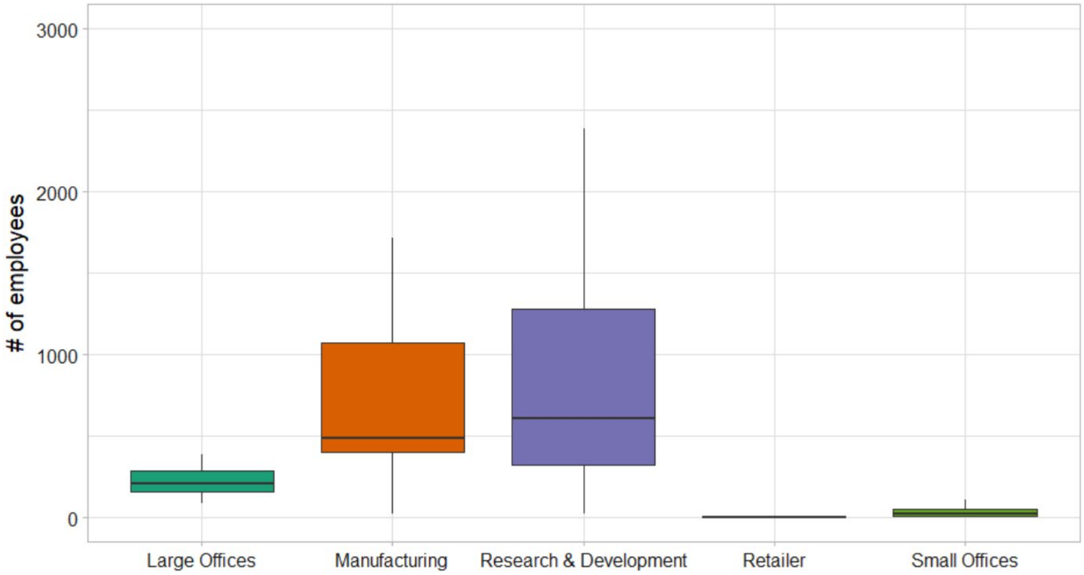


Figure A1 - Number of Employees per Facility Type. The boxplot displays the data utilizing a five-number summary: the minimum, the maximum, the sample median, and the first and third quartiles.

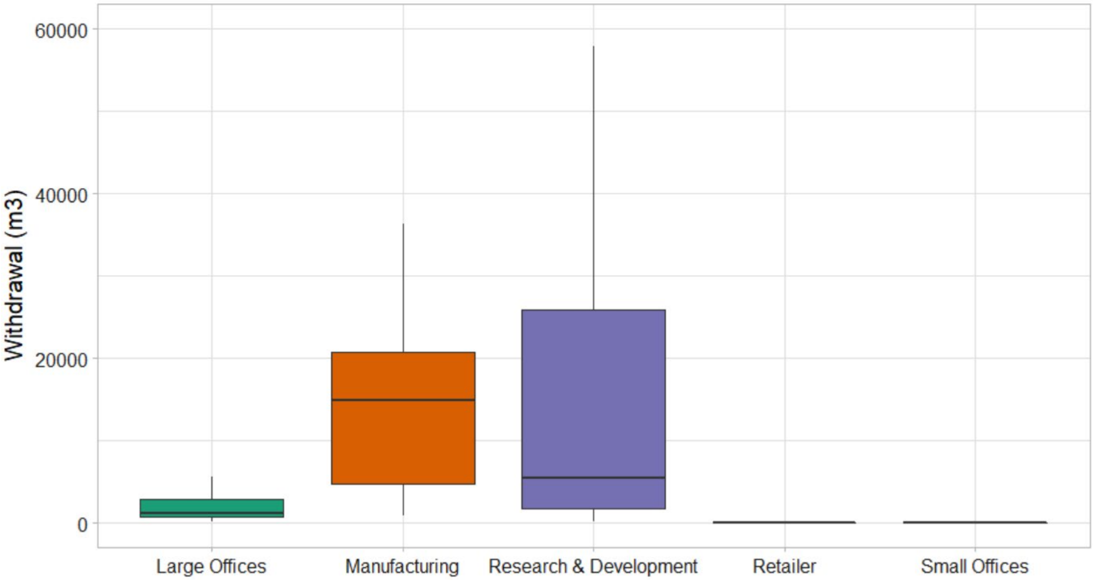


Figure A2 - Total Withdrawal per Facility Type. The boxplot displays the data utilizing a five-number summary: the minimum, the maximum, the sample median, and the first and third quartiles.

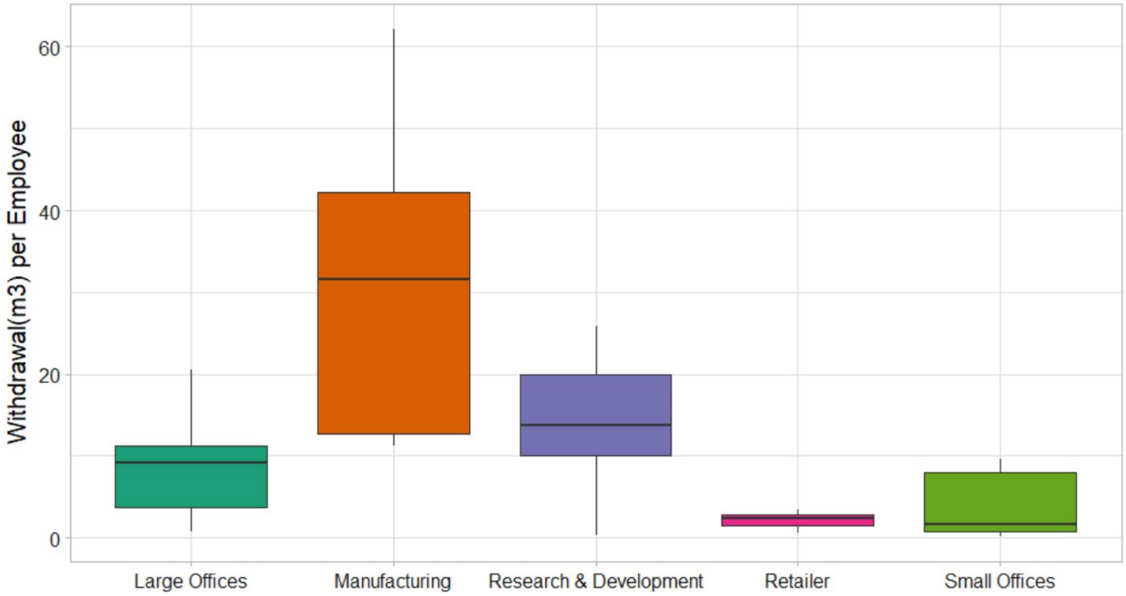


Figure A3 - Withdrawal per Employee per Facility Type. The boxplot displays the data utilizing a five-number summary: the minimum, the maximum, the sample median, and the first and third quartiles.

11 Appendix B

To visualize and analyze the data from Lenovo's environmental data tracking tool from 2014 to 2018 and the results of the water risk tools we created a dashboard using Tableau Desktop 2020.1. The dashboard file can be opened in Tableau Reader, which is a free software created to distribute Tableau Desktop content. The dashboard is better viewed in presentation mode. At the bottom of the dashboard are a series of tabs. Each tab takes you to a different analysis as described below.

11.1 Water Usage Tab

This tab shows water usage in MFG and RD facilities using a map and a bar plot. On the right-hand side, the user may select which parameter to display on the map and bar plot: withdrawals and discharge, withdrawals and discharge normalized by number of employees, and the percent variation from year to year. The user can select which year to display. For percent variation, the year selected displays the change from the prior year to the selected year. Similarly, users may filter by country or region. The visualizations are also dynamic. A user may select a specific facility in the map or the bar chart to see results for only that facility. To return to a full list of the results in presentation mode press Shift + Esc.

11.2 Water Usage Time Series Tab

This tab shows time series of water usage, number of employees, and number of sites reporting data in MFG and RD facilities using a stacked area plot, a line plot for per employee data, and bar plots for number of employees and sites. On the right-hand side, the user can select which parameter to display: withdrawals or discharge. Similarly, the user can select the period range to show in the plots, the facility type, the country or region of the facilities, and individual or groups of facilities.

11.3 Recycled Water Time Series Tab

This tab shows recycled water over time per facility using a bar plot. The top plot shows bar plot of recycled water over time colored by facility. The bottom plot is a bar plot of the percentage of water withdrawal that was recycled each year. On the right-hand side, the user may select type of facility, and individual or groups of facilities.

11.4 Water Risk Results Tab

This tab shows the results of the water risk tools using a map and a table. On the left-hand side, the user may select the type of facility, the water risk tool(s), and type of risk to show on the map and table. The map shows the locations of the selected facilities colored by the average of the score of the selected indices. The visualizations are also dynamic. A user may select a specific or group of facilities in the map or the table to see a subset of the results. The table can be used also to select a specific index to be shown in the map. To return to a full list of the results in presentation mode press Shift + Esc.

11.5 Suppliers Water Risk Results Tab

This tab shows the Suppliers Water Risk Results using a map and a table. On the right-hand side, the user may select country or region of the facilities shown in the table and the map. The map shows the locations of the selected facilities colored by the score of the WRI - Overall Water Risk Index. The visualizations are also dynamic. A user may select a specific or group of facilities in the map or the table to see a subset of the results. To return to a full list of the results in presentation mode press Shift + Esc.

12 Appendix C

Most water use by Lenovo was for domestic purposes, as such we applied Pearson's correlation between Lenovo's MFG and RD facilities water withdrawal, discharge, and consumption data with the number of employees. We found a strong and significant correlation for all periods for water withdrawal and discharge with a minimum correlation coefficient of 92.4% and a maximum of 96.3% (Figure C1); thus, number of employees is an adequate parameter for normalizing discharge and withdrawal.

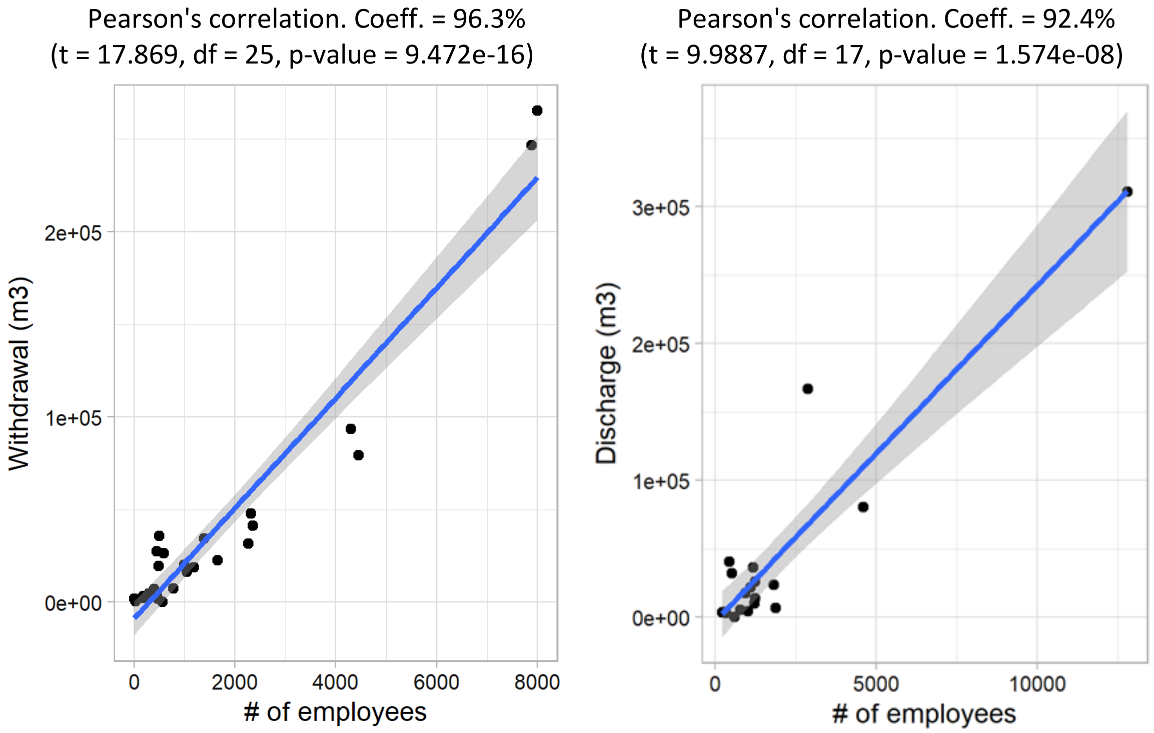


Figure C1 - Water Withdrawal per # Employees 2016 – Maximum correlation coefficient and Water Discharge per # Employees 2014 – Minimum correlation coefficient

13 Appendix D

To assess Lenovo's water-related risks we utilized the WRI Aqueduct 3.0 tool and the WWF Water Risk Filter 5.0. The following is the detail of how the tools' indicators are calculated by each tool, their details, and descriptions. Both tools scores are based on a 0 – 5 scale. The results of each indicator can be seen in the Tableau Dashboard.

13.6 Physical Quantity Risk

The WRI Baseline Water Stress, Baseline Water Depletion, Inter-Annual Variability, and Seasonal Variability indices are based on an open source global hydrological model called PCRaster Global Water Balance (PCRGLOBWB 2), which considers 5 × 5 arc minutes (approx. 10 km. × 10 km.) pixels grid cells. Withdrawal and available water data are aggregated to HydroBASINS level 6 hydrological sub-basins (median area per sub-basin of 5,318 km2). Groundwater level data are aggregated to aquifers defined by Margat & Van der Gun (2013) in the WHYMAP Worldwide Hydrogeological Mapping and Assessment Program (Hofste et al., 2019).

13.6.1 WRI Aqueduct - Baseline Water Stress and Water Depletion Index

Water stress happens when regional water demand exceeds the available renewable amount (supply); on the other hand, water depletion occurs when the consumption of water in a region exceeds the available renewable supply. The baseline water stress and the baseline water depletion measure the ratio of water withdrawals to available renewable groundwater and surface water and the ratio of water consumption (withdrawals - discharge) to available renewable groundwater and surface water respectively, per HydroBASINS 6 hydrological sub-basin. These indicators consider the impact of water users consuming water upstream and dams on downstream water supply (Hofste et al., 2019).

13.6.2 WRI Aqueduct - Inter-Annual and Seasonal Variability Index

Companies confront higher risks when operating in regions with higher annual and seasonal water supply variability. Usually, businesses´ water demand patterns tend to be relatively stable in time; nevertheless, in several regions of the world water supply can be extremely variable, which can cause that water requirements are not met yearly or seasonally. The Inter-Annual and Seasonal Variability indices determine the annual and within-year variability of renewable surface and groundwater supplies per HydroBASINS 6 hydrological sub-basin using the global hydrological model PCRGLOBWB 2 (Hofste et al., 2019).

13.6.3 WRI Aqueduct - Riverine and Coastal Flood Risk Indices

Companies face higher risk when operating in regions with higher probability of flood events. Riverine and Coastal Flood risk are assessed separately considering the area and population exposed to inundations, and existing level of flood protection. These calculations were made using the Aqueduct Floods GLOFRIS model aggregated up to the HydroBASIN 6 scale (Hofste et al., 2019).

13.6.4 WWF Water Risk Filter – Historic Flood Occurrence Risk Index

The Flood Occurrence Risk Index complements the Riverine and Coastal Flood risk indices. It considers the record of floods per location in the period of 1985 to 2019 using news, governmental, instrumental, and remote sensing source data from the Flood Observatory of the University of Colorado. It labels a site as Very Low Risk if no floods occurred, Low Risk if 1-3 floods occurred, Moderate Risk if 4-30 floods occurred, High Risk if 31-400 floods occurred, and Very high Risk if more than 400 floods have occurred in the studied period (WWF, 2019).

13.6.5 WRI Aqueduct - Drought Risk Index

The Drought Risk index measures the company’s potential inability to use water due to droughts. It considers whether droughts are likely to happen, the exposed population and assets, and the resiliency of these elements to adverse effects. Drought risk is assessed for the period 2000–2014 using the 2016 study by Carrão, Naumann, and Barbosa called "Mapping Global Patterns of Drought Risk: An Empirical Framework Based on Sub-national Estimates of Hazard, Exposure and Vulnerability" (Hofste et al., 2019).

13.7 Physical Quality Risk

13.7.1 WRI Aqueduct - Untreated Connected Wastewater Index

For the Untreated Connected Wastewater index, untreated connected wastewater is considered as a proxy for water quality risk because wastewater discharge without adequate treatment makes water bodies vulnerable to contaminants such as salts, pathogens, and nutrients. It is based on the percentage of domestic wastewater that is not being treated to at least a primary treatment level per country. The data was obtained from a 2016 study published by the International Food Policy Research Institute (IFPRI) and Veolia (Hofste et al., 2019). Veoila is one of the world's leading providers of services and technologies for water and wastewater (Veiola, 2019).

13.7.2 WRI Aqueduct - Coastal Eutrophication Potential Index

The Coastal Eutrophication Potential index assesses whether human activities are generating potentially harmful levels of point-source and nonpoint-source pollution. It is based on the Coastal Eutrophication Potential (ICEP) methodology, which measures the potential for discharges of nutrients to produce harmful algal blooms in coastal waters. The nutrient data was obtained from the Global NEWS 2 model aggregated to the HydroBASINS level 6 hydrological sub-basins (Hofste et al., 2019).

13.7.3 WWF Water Risk Filter – Surface Water Contamination Index

The Surface Water Contamination Index is based on a global geospatial framework developed by Vörösmarty et al. (2010) in which an array of crucial contaminants was weighted according to their impact on water security to produce a human and a biodiversity water security incident threat map. This information was then aggregated by WWF up to the HydroBASIN 7 scale (WWF, 2019).

13.8 Regulatory Risk

13.8.1 WRI Aqueduct - Peak RepRisk Country ESG Risk Index

The Peak RepRisk Country ESG Risk index determines Environmental, Social, and Governance (ESG) risk exposure. ESG are considered the three most relevant factors for assessing the sustainability and societal impact of any business (Kell, 2014)). The index provides information about potential reputational, and compliance risks that could possibly threaten water access, quantity, and quality (Hofste et al., 2019). The index is calculated by RepRisk, which is a global company specialized in data science, premium ESG, and business conduct risk due diligence data (Reprisk, 2019).

13.8.2 WWF Water Risk Filter - Enabling Environment (Policy & Laws) Index

The Enabling Environment (Policy & Laws) index considers the basin’s freshwater policy status, law status, and implementation status of water management plans. It evaluates the water risk under the premise that businesses face higher risks when operating in countries with absence or weak government water policies, laws, and implemented water plans (WWF, 2019). The elements of this indicator are based on the UN Sustainable Development Goal Target SDG 6.5.1. database (UN Environment, 2018)

The freshwater policy status determines the existence and quality of local, national and upstream governments’ water strategy, including drought and flood management plans. On the other hand, the law status establishes the level of sophistication and clarity of national or regional water-related legal framework (WWF, 2019). Finally, the implementation status of water management plans refers to the implementation status of national or basin level policies, management instruments, and legal and institutional frameworks required for adequate water resources management (WWF, 2019).

13.8.3 WWF Water Risk Filter - Institutions and Governance Index

Businesses face higher risks when operating in countries with weak governments and institutions, and low participation of stakeholders in management decisions. The Institutions and Governance index combines the basin's corruption perception, freedom in the world, and business participation in water management indices (WWF, 2019).

The corruption index indicator assesses perceived levels of public sector corruption per region and it is based on the Transparency International's 2018 Corruption Perceptions Index. The freedom in the world risk indicator measures the conditions of political rights and civil liberties worldwide, and it is based on Freedom House's 2019 data. The business participation in water management index determines the existence and quality of a platform where stakeholders come together to discuss water-related issues, based on UN Sustainable Development Goal Target SDG 6.5.1. "Business Participation in Water Resources Development, Management and Use" (WWF, 2019).

13.8.4 WWF Water Risk Filter - Management Instruments Index

For the Management Instruments index, the state of the basin or region's management instruments is used as a proxy of regulatory water risk. A company that is located in a basin or region with few or no tools that enable rational and informed decisions related to water management, together with low density and availability of ground and surface water monitoring stations and data, faces an increased risk. This index combines the basin's management instruments for water management, availability of monitoring data for groundwater management, and density of runoff monitoring stations indicators (WWF, 2019).

The basin's management instruments for water management indicator assess the status of the tools and activities that allow rational and informed decision making between options in any particular region or country, and is based s based on the UN Sustainable Development Goal Target SDG 6.5.1. "Sustainable and efficient water use management" indicator. On the other hand, the Groundwater Monitoring Data Availability and Management status is based on the 2019 data set by UN International Groundwater Resources Assessment Centre (IGRAC). Similarly, the density of monitoring stations for surface water quantity indicator was based on the German Federal Institute of Hydrology (BfG) Global Runoff 2018 Data Base.

13.8.5 WWF Water Risk Filter - Financing for Water Resource Development and Management Index

Businesses face lower risks when operating in regions with adequate budgets and financing made available for water resources management and development. The financing for water resource development and management index is based on the UN Sustainable Development Goal Target SDG 6.5.1. "Financing" indicator (WWF, 2019).

13.9 Reputational Risk

13.9.1 WRI Aqueduct - Unimproved/No Drinking Water Risk Index

The Unimproved/No Drinking Water Risk index score is based on the proportion of population per HydroBASINS level 6 hydrological sub-basin that does not have a formal water source. Data for this indicator come from the WHO and UNICEF Joint Monitoring Programme for Water Supply, Sanitation, and Hygiene (Hofste et al., 2019).

13.9.2 WRI Aqueduct - Unimproved/No Sanitation Risk Index

The Unimproved/No Sanitation Risk index determines Unimproved/no sanitation risk exposure. The indicator score is based on the proportion of population per HydroBASINS level 6 hydrological sub-basin that does not have a formal sanitation solution; thus, it directly disposes wastewater in open spaces, or use pit latrines without a platform, hanging/bucket latrines or slab. Data for this indicator come from the WHO and UNICEF Joint Monitoring Programme for Water Supply, Sanitation, and Hygiene (Hofste et al., 2019).

13.9.3 WWF Water Risk Filter - Biodiversity Importance Index

The Biodiversity Importance index is based on the biodiversity importance in each HydroBASINS level 6 hydrological sub-basin, which is used as a proxy for exposure to reputational water risk due to damage to aquatic ecosystems in the basin where the facility is located. The assumption is that companies operating in basins with richer aquatic ecosystems are exposed to higher reputational risks. The data used for this risk indicator is the WWF and The Nature Conservancy Freshwater Ecoregions of the World (FEOW) 2015 data set (WWF, 2019).

13.9.4 WWF Water Risk Filter – Media Scrutiny Index

The Media Scrutiny index takes into account the status of the river basin (e.g., quality and quantity), as well as the importance of water for the population's living conditions (e.g., food and shelter) in relation with how aware local residents are of these water-related issues due to national and global media coverage (WWF, 2019). This risk indicator is based on joint qualitative research by WWF and Tecnoma. Tecnoma is an environmental consulting firm part of Typsa Group, which is a group of independent consulting engineering firms working together since 1966 (Typsa Group, 2019).

13.9.5 WWF Water Risk Filter – Trust & Conflict Index

Businesses face lower risks when operating in regions with low frequency of negative incidents and controversies, as well as low probability of water cross-border conflicts and hydro-political issues. According to WFF (2019) the index score is based on regional incidents and controversies data arranged by RepRisk, and on the assessment of hydro-political risk by Farinosi et al. (2018).

13.10 Water Risk Projections Indices

We considered, from the Aqueduct WRI Aqueduct 3.0 tool, the 2030 business as usual and pessimistic change in water stress, and the 2030 business as usual and pessimistic change in seasonal variability, and from the WWF Water Risk Filter 5.0 tool, the 2050 Projected Change in Drought Occurrence, and the 2050 Projected Change in Flood Occurrence.

13.10.1 WRI Aqueduct – Projected Change in Water Stress and Seasonal Variability

WRI determines projected change of Water Stress and Seasonal Variability from mixed-effects regression models based on projected socioeconomic variables from the International Institute for Applied Systems Analysis (IIASA)'s Shared Socioeconomic Pathways (SSP) database, and general circulation models (GCMs) from the Coupled Model Intercomparison Project Phase 5 (Luck, 2015).

The "business as usual" scenario (SSP2 RCP8.5) considers stable economic growth and gradually increasing carbon emissions, global mean temperatures increasing by 2.6–4.8°C relative to 1986–2005 levels, and CO2 concentrations reaching ~1370 ppm by 2100 (Luck, 2015).

The "pessimistic" scenario (SSP3 RCP8.5) considers uneven economic development, higher population growth, lower GDP growth and rate of urbanization, and steadily rising global carbon emissions, with CO2 concentrations ~1370 ppm by 2100 and global mean temperatures increasing by 2.6–4.8°C relative to 1986–2005 levels (Luck, 2015).

13.10.2 WWF Water Risk Filter – Projected Change in Drought and Flood Occurrence

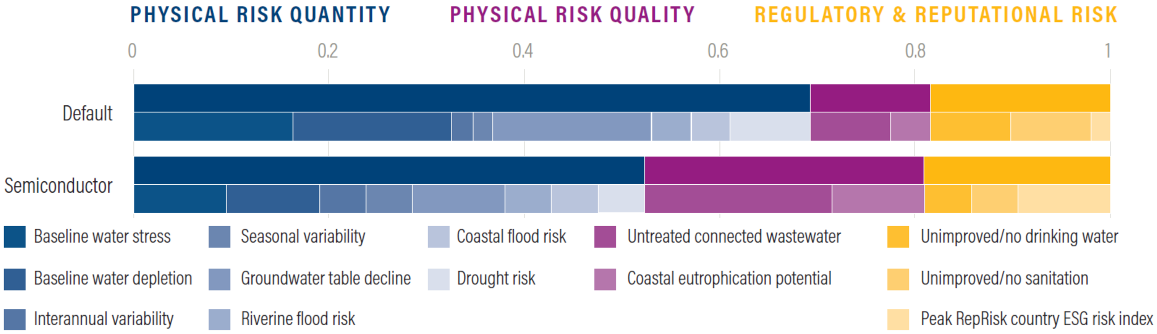
These projected change estimations for the year 2050 were developed by WWF in partnership with the Potsdam Institute for Climate Impact Research and are based on a multi-model simulation that applies global climate and drought models from the Inter-Sectoral Impact Model Intercomparison Project. The drought threshold for initial conditions was determined using time-series averages. The magnitude of the reference flood event was defined based on 100-year return period for pre-industrial conditions. Results are expressed in terms of relative change (%) in probability between pre-industrial and climate change 2°C scenarios (WWF, 2019).

13.11 Aggregated and Overall Water Risk Score

The aggregation is done by taking a weighted average of the indicators that belong to each subgroup. WRI Aqueduct 3.0 considers a default set of indicator weights, which was determined by staff water experts based on intensive questionnaires combined with controlled opinion feedback, and industry-specific weighting schemes that considers how specific industries are exposed to different aspects of water risk (Hofste et al., 2019).

In Figure D1 are presented the WRI Aqueduct 3.0 defined weights for default and semiconductor industry. The main difference between Default and Semiconductor weights is the relative importance that water quality has for the semiconductor industry, especially when water is used for manufacturing processes. Because Lenovo utilizes water only in domestic uses, HVAC systems, and landscape irrigation, the Semiconductor Industry considerations and weights do not apply to the company’s water risk considerations; therefore, it is considered the Default Weight configuration for Lenovo’s Facilities Overall Water Risk.

Figure D1 - Default and Semiconductor Industry Weights (Source: WRI - Hofste et al., 2019)



13.12 Indices that were not considered

Table D1 - Indices that were not considered

Index	Tool	Reason
Groundwater table decline	WRI Aqueduct 3.0	Its effect on Lenovo's water risk is already included in the Baseline Water Stress and Baseline Water Depletion Indices.
Projected water demand	WRI Aqueduct 3.0	Its effect on Lenovo's water risk is already included in the Projected Water Stress Index.
Projected water supply	WRI Aqueduct 3.0	Its effect on Lenovo's water risk is already included in the Projected Water Stress Index.
Aridity	WWF Water Risk Filter 5.0	Its effect on Lenovo's water risk is already included in the Baseline Water Stress and Baseline Water Depletion Indices among others.
Blue Water Scarcity	WWF Water Risk Filter 5.0	Its effect on Lenovo's water risk is already included in the Baseline Water Stress and Baseline Water Depletion Indices.
Projected Change in Water Discharge	WWF Water Risk Filter 5.0	Its effect on Lenovo's water risk is already included in the Projected Water Stress Index.
Cultural Diversity	WWF Water Risk Filter 5.0	Not relevant for Lenovo.

13.13 Analysis of WWF Water Risk Filter Redundant Indices

WRI Aqueduct was considered as the primary tool for assessing water risk. The WWF Water Risk Filter 5.0. indicators were used as a complement of the information provided by WRI Aqueduct 3.0; The indices included in the WWF Water Risk Filter 5.0. that are redundant to the WRI tool were not considered in the water risk assessment; nevertheless, we analyzed the relationship and coincidence between the results of the two tools in these redundant indices.

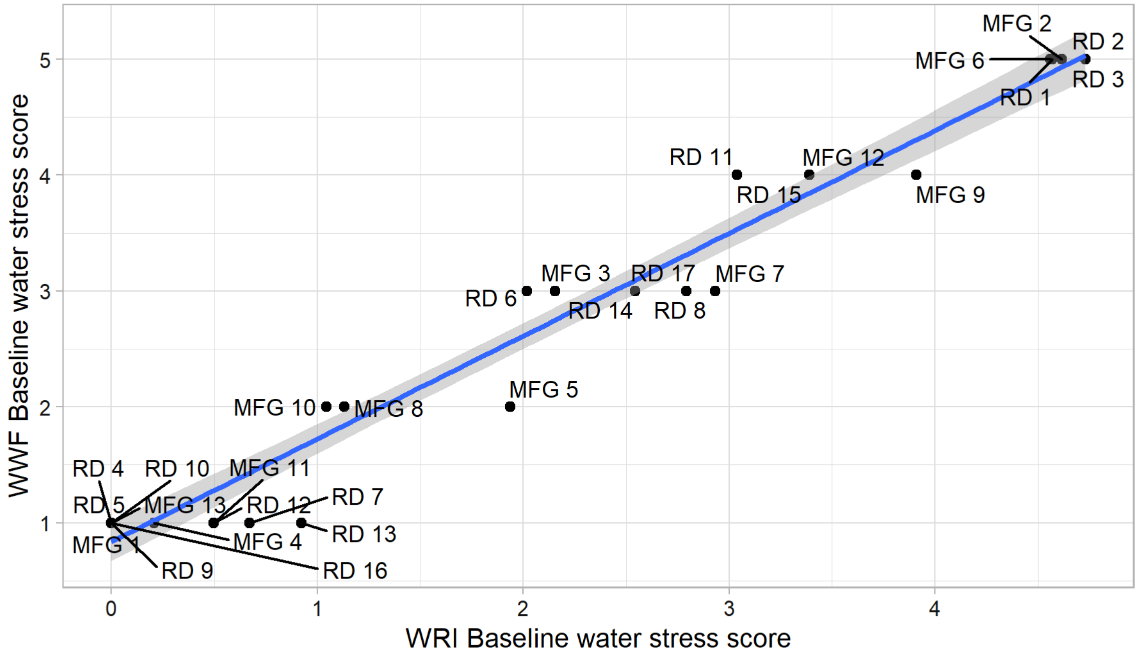


Figure D2 - WRI Aqueduct 3.0 - Baseline water stress and WWF Water Risk Filter 5.0 - Baseline water stress. Pearson's correlation. Coeff. = 98.2% (t = 27.668, df = 28, p-value < 2.2e-16)

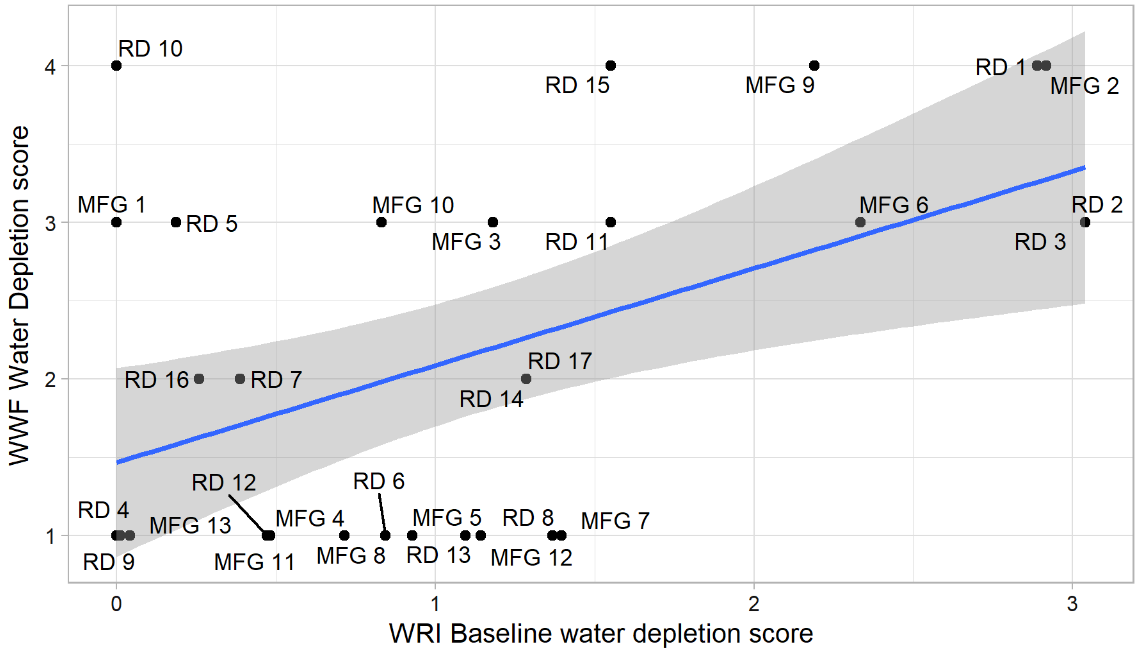


Figure D3 - WRI Aqueduct 3.0 - Baseline water depletion and WWF Water Risk Filter 5.0 – Water depletion. Pearson's correlation. Coeff. = 50.7% (t = 3.112, df = 28, p-value = 0.00425)

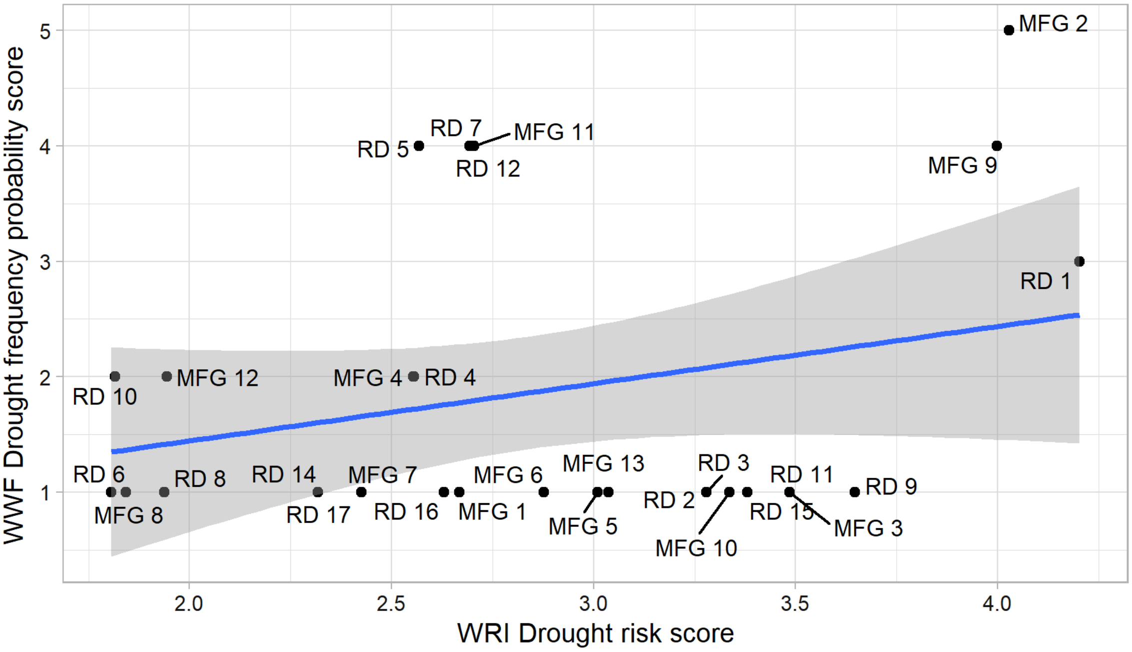


Figure D4 - WRI Aqueduct 3.0 – Drought and WWF Water Risk Filter 5.0 – Drought frequency probability. Pearson's correlation. Coeff. = 25.7% (t = 1.3836, df = 27, p-value = 0.1778)

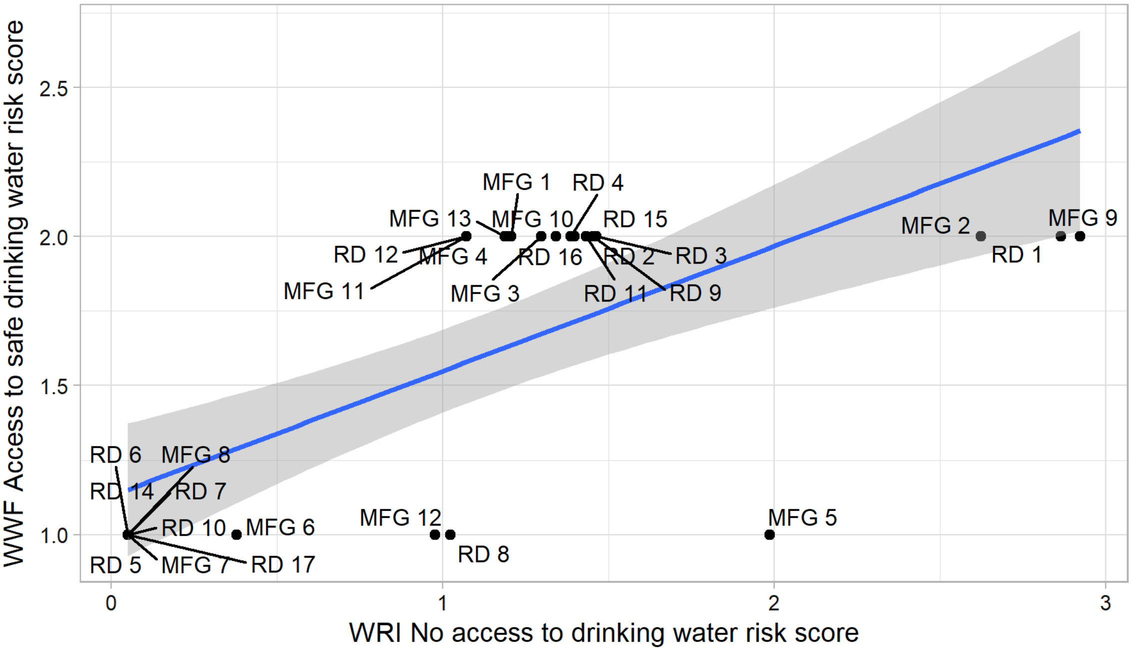


Figure D5 - WRI Aqueduct 3.0 – No access to drinking water and WWF Water Risk Filter 5.0 – Access to safe drinking water. Pearson's correlation. Coeff. = 70.3% (t = 5.1395, df = 27, p-value = 2.094e-05)

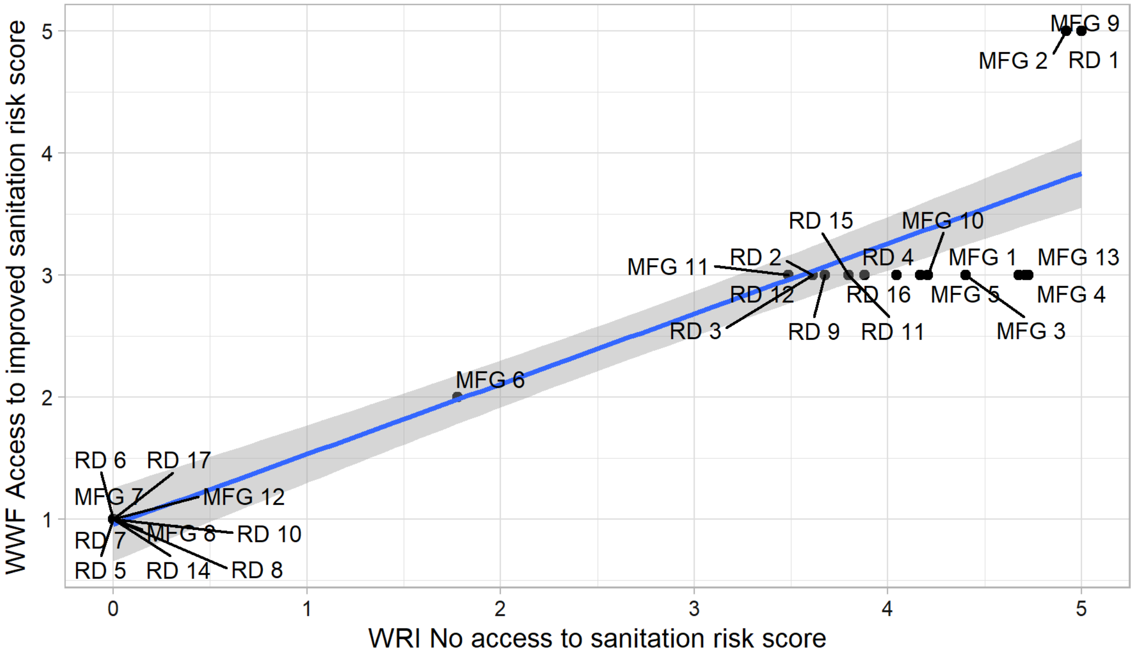
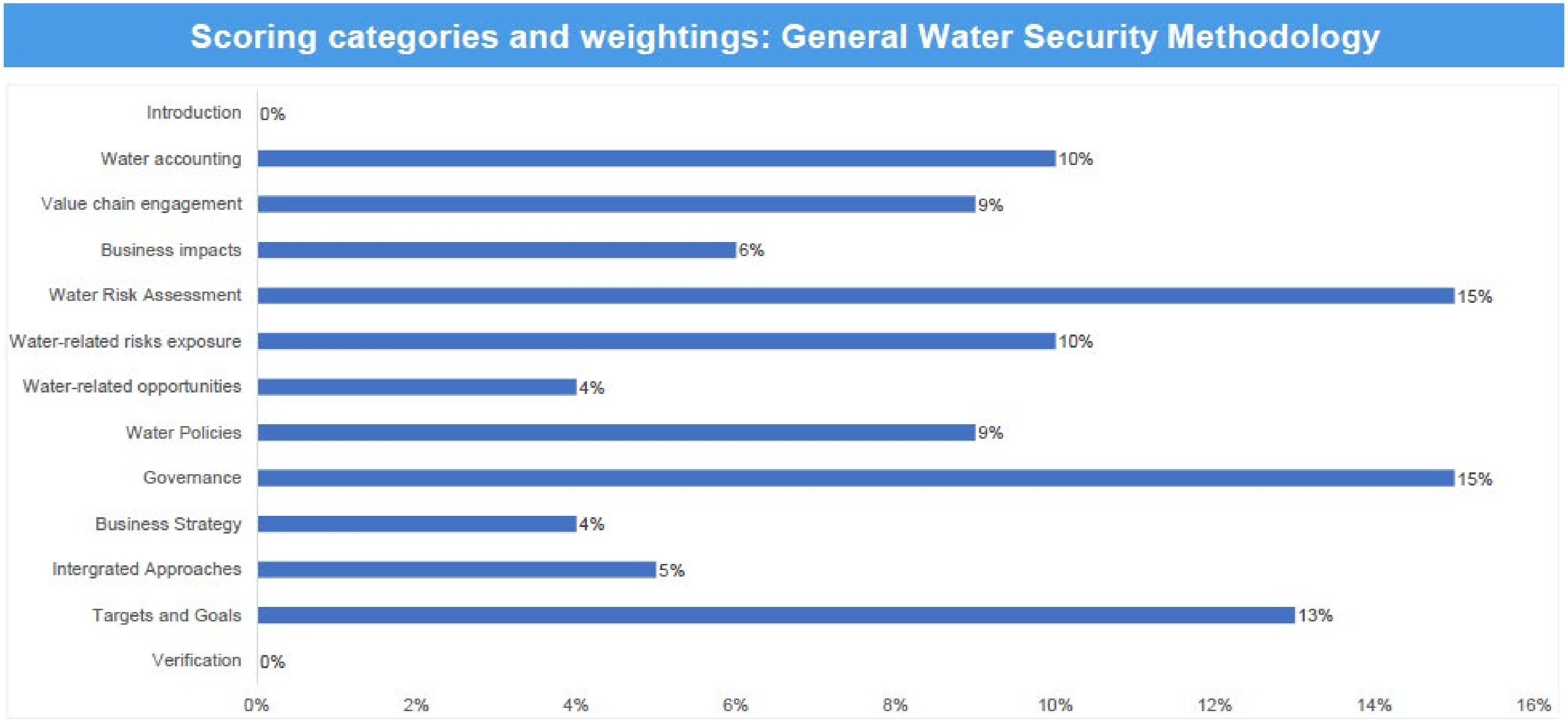


Figure D6 - WRI Aqueduct 3.0 – No access to sanitation and WWF Water Risk Filter 5.0 – Access to improved sanitation. Pearson's correlation. Coeff. = 92.9% (t = 13.033, df = 27, p-value = 3.668e-13)

14 Appendix E

There are 13 categories in CDP's Water Security questionnaire: Introduction; Water accounting; Value chain engagement; Business impacts; Water Risk Assessment; Water-related risks exposure; Water-related opportunities; Water Policies; Governance; Business Strategy; Integrated Approaches; Targets and Goals; and Verification. At the Management and Leadership levels, weightings are applied to scoring categories. These weights reflect the relative importance of each category in a company's progress towards water stewardship within CDP's criteria. The top five categories according to the weights are: water risk assessment; governance; targets and goals; water-related risks exposure; and water accounting.



Source: CDP Water Security 2019: General Scoring Methodology Category Weightings

15 Appendix F

The following tables were developed by combining CDP's Scoring Methodology, Categories and Weightings, and Lenovo's CDP Water Security 2019 responses. Each question was scored against CDP's scoring criteria for each level (Disclosure, Awareness, Management, Leadership). Although our scores were speculative estimates, our final score did align with the score awarded by CDP.

For **Disclosure and Awareness**: the total number of points awarded (*Numerator*) is divided by the total maximum number that could have been awarded (*Denominator*). Dividing the *Numerator* by the *Denominator* provides a fraction which is then changed to a percentage by multiplying by 100 and rounded to the nearest whole number. This whole number is the final percentage score that is used to determine the score received for Disclosure and Awareness.

For **Management and Leadership**: the number of points achieved (*Numerator*) per scoring category are used to calculate the final score according the scoring category weights (see Appendix E). Weights are applied by calculating the Management and Leadership score per scoring category: Numerator / Denominator * 100. These (Management/Leadership) percent scores are then translated into a category score per level by calculating the proportion of points achieved relative to the category weights: Category weights (%) / 100 * Management/Leadership percent score.

Lenovo's current CDP score breakdown is shown in Table F1. Table F2 shows how Lenovo's score could differ by following the scoring criteria when preparing response. Table F3 shows the potential score if additional measures are taken as discussed in Section 7.2.3.

Table F1: Lenovo's CDP Score Breakdown - Current

Lenovo CDP Water Scoring										
Module	Scoring Category	Question	Disclosure		Awareness		Management		Leadership	
			Numerator	Denominator	Numerator	Denominator	Numerator	Denominator	Numerator	Denominator
Introduction	Introduction	W0.1	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥
		W0.2	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥
		W0.3	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥
		W0.4	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥
		W0.5	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥
		W0.6	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥
Current State	Water Accounting	W1.1	9	9	6	6	1	4	0	2
		W1.2	12	12	3	3	0	6	0	1.2
		W1.2b	9	9	3	3	4	6	1	1
		W1.2d	▨	▨	▨	▨	▨	▨	▨	▨
		W1.2h	6	6	6	6	2.5	4.5	🟥	🟥
		W1.2i	6	6	4	4	1.5	3	🟥	🟥
		W1.2j	3	3	1	1	1	3	🟥	🟥
	Value Chain Management	W1.4	1	1	1	1	1	1	🟥	🟥
		W1.4a	4	4	4	4	0	5	0	1.5
		W1.4b	6	6	4	4	3	3	0	1
		W1.4c	1	1	🟥	🟥	3	4	🟥	🟥
Business Impacts	Business Impacts	W2.1	1	1	🟥	🟥	🟥	🟥	0	1
		W2.2	1	1	1	1	1	1	🟥	🟥
Procedures	Water Risk Assessment	W3.3	2	2	1	1	🟥	🟥	🟥	🟥
		W3.3a	12	12	12	12	8	8	0	1
		W3.3b	7	7	5	7	0	7	0	3.5
		W3.3c	11	11	7	11	0	11	0	5.5
		W3.3d	1	1	1	1	1	4	🟥	🟥
Risks and Opportunities	Water-Related Risks Exposure	W4.1	1	1	🟥	🟥	🟥	🟥	🟥	🟥
		W4.1a	5	5	3	3	1	5	0	1
		W4.1b	2	2	1	1	🟥	🟥	🟥	🟥
		W4.1c	4	5	1	1	🟥	🟥	🟥	🟥
		W4.2	22.5	22.5	18	18	3	9	0	9
		W4.2a	8	8	6	6	0	3	0	3
	Water-Related Opportunities	W4.3	2	2	🟥	🟥	1	1	🟥	🟥
		W4.3a	21	21	6	9	0	12	0	6
Facility-level Water Accounting	Water Accounting	W5.1	27.5	27.5	15	15	20	20	🟥	🟥
		W5.1a	17.5	17.5	🟥	🟥	10	10	5	5
		W5.1b	17.5	17.5	🟥	🟥	10	10	5	5
		W5.1c	15	15	10	10	🟥	🟥	🟥	🟥
		W5.1d	3.75	5	2.5	5	🟥	🟥	🟥	🟥
Governance	Water Policies	W6.1	5	5	3	3	1	1	1	1
		W6.1a	3	3	0	3	0	10	0	6
	Governance	W6.2	1	1	🟥	🟥	0	1	🟥	🟥
		W6.2a	▨	▨	▨	▨	▨	▨	▨	▨
		W6.2b	▨	▨	▨	▨	▨	▨	▨	▨
		W6.2c	3	3	0	1	0	2	0	1
		W6.3	4	4	2	3	2	4	0	1
	Water Policies	W6.5	1	1	🟥	🟥	🟥	🟥	🟥	🟥
		W6.5a	▨	▨	▨	▨	▨	▨	▨	▨
	Governance	W6.6	1	1	1	1	🟥	🟥	🟥	🟥
Business Strategy	Business Strategy	W7.1	4.5	9	0	6	0	6	0	2
		W7.2	1	5	0	1	🟥	🟥	🟥	🟥
	Integrated Approaches	W7.3	1	1	1	1	🟥	🟥	1	1
		W7.3a	1	1	🟥	🟥	🟥	🟥	🟥	🟥
		W7.3b	▨	▨	▨	▨	▨	▨	▨	▨
	Business Strategy	W7.4	2	2	0	1	🟥	🟥	🟥	🟥
Targets	Targets and Goals	W8.1	6	6	5	5	2	6	0	1
		W8.1a	22	22	12	12	12	12	1	1
		W8.1b	▨	▨	▨	▨	▨	▨	▨	▨
Linkages and Tradeoffs	Integrated Approaches	W9.1	1	1	1	1	🟥	🟥	🟥	🟥
		W9.1a	4	4	🟥	🟥	1	2	1	3
Verification	Verification	W10.1	1	1	0	1	🟥	🟥	🟥	🟥
		W10.1a	▨	▨	▨	▨	▨	▨	▨	▨
Signoff	Governance	W11.1	2	2	🟥	🟥	1	2	0	1
		W11.2	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥
		Total	302.25	313	146.5	172	Check Category Weightings			
		Score	**97%**		**85%**		**44%**		**18%**	

🟥 **Not scored**

▨ **Question did not appear**

Disclosure		**Awareness**		**Management**		**Leadership**	
0-44%	D-	0-44%	C-	0-44%	B-	0-79%	A-
45-79%	D	45-79%	C	45-79%	B	80-100%	A

Table F2: Current Score - Management/Leadership Weighted Scores

Management Category Weightings Score				
Categories	**Weight**	**Numerator**	**Denominator**	**Final %**
Water Accounting	10%	50	66.5	8%
Value Chain Engagement	9%	7	13	5%
Business Impacts	6%	1	1	6%
Water Risk Assessment	15%	9	30	5%
Water-Related Risks Exposure	10%	4	17	2%
Water-Related Opportunities	4%	1	13	0%
Water Policies	9%	1	11	1%
Governance	15%	3	9	5%
Business Strategy	4%	0	6	0%
Integrated Approaches	5%	1	2	3%
Targets and Goals	13%	14	18	10%
			Total	44%

Leadership Category Weightings Score				
Categories	**Weight**	**Numerator**	**Denominator**	**Final %**
Water Accounting	10%	11	14.2	8%
Value Chain Engagement	9%	0	2.5	0%
Business Impacts	6%	0	1	0%
Water Risk Assessment	15%	0	10	0%
Water-Related Risks Exposure	10%	0	13	0%
Water-Related Opportunities	4%	0	6	0%
Water Policies	9%	1	7	1%
Governance	15%	0	3	0%
Business Strategy	4%	0	2	0%
Integrated Approaches	5%	2	4	3%
Targets and Goals	13%	1	2	7%
			Total	18%

Table F3: Lenovo's CDP Score Breakdown – Following CDP Scoring Methodology

Lenovo CDP Water Scoring										
Module	**Scoring Category**	**Question**	**Disclosure**		**Awareness**		**Management**		**Leadership**	
			Numerator	Denominator	Numerator	Denominator	Numerator	Denominator	Numerator	Denominator
Introduction	Introduction	W0.1	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥
		W0.2	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥
		W0.3	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥
		W0.4	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥
		W0.5	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥
		W0.6	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥
Current State	Water Accounting	W1.1	9	9	6	6	2	4	1	2
		W1.2	12	12	3	3	3.5	6	0	1.2
		W1.2b	9	9	3	3	6	6	1	1
		W1.2d	▨	▨	▨	▨	▨	▨	▨	▨
		W1.2h	6	6	6	6	4.5	4.5	🟥	🟥
		W1.2i	6	6	4	4	3	3	🟥	🟥
		W1.2j	3	3	1	1	3	3	🟥	🟥
	Value Chain Management	W1.4	1	1	1	1	1	1	🟥	🟥
		W1.4a	4	4	4	4	5	5	1.5	1.5
		W1.4b	6	6	4	4	3	3	0	1
		W1.4c	1	1	🟥	🟥	4	4	🟥	🟥
Business Impacts	Business Impacts	W2.1	1	1	🟥	🟥	🟥	🟥	0	1
		W2.2	1	1	1	1	1	1	🟥	🟥
Procedures	Water Risk Assessment	W3.3	2	2	1	1	🟥	🟥	🟥	🟥
		W3.3a	12	12	12	12	8	8	0	1
		W3.3b	7	7	7	7	7	7	2.5	3.5
		W3.3c	11	11	11	11	11	11	3.5	5.5
		W3.3d	1	1	1	1	4	4	🟥	🟥
Risks and Opportunities	Water-Related Risks Exposure	W4.1	1	1	🟥	🟥	🟥	🟥	🟥	🟥
		W4.1a	5	5	3	3	5	5	1	1
		W4.1b	2	2	1	1	🟥	🟥	🟥	🟥
		W4.1c	4	5	1	1	🟥	🟥	🟥	🟥
		W4.2	45	45	36	36	6	18	0	18
		W4.2a	8	8	6	6	0	3	0	3
	Water-Related Opportunities	W4.3	2	2	🟥	🟥	1	1	🟥	🟥
		W4.3a	21	21	6	9	0	12	0	6
Facility-level Water Accounting	Water Accounting	W5.1	27.5	27.5	15	15	20	20	🟥	🟥
		W5.1a	17.5	17.5	🟥	🟥	10	10	5	5
		W5.1b	17.5	17.5	🟥	🟥	10	10	5	5
		W5.1c	15	15	10	10	🟥	🟥	🟥	🟥
		W5.1d	3.75	5	2.5	5	🟥	🟥	🟥	🟥
Governance	Water Policies	W6.1	5	5	3	3	1	1	1	1
		W6.1a	3	3	0	3	0	10	0	6
	Governance	W6.2	1	1	🟥	🟥	0	1	🟥	🟥
		W6.2a	▨	▨	▨	▨	▨	▨	▨	▨
		W6.2b	▨	▨	▨	▨	▨	▨	▨	▨
		W6.2c	3	3	0	1	0	2	0	1
		W6.3	4	4	2	3	2	4	0	1
	Water Policies	W6.5	1	1	🟥	🟥	🟥	🟥	🟥	🟥
		W6.5a	▨	▨	▨	▨	▨	▨	▨	▨
	Governance	W6.6	1	1	1	1	🟥	🟥	🟥	🟥
Business Strategy	Business Strategy	W7.1	4.5	9	0	6	0	6	0	2
		W7.2	1	5	0	1	🟥	🟥	🟥	🟥
	Integrated Approaches	W7.3	1	1	1	1	🟥	🟥	1	1
		W7.3a	1	1	🟥	🟥	🟥	🟥	🟥	🟥
		W7.3b	▨	▨	▨	▨	▨	▨	▨	▨
	Business Strategy	W7.4	2	2	0	1	🟥	🟥	🟥	🟥
Targets	Targets and Goals	W8.1	6	6	5	5	2	6	0	1
		W8.1a	22	22	12	12	12	12	1	1
		W8.1b	▨	▨	▨	▨	▨	▨	▨	▨
Linkages and Tradeoffs	Integrated Approaches	W9.1	1	1	1	1	🟥	🟥	🟥	🟥
		W9.1a	4	4	🟥	🟥	1	2	1	3
Verification	Verification	W10.1	1	1	0	1	🟥	🟥	🟥	🟥
		W10.1a	▨	▨	▨	▨	▨	▨	▨	▨
Signoff	Governance	W11.1	2	2	🟥	🟥	1	2	0	1
		W11.2	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥
		Total	324.75	335.5	170.5	190	Check Category Weightings			
		Score	**97%**		**90%**		**62%**		**34%**	

🟥 **Not scored**

▨ **Question did not appear**

🟧 **Changes**

***W4.1b-W4.2 Changes: Number of facilities disclosed**

Disclosure		**Awareness**		**Management**		**Leadership**	
0-44%	D-	0-44%	C-	0-44%	B-	0-79%	A-
45-79%	D	45-79%	C	45-79%	B	80-100%	A

Table F4: Following Methodology Score - Management/Leadership Weighted Scores

Management Category Weightings Score				
Categories	**Weight**	**Numerator**	**Denominator**	**Final %**
Water Accounting	10%	62	66.5	9%
Value Chain Engagement	9%	13	13	9%
Business Impacts	6%	1	1	6%
Water Risk Assessment	15%	30	30	15%
Water-Related Risks Exposure	10%	11	26	4%
Water-Related Opportunities	4%	1	13	0%
Water Policies	9%	1	11	1%
Governance	15%	3	9	5%
Business Strategy	4%	0	6	0%
Integrated Approaches	5%	1	2	3%
Targets and Goals	13%	14	18	10%
			Total	62%

Leadership Category Weightings Score				
Categories	**Weight**	**Numerator**	**Denominator**	**Final %**
Water Accounting	10%	12	14.2	8%
Value Chain Engagement	9%	1.5	2.5	5%
Business Impacts	6%	0	1	0%
Water Risk Assessment	15%	6	10	9%
Water-Related Risks Exposure	10%	1	22	0%
Water-Related Opportunities	4%	0	6	0%
Water Policies	9%	1	7	1%
Governance	15%	0	3	0%
Business Strategy	4%	0	2	0%
Integrated Approaches	5%	2	4	3%
Targets and Goals	13%	1	2	7%
			Total	34%

Table F5: Lenovo's CDP Score Breakdown – Additional Steps

Lenovo CDP Water Scoring

Module	Scoring Category	Question	Disclosure		Awareness		Management		Leadership	
			Numerator	Denominator	Numerator	Denominator	Numerator	Denominator	Numerator	Denominator
Introduction	Introduction	W0.1	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥
		W0.2	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥
		W0.3	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥
		W0.4	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥
		W0.5	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥
		W0.6	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥
Current State	Water Accounting	W1.1	9	9	6	6	4	4	2	2
		W1.2	12	12	3	3	5	6	1	1.2
		W1.2b	9	9	3	3	6	6	1	1
		W1.2d	4	4	1	1	2	2	🟥	🟥
		W1.2h	6	6	6	6	4.5	4.5	🟥	🟥
		W1.2i	6	6	4	4	3	3	🟥	🟥
		W1.2j	3	3	1	1	3	3	🟥	🟥
	Value Chain Management	W1.4	1	1	1	1	1	1	🟥	🟥
		W1.4a	4	4	4	4	5	5	1.5	1.5
		W1.4b	6	6	4	4	3	3	1	1
		W1.4c	1	1	🟥	🟥	4	4	🟥	🟥
Business Impacts	Business Impacts	W2.1	1	1	🟥	🟥	🟥	🟥	1	1
		W2.2	1	1	1	1	1	1	🟥	🟥
Procedures	Water Risk Assessment	W3.3	2	2	1	1	🟥	🟥	🟥	🟥
		W3.3a	12	12	12	12	8	8	1	1
		W3.3b	7	7	7	7	7	7	3.5	3.5
		W3.3c	11	11	11	11	11	11	5.5	5.5
		W3.3d	1	1	1	1	4	4	🟥	🟥
Risks and Opportunities	Water-Related Risks Exposure	W4.1	1	1	🟥	🟥	🟥	🟥	🟥	🟥
		W4.1a	5	5	3	3	5	5	1	1
		W4.1b	2	2	1	1	🟥	🟥	🟥	🟥
		W4.1c	4	5	1	1	🟥	🟥	🟥	🟥
		W4.2	45	45	36	36	18	18	18	18
		W4.2a	8	8	6	6	3	3	3	3
	Water-Related Opportunities	W4.3	2	2	🟥	🟥	1	1	🟥	🟥
		W4.3a	21	21	9	9	12	12	6	6
Facility-level Water Accounting	Water Accounting	W5.1	27.5	27.5	15	15	20	20	🟥	🟥
		W5.1a	17.5	17.5	🟥	🟥	10	10	5	5
		W5.1b	17.5	17.5	🟥	🟥	10	10	5	5
		W5.1c	15	15	10	10	🟥	🟥	🟥	🟥
		W5.1d	5	5	5	5	🟥	🟥	🟥	🟥
Governance	Water Policies	W6.1	5	5	3	3	1	1	1	1
		W6.1a	3	3	3	3	10	10	6	6
	Governance	W6.2	1	1	🟥	🟥	1	1	🟥	🟥
		W6.2a	6	6	1	1	1	1	1.5	1.5
		W6.2b	3	3	5.5	5.5	2	2	1	1
		W6.2c	▨	▨	▨	▨	▨	▨	▨	▨
		W6.3	4	4	3	3	4	4	0	1
	Water Policies	W6.5	1	1	🟥	🟥	🟥	🟥	🟥	🟥
		W6.5a	▨	▨	▨	▨	▨	▨	▨	▨
	Governance	W6.6	1	1	1	1	🟥	🟥	🟥	🟥
Business Strategy	Business Strategy	W7.1	9	9	6	6	6	6	2	2
		W7.2	1	5	0	1	🟥	🟥	🟥	🟥
	Integrated Approaches	W7.3	1	1	1	1	🟥	🟥	1	1
		W7.3a	1	1	🟥	🟥	🟥	🟥	🟥	🟥
		W7.3b	3	3	1	1	🟥	🟥	🟥	🟥
	Business Strategy	W7.4	2	2	0	1	🟥	🟥	🟥	🟥
Targets	Targets and Goals	W8.1	6	6	5	5	6	6	1	1
		W8.1a	22	22	12	12	12	12	1	1
		W8.1b	8	8	6	6	4	4	1	2
Linkages and Tradeoffs	Integrated Approaches	W9.1	1	1	1	1	🟥	🟥	🟥	🟥
		W9.1a	4	4	🟥	🟥	2	2	2	3
Verification	Verification	W10.1	1	1	1	1	🟥	🟥	🟥	🟥
		W10.1a	4	4	🟥	🟥	🟥	🟥	🟥	🟥
Signoff	Governance	W11.1	2	2	🟥	🟥	2	2	0	1
		W11.2	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥
		Total	355.5	360.5	201.5	203.5	Check Category Weightings			
		Score	**99%**		**99%**		**100%**		**89%**	

🟥 **Not scored**

▨ **Question did not appear**

🟧 **Previous changes**

🟩 **Additional changes**

Disclosure		Awareness		Management		Leadership	
0-44%	D-	0-44%	C-	0-44%	B-	0-79%	A-
45-79%	D	45-79%	C	45-79%	B	80-100%	A

Table F6: Additional Steps Score - Management/Leadership Weighted Scores

Management Category Weightings Score				
Categories	**Weight**	**Numerator**	**Denominator**	**Final %**
Water Accounting	10%	67.5	68.5	10%
Value Chain Engagement	9%	13	13	9%
Business Impacts	6%	1	1	6%
Water Risk Assessment	15%	30	30	15%
Water-Related Risks Exposure	10%	26	26	10%
Water-Related Opportunities	4%	13	13	4%
Water Policies	9%	11	11	9%
Governance	15%	10	10	15%
Business Strategy	4%	6	6	4%
Integrated Approaches	5%	2	2	5%
Targets and Goals	13%	22	22	13%
			Total	100%

Leadership Category Weightings Score				
Categories	**Weight**	**Numerator**	**Denominator**	**Final %**
Water Accounting	10%	14	14.2	10%
Value Chain Engagement	9%	2.5	2.5	9%
Business Impacts	6%	1	1	6%
Water Risk Assessment	15%	10	10	15%
Water-Related Risks Exposure	10%	22	22	10%
Water-Related Opportunities	4%	6	6	4%
Water Policies	9%	7	7	9%
Governance	15%	2.5	4.5	8%
Business Strategy	4%	2	2	4%
Integrated Approaches	5%	3	4	4%
Targets and Goals	13%	3	4	10%
			Total	89%