# FINANCIAL IMPLICATIONS OF ADDRESSING WATER-RELATED EXTERNALITIES IN THE APPAREL SECTOR

December 2021

**About Ceres**

Ceres is a nonprofit organization working with the most influential capital market leaders to solve the world's greatest sustainability challenges. Through our powerful networks and global collaborations of investors, companies and nonprofits, we drive action and inspire equitable market-based and policy solutions throughout the economy to build a just and sustainable future. For more information, visit ceres.org and follow @CeresNews.


**Report Authors**
**Jenna Stewart**, Analyst, Bluerisk, jennastewart@blueriskintel.com
**Paul Reig**, Founder, Bluerisk, paulreig@blueriskintel.com

**Contributing Authors**
**Kirsten James**, Water Senior Program Director, Ceres, james@ceres.org
**Virginie Galas,** Head of Research Equities / CROCI, DWS, virginie.galas@dws.com
**Murray Birt,** Senior ESG Strategist, DWS, murray.birt@dws.com
**Janamejay Kumar,** CROCI Analyst, DWS, janamejay.kumar@dws.com
**Gyanendra-P Jaiswal,** CROCI Analyst, DWS, gyanendra-p.jaiswal@dws.com


**Key data sources for certain information and analysis within t**

- S&P Global Sustainable1
- DWS




**Acknowledgements**

We would like to [illegible] useful assistance with this project, includi[illegible]ordes, Peter Ellsworth, Heather Green, [illegible].

[illegible]inancial support provided by Ceres' partner under the Valuing Water [illegible]ds, along with contributions from the Water Funder Initiative (WFI), Lyda Hill [illegible]y Foundation, and The Sobecki Family Foundation. The opinions expressed in the report [illegible]rs and do not necessarily reflect the views of the sponsors.


**[illegible] and disclaimer**

The information outlined within this document was originally developed by the authors for Ceres. The views expressed in this publication are those of the project team and do not necessarily reflect those of the project sponsors. This publication contains preliminary research, analysis, findings, and recommendations. It is being circulated to stimulate timely discussion and critical feedback and to influence ongoing debate on emerging issues. This document may eventually be published in another form and its content may be revised.

Ceres includes the logos of S&P Global and DWS in presentations and materials surrounding its release, subject to inclusion of appropriate legends and disclaimers.

# Key findings

- The apparel industry withdraws more than 215 billion cubic meters of water annually (Quantis 2018), equal to the total amount of water withdrawn by Indonesia (World Bank). While the sector is responsible for polluting 20% of the globe's freshwater (The Sustainable Business Group 2015), just one in 10 fashion companies that disclose water-related information to CDP (CDP 2020) acknowledges water pollution issues at each stage of the value chain.

- Despite that, in our view current approaches for estimating water risk ignore the value at risk from the widespread negative impacts that apparel companies have on water resources. This leaves companies in this industry and their investors exposed to much higher-than-expected potential losses.

- This brief provides investors with an estimate[1] of the total annual costs of addressing water-related externalities for eight[2] companies in the apparel industry: Burberry Group PLC, H & M Hennes & Mauritz AB, Hanesbrands Inc., Industria de Diseño Textil SA (Inditex), PVH Corporation, Ralph Lauren Corporation, The Gap Inc., and V.F. Corporation[3], which are some of the world's largest in the sector and that represent combined sales of around US$110 billion in 2019 and market capitalization of US$197 billion. It also quantifies the impact of these annual costs on each company's valuation using DWS's[4] Cash Return on Capital Invested (CROCI©) framework. The companies were selected because they are the companies within DWS's CROCI coverage that have a high reliance on cotton and also have water data coverage from S&P Global Trucost [data as of July 25, 2021].

- Based on our analysis, eliminating these companies' impacts on freshwater from water withdrawals and wastewater discharge would require approximate total annual expenditures ranging from US$189.8 million for Burberry to US$1.77 billion[5] for Inditex. The impact of the additional annual expenditure on earnings before interest, taxes, depreciation, and amortization (EBITDA) is significant for all companies, ranging from -21% for Burberry and Inditex, to -47% for PVH.

- Companies that are less vertically integrated downstream in their value chain (e.g., Hanesbrands, PVH, and V.F.) are impacted more (as a percentage of total earnings) because the fraction of their overall margin originating from retail is less, and so can absorb less of the total annual cost required to address water-related externalities across the value chain.

- Given the limitations and exclusions of the method applied in this brief, the actual annual cost required to address water-related externalities in the apparel industry is likely higher than what the results of this brief indicate. However, based on data disclosed to CDP by 357 companies about the potential financial impact and cost of responding to water risk, the cost of inaction could be up to five times higher than the cost of fully addressing the externalities.

- The cost of action is significant but will be required for apparel companies to gain investor trust and confidence that the business is committed to reducing value at risk by addressing water-related externalities to minimize disruptions in raw material sourcing and protect its social and legal license to operate. Additionally, apparel companies that address their impacts on water are poised to strengthen their competitive advantage in the face of a growing preference for more sustainable clothing in an industry that may simply get smaller as consumers move away from fast fashion and ultimately buy less.

- The externalities on freshwater associated with wastewater discharge from the preparation of yarn and the dyeing and finishing of textiles are the costliest to address for all companies, each ranging from between 25% and 31% of the total annual costs.

- The reliance on natural fibers in the apparel industry, including cotton, is of particular importance, given how vulnerable agriculture is to growing physical climate risks. Investors should pay special attention to disclosures by apparel companies to ensure solutions are prioritized where risks and impacts are the highest across the value chain.

- Investors should encourage companies across sectors to use these methods to inform the potential capital and operational costs needed to eliminate externalities, reduce value at risk, and capitalize on opportunities in the face of increasing water challenges[6].

1. All estimates of cost and impact on financial metrics in this paper are based on historical data and are not financial forecasts.
2. These are all the companies for which the analysis could be performed: namely those apparel companies that are covered by both the CROCI© framework, as well as S&P Global Trucost, and which have a high reliance on cotton.
3. Corporates are mentioned for illustrative purposes only. References are not intended to be an investment recommendation.
4. Any reference to "DWS" shall, unless otherwise required by the context, be understood as a reference to DWS Group GmbH & Co. KGaA, including any of its affiliates or subsidiaries. DWS is a global asset manager headquartered in Frankfurt, Germany.
5. All specific financial estimates are based on 2019 company data.
6. These and other conclusions of this paper are referring to the entire apparel industry; the risks described are applicable to all companies with the industry and all analysis resulting in these conclusions has been based on historical data.

# 1 Valuing water is important for investors

One-third of the water sources on our planet are being over-exploited and, in many regions, accessing additional water supplies is unaffordable, putting global economic and business prosperity at serious risk (Brauman et al 2016). With water shortages ranked among the greatest risks to the global economy, financial institutions and regulators are starting to act. In 2020, more than 500 investors requested 1,868 large companies disclose their impacts on freshwater through CDP (CDP 2020). In addition, regulators are putting growing pressure on financial organizations to disclose water risks, and 14 financial institutions have joined the Ceres Valuing Water Finance Task Force (Box 1) to strengthen the financial case for corporate water leadership.

**Box 1. The Valuing Water Finance Task Force**

The global water crisis has created a pressing need to drive capital market actors to play a role in addressing water issues. In response, and as part of the Valuing Water Initiative, the Government of the Netherlands and Ceres partnered to launch the Valuing Water Finance Task Force to help drive corporate action on water-related financial risks. The goal of the Task Force is to raise awareness within the capital markets of the widespread negative impacts of corporate practices on water supplies, as well as to clarify which industries and practices are linked to the most severe and systemic of these impacts. To achieve that, the Valuing Water Finance Task Force has supported the documentation of the scientific evidence on the most severe and systemic private sector water-related externalities to help estimate and inform capital markets on the financial materiality of water-related externalities and guide the development of credible, actionable corporate expectations for valuing water.

However, current approaches to estimating water risk focus mostly on understanding the exposure that different asset classes have to physical climate risks (Ceres Investor Water Toolkit), often ignoring the value at risk from the widespread negative impacts that corporate externalities have on water resources. The potential for financial impacts associated with corporate externalities on water resources is evident in existing disclosures (Box 2). Unless companies take action to address their externalities on water across the value chain, companies and investors may be significantly underestimating physical, regulatory, and reputational water risks across asset classes and investment portfolios, and increasing their exposure to potential higher-than-expected losses.

**Box 2. Financial impacts driven by corporate externalities on water resources**

**Formosa Taffeta Co.**, disclosing to CDP in 2020, estimated a potential financial impact of US$126 million (7% of the company's market capitalization) attributed to customers reducing orders if the company did not perform well on the Higg Index (a tool to measure value chain sustainability that includes water use and pollution).

**A major apparel manufacturer** disclosing to CDP in 2020 estimated that fines associated with the discharge of untreated wastewater could be up to US$100,000, with the likelihood likelihood that those would increase due to tighter regulatory change. Source: CDP 2020

To assist in addressing this gap, Ceres, with insights from the Valuing Water Finance Task Force and Investor Working Group, collaborated with water risk consultant Bluerisk sustainability intelligence provider, S&P Global Sustainable1, and the asset manager DWS Group to estimate the financial materiality of addressing water externalities for eight companies in the apparel industry and provide an analytical evidence-base to support investor engagement on enhanced management of water risk. This brief aims to inform asset owners and asset managers interested in:

- Understanding the financial materiality of addressing water-related externalities in the apparel industry.
- Applying the proposed methods to other portfolio companies in the apparel or other industries.
- Using the results to inform their engagements with companies on water.[7]

7. For this report, materiality refers to what is important enough to be included in and what can be omitted from a financial statement. Externalities refer to the environmental and societal costs caused by a company that are not financially incurred or covered by the company.

# 2 Relevance of water-related externalities in the apparel sector

The apparel industry withdraws over 215 billion cubic meters of water annually (Quantis 2018), which is equivalent to the total annual water withdrawals of Indonesia in 2017 (World Bank). The sector is responsible for polluting 20% of the globe's freshwater (The Sustainable Business Group 2015), triggering global water shortages and water quality problems that impact social, economic, and ecosystem health (Al Jazeera, 2021). Furthermore, the University of Saskatchewan Global Institute for Water Security Global Impact Assessment and other subject matter experts identified several water-related externalities associated with the apparel industry that are responsible for systemic and chronic impacts on freshwater resources. To better understand where and why these occur, we linked each externality to specific activities and mapped them across the apparel industry's value chain (Table 1).

**Table 1. Externalities associated with the apparel sector identified from the scientific literature and subject matter experts, excluding the externalities associated with livestock production.**

| Value chain section | Activity | Externality | Freshwater Impact Examples | Potential Business Risk |
|---|---|---|---|---|
| **Fiber Production** | Fertilizer applications | Nutrient loading | Eutrophication | Increased CAPEX/OPEX to access alternative water supply<br><br>Increased cost of raw materials<br><br>Litigation over impacts on downstream water quality or groundwater depletion<br><br>Loss of social and legal license to operate |
| | Pesticide and herbicide applications | Pesticide/herbicide runoff | Toxicity for aquatic life | |
| | Irrigation | Water withdrawals | Water stress | |
| **Yarn Preparation** | Spinning | Water withdrawals | Water stress | |
| | Yarn preparation wastewater discharge | Wastewater discharge | Eutrophication, toxicity for aquatic life | |
| **Fabric Preparation** | Knitting and weaving | Water withdrawals | Water stress | |
| | Fabric preparation wastewater discharge | Wastewater discharge | Eutrophication, toxicity for aquatic life | |
| **Dyeing & Finishing** | Bleaching, dyeing, and finishing | Water withdrawals | Water stress | |
| | Dyeing and finishing wastewater discharge | Wastewater discharge | Eutrophication, toxicity for aquatic life | |
| **Assembly and Distribution** | Cutting, sewing, and transportation | Water withdrawals | Water stress | |
| | Assembly wastewater discharge | Wastewater discharge | Eutrophication, toxicity for aquatic life | |
| **Consumer Use** | Laundry washing | Water withdrawals | Water stress | |
| **End of Life** | Disposal | Chemical contaminant seepage into water bodies | Toxicity for aquatic life | |

# 3 Cost of action required to address water-related externalities in the apparel sector

DWS's Cash Return on Capital Invested (CROCI©) framework currently provides coverage for eight apparel companies[8] that are also covered by S&P Global Trucost, [Data as of July 25, 2021] and have a high reliance on cotton: Burberry Group PLC (Burberry), H & M Hennes & Mauritz AB (H&M), Hanesbrands Inc. (Hanesbrands), Industria de Diseno Textil SA (Inditex), PVH Corporation (PVH), Ralph Lauren Corporation (Ralph Lauren), The Gap Inc. (The Gap), and V.F. Corporation (V.F.). Because of that, these eight companies were selected to estimate, using the CROCI© methodology, the impact that the annual cost of addressing water-related externalities may have on the valuation of each company, and inform the degree to which water-related externalities may be financially material to these and other apparel companies. These companies are some of the world's largest in the sector and represented combined sales of around US$110 billion in 2019 and market capitalization of US$197 billion (Table 2).

**Table 2. Information on the eight apparel companies included in the analysis. Source: S&P Global Trucost, [data as of July 25, 2021], and company data.**

| Company | Revenue (US$ M) | Adj. Net Profit (US$ M) | Headquarters | Employees |
|---|---|---|---|---|
| **Burberry** | 3,571 | 337 | England | 10,000 |
| **H&M** | 24,710 | 1,449 | Sweden | 171,000 |
| **Hanesbrands** | 6,967 | 602 | US | 61,000 |
| **Inditex** | 30,692 | 4,082 | Spain | 144,000 |
| **PVH** | 9,657 | 637 | US | 33,000 |
| **Ralph Lauren** | 6,313 | 390 | US | 20,000 |
| **The Gap** | 16,580 | 530 | US | 117,000 |
| **V.F.** | 13,849 | 944 | US | 40,000 |

Of the externalities identified in Table 1, we used publicly available data to estimate the magnitude of the externalities caused by withdrawals of irrigated water during the production stage of cotton and the withdrawals of industrial water and discharges during the manufacturing stages. We then attributed to each company the fraction of the externality they are responsible for, using company disclosures and geospatial analysis of top cotton, textile, and clothing producing countries.

Limitations in data available required that certain externalities be excluded from the scope of this research (Appendix A), including nutrient loading and pesticide and herbicide runoff from the cotton production stage, and the externalities associated with consumer use and end of life.

After estimating the magnitude of the externalities and adjusting for existing commitments (Box 3), we developed and applied methods (Appendix B) to estimate the annual cost required for each company to eliminate its externalities. The results (Table 3) indicate that eliminating the impacts on freshwater from water withdrawals and wastewater discharges would require an approximate total annual expenditure, including CAPEX and OPEX, ranging from US$189.8 million for Burberry to US$1.77 billion for Inditex. The externalities associated with wastewater discharge from yarn preparation and dyeing and finishing are the costliest to address for all companies, each ranging between 25% and 31% of the total annual cost.

Externalities associated with wastewater discharge are more expensive to address than the externalities associated with industrial water withdrawals because all wastewater needs to be treated, while only a portion of the withdrawals needs to be reduced (between 8 and 14% for the companies analyzed) to eliminate a company's contribution to water stress. For instance, we estimated that it would cost Inditex US$1.23 billion annually to adopt business practices that would eliminate impacts from wastewater discharge during the textile manufacturing stages, while it would cost an estimated US$540 million annually to reduce industrial water withdrawals.

8. Corporates are mentioned for illustrative purposes only. References are not intended to be an investment recommendation.

### Box 3. Existing company commitments to address water-related externalities

Because the eight companies have publicly committed to sustainably source all cotton by 2025, including commitments to source certified organic cotton or to source through the Better Cotton Initiative (BCI), we reduced the externalities associated with irrigated water withdrawals by 14%, which represents the average water savings associated with sustainable cotton sourcing (The Sustainable Business Group 2015). Similarly, because the eight companies have committed to reducing water consumption throughout their value chains, we adjusted the externalities associated with industrial water withdrawals proportional to their commitments and used a default reduction of 10% if no quantified water reduction target was disclosed by the company. The companies have also committed to treating wastewater discharges throughout their value chains, though the commitments vary in terms of treatment level and amount. Because of that, we assumed that only 50% of the wastewater will need to be treated. Companies without voluntary commitments or legal requirements to treat all wastewater discharge or reduce water withdrawals may face significantly higher costs of action than the companies analyzed in this brief.

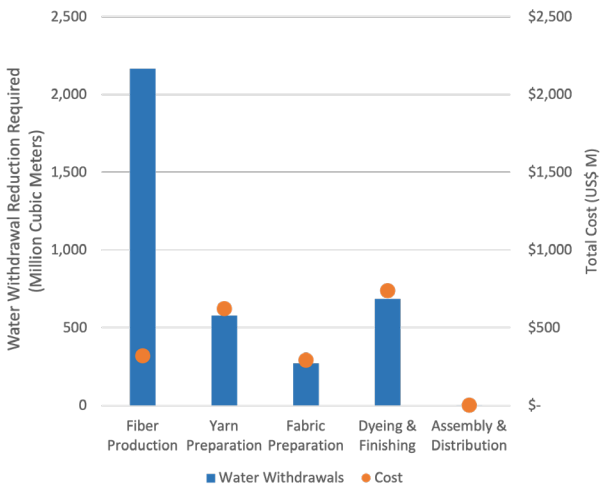
The average volume of irrigated water withdrawals used to grow cotton would need to drop 33% to eliminate a company's contribution to water stress in the fiber production section of the value chain. This is more than double the average percent reduction in water withdrawals that would be required to eliminate a company's contribution to water stress during yarn preparation, fabric preparation, dyeing, finishing, assembly, and distribution, which ranges between 8% and 14%. Apparel companies could reduce water withdrawals during yarn preparation, fabric preparation, dyeing, finishing, assembly, and distribution by incorporating solutions like water efficiency, water pressure reduction, water reuse, and recycling. The cost of these solutions, as estimated in this brief, are on average much higher than the ones used for their agricultural counterparts, such as irrigation scheduling, improved soil drainage, or advanced sprinkler systems. Because of that, the annual cost of reducing industrial water withdrawals is higher than reducing much larger volumes of irrigated water withdrawals associated with cotton production (Figure 1).

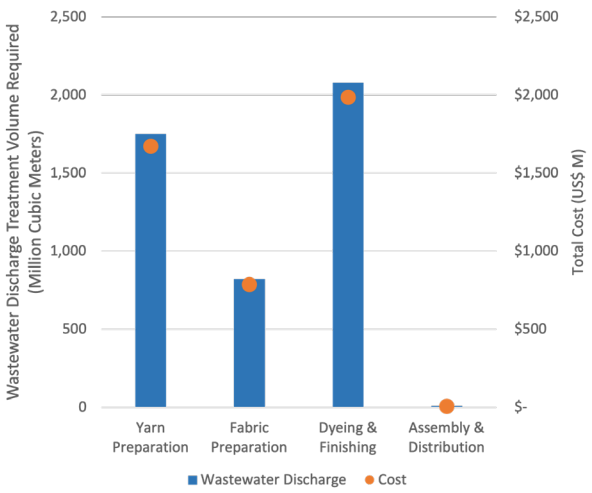
Separately, addressing the impacts of wastewater discharge throughout the supply chain of the apparel companies considered in this analysis represents 69% of the total annual expenditure required, whereas the cost of addressing the impacts on water quantity is less than half that (Figure 1).

**Table 3. Estimated annual cost required to address water externalities across the value chain for eight apparel companies.**

| | | Percent of the total annual cost to address externalities | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Value chain section | Externality | Burberry | H & M | Hanesbrands | Inditex | PVH | Ralph Lauren | The Gap | V.F. |
| Fiber Production | Water withdrawals | 4.7% | 5.6% | 5.6% | 4.7% | 4.7% | 5.3% | 4.7% | 4.7% |
| Yarn Preparation | Water withdrawals | 9.7% | 9.6% | 9.6% | 9.7% | 9.7% | 9.7% | 9.7% | 9.7% |
| | Wastewater discharge | 26.1% | 25.9% | 25.7% | 26.1% | 26.1% | 25.9% | 26.1% | 26.1% |
| Fabric Preparation | Water withdrawals | 4.6% | 4.5% | 4.5% | 4.6% | 4.6% | 4.5% | 4.6% | 4.6% |
| | Wastewater discharge | 12.2% | 12.1% | 12.1% | 12.3% | 12.3% | 12.2% | 12.3% | 12.2% |
| Dyeing & Finishing | Water withdrawals | 11.5% | 11.4% | 11.4% | 11.6% | 11.6% | 11.5% | 11.6% | 11.5% |
| | Wastewater discharge | 30.9% | 30.7% | 30.5% | 31.0% | 31.0% | 30.8% | 31.0% | 31.0% |
| Assembly and Distribution | Water withdrawals | 0.1% | <0.1% | 0.1% | <0.1% | <0.1% | <0.1% | <0.1% | <0.1% |
| | Wastewater discharge | 0.2% | <0.1% | 0.4% | <0.1% | <0.1% | 0.2% | <0.1% | 0.1% |
| Total annual cost to address externalities (US$/year) | | 189,844,000 | 1,103,943,000 | 503,704,000 | 1,766,358,000 | 738,742,000 | 337,020,000 | 911,568,000 | 874,871,000 |

**Figure 1. Total annual water withdrawal reduction volumes and associated costs required for the sample companies to eliminate water quantity externalities (left), and total annual wastewater discharge treatment volumes and associated costs required for the sample companies to eliminate water quality externalities (right).**




These results provide high-level estimates of the annual expenditure required by Burberry[9], H&M, Hanesbrands, Inditex, PVH, Ralph Lauren, The Gap, and V.F. to address the externalities and associated freshwater impacts considered in this research. The actual annual cost is likely higher than what the results of this brief indicate due to the exclusion of the externalities listed in Appendix A. Furthermore, there are several assumptions and limitations that must be considered (Appendix B10). Primarily, estimates for the volume of sourced cotton were obtained from PVH, Ralph Lauren, and V.F. disclosures. Due to limited cotton volume sourcing disclosure information from the remaining five companies, we developed a factor based on revenue rebased at estimated wholesale prices and based on data disclosed by PVH, Ralph Lauren, and V.F. disclosures, and applied it to estimate the volume of cotton sourced for Burberry, H&M, Hanesbrands, Inditex, and The Gap. Given that the relative breakdown in products is not the same for all companies, the factors could be improved in the future through better disclosures or direct engagement with the company. Other assumptions include the exclusion of non-cotton-based fibers in the fiber production stage and limiting cotton sourcing areas to the top 10 cotton producing countries.

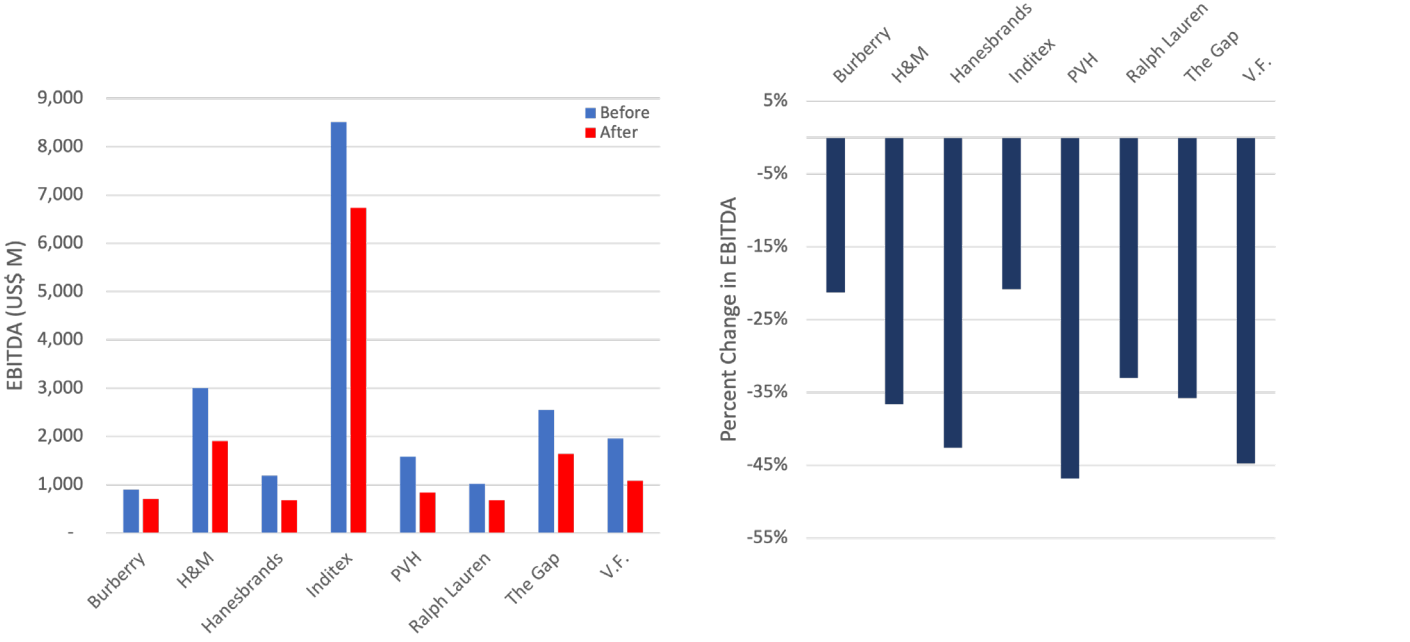
9. Corporates are mentioned for illustrative purposes only. References are not intended to be an investment recommendation.

# 4 Water-related financial materiality of addressing water externalities for eight apparel companies

After estimating the annual cost of addressing externalities, we then used DWS's CROCI© methodology to conduct a sensitivity analysis to evaluate the potential impact that the additional annual expenditure would have on each company's valuation, based on their 2019 financial performance. The results (Figure 2 and Appendix D) indicate that the impact of the additional annual expenditure, as calculated in this brief, is significant, moving all companies' valuation (multiples) to expensive territories (higher than equity market average valuation multiples). Specifically, the results highlight:

- Significant impact on EBITDA, ranging from -21% for Burberry and Inditex, to -47% for PVH, and on CROCI Cash Flows (CROCI CF) (adjusted EBITDA post tax), ranging from -15% to -37%. The relative differences in impact on EBITDA and CROCI CF reflect differences in tax rates and in accounting treatment of operating leases (before IFRS 16 implementation[10]). For example, compared to peers, the impact on CROCI CF is much less than the impacts on EBITDA for H&M after homogenizing operating lease treatment.
- The impact on EBITDA is lower for the more profitable companies with higher EBITDA margins, such as Burberry and Inditex, and higher for companies less vertically integrated downstream, such as Hanesbrands, PVH, and V.F. This is because the fraction of their overall earnings originating from retail is lower and therefore can absorb less of the total annual cost required to address water-related externalities across the value chain.
- Significant impact on net profit for all companies, ranging from -34% for Inditex to -127% for The Gap, mainly reflecting differences in indebtedness.
- Impact on the CROCI cash return (a measure of profitability) ranging from a decrease of -3.7% for Burberry to a drop by -11% for V.F.
- Four companies would see their profitability (as measured by CROCI cash return) fall below the cost of capital: H&M, PVH, Ralph Lauren, and The Gap, mainly as a result of their lower CROCI, even before accounting for the annual cost addressing water-related externalities.

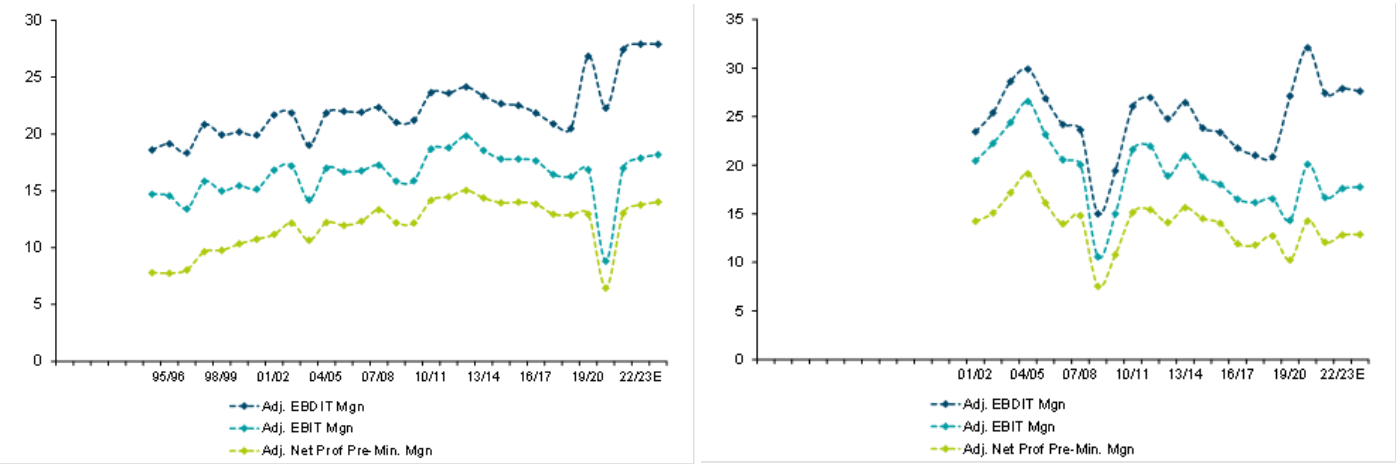
**Figure 2. Impact of the annual cost to address externalities on EBITDA in US$M and as a percentage change, based on the 2019 annual currency conversion rate.**




The above calculations have been made based on 2019 performance. Considering the sometimes highly cyclical nature of demand, revenues, and margins in the apparel industry, the impact could vary significantly depending on the timing of the analysis and company position in the cycle (Figure 3).

10. IFRS 16 is a standard for accounting cost treatment of operating leases on buildings www.ifrs.org/issued-standards/list-of-standards/ifrs-16-leases.

**Figure 3. Evolution and cyclicality of margins over time for Inditex (left) and Burberry (right).**




It is important to note that the annual cost to address externalities accounts only for the cost of eliminating water-related externalities associated with each company's activities. It does not consider the cost of mitigating or adapting to water-related risks driven by externalities caused by other water users or physical climate risks, and their impact on market conditions (Box 4). For example, water-related impacts on cotton production caused by increasing water stress (Figure 4), floods, or droughts could have considerable impact on cotton prices and supply availability, leading to impact on company margins and/or consumer prices.

**Box 4. Financial impacts driven by externalities caused by other water users or physical climate risks, and their impact on market conditions**

**In Bangladesh**, preliminary results indicate that irrigation costs could rise by US$1.5 billion by 2030 due to lower water tables, increased groundwater pumping, and higher fuel costs (WWF and H&M 2016).

**In Pakistan**, cotton prices rose from US$0.65-0.70 per pound in 2009 to US$2.48 in 2010 as a result of extreme flooding in the region (Forum for the Future 2021).

**In Australia**, due to wildfires, water scarcity, and hot conditions, cotton production decreased from 3.63-3.92 million bales over three years to less than 1 million bales in 2019/2020 (Forum for the Future 2021).

**In Texas**, due to severe drought conditions in 2011, 55% of cotton fields were abandoned, which lead to financial losses of around US$2.2 billion. In 2017, flooding from hurricanes caused losses of more than US$100 million due to damaged cotton crops (Forum for the Future 2021).

**In Vietnam**, World Bank Group estimates that by 2035, the cost of inaction on wastewater (treating only 10% of municipal wastewater) would decrease Vietnam's GDP by -3.5%, while treating 100% of the municipal wastewater would increase GDP by 2.3% (World Bank Group 2019).

**50% of cotton growing regions** face high to very high exposure to climate risk (Cotton 2040, 2021).

Across the value chain, the results also exclude the cost of restoring impacts from past externalities and the cost savings and increased revenue generation potential associated with implementing solutions.

Because of this, additional data and analysis is required to understand the full costs and benefits, and associated impacts on EBITDA and net profits.

**Figure 4. Baseline water stress in areas of cotton production (WRI 2019, EarthStat).**

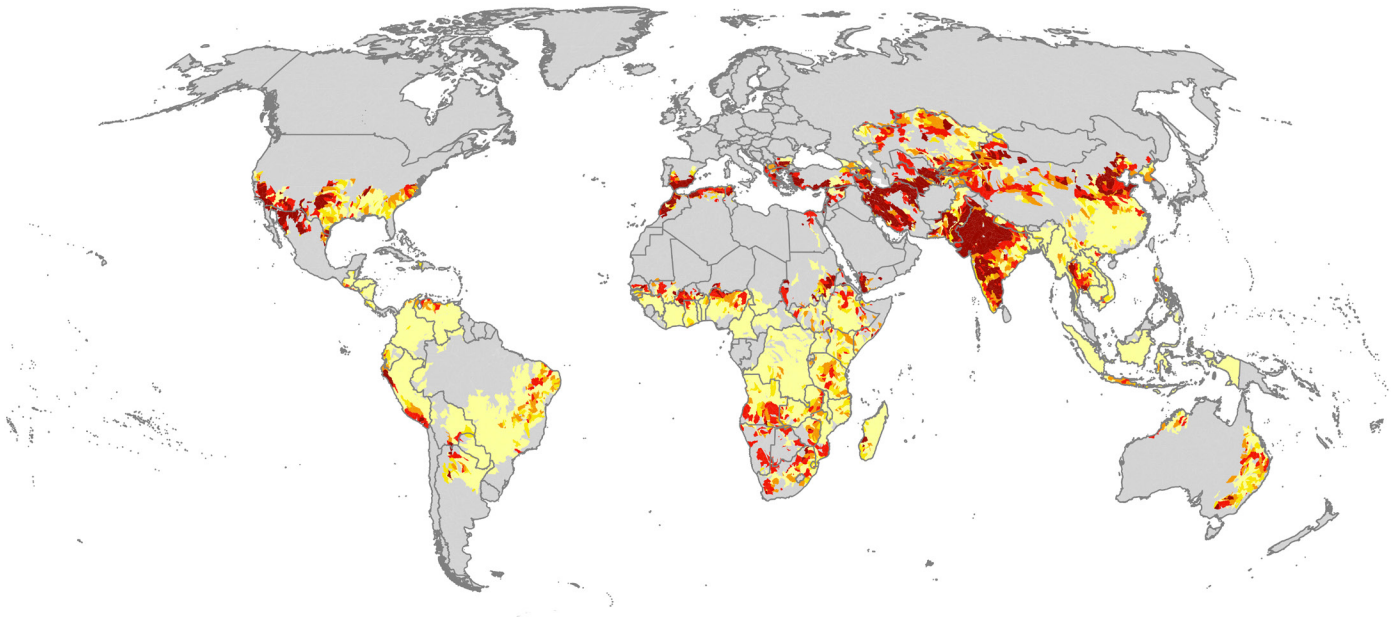


**Table 4. Cotton lint production and average baseline water stress in the top 10 cotton producing countries for 2018/2019 (ICAC, WRI 2019).**

| Country | Total cotton lint production for 2018/2019 ('000 metric tonnes) | Average baseline water stress weighted by cotton production |
|---|---|---|
| China | 6,040 | Medium - High |
| India | 5,661 | Extremely High |
| USA | 3,999 | Medium - High |
| Brazil | 2,779 | Low |
| Pakistan | 1,670 | High |
| Turkey | 977 | High |
| Uzbekistan | 637 | High |
| Australia | 485 | Low – Medium |
| Mexico | 414 | Extremely High |
| Benin | 295 | Low |

# 5 Implications[11] for companies and investors

Given the limitations and exclusions referenced above, the actual annual cost required to address water-related externalities is likely to vary from what the results of this brief indicate. Most notably, estimates of water withdrawals across the value chain are unlikely to match the actual water withdrawal volumes. Similarly, despite current efforts by Better Cotton Initiative, Organic Cotton, and other cotton sourcing certification bodies, the cost of eliminating the impacts from nutrient runoff and pesticide use during cotton production are excluded yet may be significant. Additionally, the annual cost of mitigating or adapting to emerging water-related risks must be added, highlighting that companies in the apparel industry and their investors must not underestimate future expenditures required to minimize value at risk. However daunting the annual cost to address water-related externalities may be, the cost of inaction can be up to five times higher (CDP 2020).

For the companies assessed in this brief, the annual costs of addressing water-related externalities is significant, ranging between 3.5% and 7% of annual revenue. However, what's most concerning may not be the annual expenditure required, but rather that just one in 10 fashion companies that disclose water impacts to CDP acknowledges water pollution issues at each stage of the value chain in disclosures (CDP 2020). On top of that, in 2020, Morgan Stanley Investment Research[12] found that while consumers are not yet aware of the scale of the industry's environmental footprint, they have started buying fewer items and have a growing preference for more sustainable clothing. Increased consumer awareness of the scale and magnitude of the industry's impacts on freshwater resources will only accelerate these trends.

The negative impacts that the apparel industry is having on water should be addressed promptly to gain investor trust and confidence that companies are committed to protecting their social and legal license to operate and minimizing price volatility and disruptions in raw material sourcing. Companies that take meaningful actions to address their impacts on water resources are poised to strengthen their competitive advantage in the face of a growing preference for more sustainable clothing in an industry that may simply get smaller as consumers move away from fast fashion and ultimately buy less.

The information and methods provided in this brief, as well as recent analyses by companies such as Kering (Kering 2020), are indicative that water-related externalities across the value chain can be calculated, particularly when the work is carried out by the company in question and therefore more detailed operational and procurement data are accessible.

In addition, the reliance on natural fibers, such as cotton, in the apparel industry is of particular importance, given the vulnerability of the agricultural sector to physical climate risks. Globally, approximately 73% of cotton is grown with full or partial irrigation. Changes in temperature, drought frequency and intensity, freshwater availability, and unpredictable rain patterns across current cotton growing regions around the world are expected to reduce cotton productivity (Copernicus, the European Union's Earth Observation Programme, 2021). Investors should pay special attention to disclosures of apparel companies to ensure that solutions, including emerging technologies to reduce water intensity in the textile industry (Levi Strauss & Co 2016), are prioritized where risks and impacts are highest across the value chain and in response to the contextual challenges each company faces at the locations it operates and sources from (Figure 4).

Investors should encourage companies across sectors to use these methods to estimate their impacts on water resources across the value chain and the benefits of taking action to inform the potential capital and operational expenditure required to eliminate impacts, reduce value at risk, and capitalize on opportunities in the face of increasing water challenges.

Based on the results of this brief, investors engaging companies should consider the following:

- Has the company assessed the value at risk from water-related externalities?
- To minimize the value at risk from water-related externalities:
  - Has the company assessed the cost and financial implications of addressing water-related externalities?
  - How is the company planning to re-allocate expenditures to cover the additional cost?
- Is the company investing the data collection infrastructure required to make these decisions?

11. These and other conclusions of this paper are referring to the entire apparel industry; the risks described are applicable to all companies within the industry and all analysis resulting in these conclusions has been based on historical data.
12. Morgan Stanley Investment Research (May 2020) Sustainable Consumption: Covid19 isn't the only challenge facing Apparel Retailers.

# Appendices

## Appendix A: Externalities excluded from this research

- **Pesticide and herbicide runoff**
  There are numerous compounds applied to agriculture, the regulatory requirements vary across regions, and pesticide exceedance studies are limited and context-specific, making it difficult to quantify and extrapolate the origins and exceedances of company pesticide and herbicide applications (Stackpoole et al. 2021). Additional geographic data is required on pesticide consumption trends and regulations. However, though the textile sector still consumes 10-20% of global pesticides (McKinsey 2020), the eight companies included in this analysis committed to sourcing 100% sustainable cotton over the next few years. Initiatives such as Better Cotton Initiative and organic cotton minimize pesticide use, potentially making this externality less material in the future (The Sustainable Business Group 2015).
- **Nutrient loading**
  At a global scale, nutrient loading from cotton is difficult to attribute to companies due to limited visibility into supply chain fertilizer practices and the resulting runoff into nearby water sources. In addition, as per pesticide use, initiatives such as Better Cotton Initiative and organic cotton minimize nutrient use, potentially decreasing the impact from apparel companies in the future (The Sustainable Business Group 2015).
- **Consumer use**
  Consumer behavior varies throughout the world and there are high levels of uncertainty and very limited data to attribute consumer behavior related to specific companies (Quantis 2018).
- **End of life**
  The impacts are negligible relative to other impacts across the value chain and are therefore excluded from this research.

## Appendix B: Methods

### B1. Fiber Production Water Withdrawals

Method: $C_1 = C_{Wag} * P_{(bws\ cotton)} * W_{irr}$
M In which,
$C_1$ = Total cost of reducing water withdrawals from irrigation to eliminate water stress ($/year)
$C_{Wag}$ = Cost of reducing water withdrawals in the agricultural sector ($/m$^3$)
$P_{bws\ cotton}$ = Percent withdrawal reduction required to eliminate water stress in basins of the top 10 cotton producing countries (%)
$W_{irr}$ = Water use from irrigated cotton for each company (m$^3$/year)

Water withdrawals from irrigation for each company were determined from the total weight of cotton sourced (PVH 2019, Ralph Lauren 2019, VF 2018, DWS) and irrigated water applications per pound of cotton lint (Field to Market 2016). The water withdrawal reduction target was calculated based on the percentage of cotton production (EarthStat) in water stressed basins (WRI 2019) in the top 10 cotton lint producing countries (comprising 88% of total cotton lint production) (ICAC), and the reduction in withdrawals required to eliminate the stress. Solution costs were determined from integrated solution cost curves for the agricultural sector to reduce a cubic meter of water (WRI 2020).

Assumptions

- Total tonnes of cotton were obtained from company disclosures for PVH, Ralph Lauren, and VF. To calculate a proxy of tonnes of cotton for the remaining companies, an average factor of tonnes of cotton per revenue was calculated from PVH, Ralph Lauren and VF, and then applied to the remaining companies based on their revenue. For this calculation, the revenue was based on wholesale prices for each company to allow for comparability.
- All eight companies disclosed targets to source only sustainable cotton, and so a decrease in water withdrawals of 14% was applied (The Sustainable Business Group 2015).
- Company disclosures on tonnes of sourced cotton were assumed to be comparable to cotton lint.
- Cotton sourcing locations for all companies were assumed to be from the top 10 cotton producing countries in the world.

### B2. Yarn Preparation Water Withdrawals

Method: $C_2 = C_{Wind} * P_{(bws\ textiles)} * W_{yarn}$
In which,
$C_2$ = Total cost of reducing water withdrawals from yarn preparation to eliminate water stress ($/year)
$C_{Wind}$ = Cost of reducing water withdrawals in the industrial sector ($/m$^3$)
$P_{bws\ textiles}$ = Percent withdrawal reduction required to eliminate water stress in the top 10 textile exporting countries (%)
$W_{yarn}$ = Water withdrawals from yarn preparation for each company (m$^3$/year)

Water withdrawals from yarn preparation were determined from each company's total water withdrawals along the value chain (estimated from the relative percentage of fiber production withdrawals in the value chain) multiplied by the relative percentage of yarn preparation withdrawals in the value chain (Quantis 2018). The water withdrawal reduction target was calculated from the percentage of the top 10 textile exporting countries (comprising 86% of total textile exports) (WTO 2020) in water stressed areas weighted for the industrial sector (WRI 2019) and the reduction in withdrawals required to eliminate the stress. Solution costs were determined from integrated solution cost curves for the industrial sector to reduce a cubic meter of water (WRI 2020).

Assumptions

- The relative percentages of company withdrawals throughout the value chain were assumed to follow the percentages outlined by Quantis (Quantis 2018).
- A baseline of 10% water use reduction was assumed for all companies that disclosed a target to reduce water use unless the company explicitly disclosed otherwise.
- The yarn preparation locations for all companies were assumed to be from the top 10 textile exporting countries in the world.

### B3. Yarn Preparation Wastewater Discharge

Method: $C_3 = C_{WWind} * WW_{yarn}$

In which,

$C_3$ = Total cost of treating wastewater discharge from yarn preparation ($/year)

$C_{WWind}$ = Cost of treating industrial wastewater to tertiary standards ($/m$^3$)

$WW_{yarn}$ = Wastewater discharge from yarn preparation for each company (m$^3$/year)

Wastewater discharge from yarn preparation for each company was estimated from the water withdrawals from yarn preparation (Quantis 2018). The wastewater discharge treatment target was calculated based on applying a 50% threshold to all companies. Solution costs were determined for the industrial sector to treat a cubic meter of water to secondary and tertiary standards in the top 10 textile exporting countries (WRI 2020, WTO 2020).

Assumptions

- Wastewater discharge was assumed to equal water withdrawals (Quantis 2018).
- Water withdrawals were assumed to have already been reduced to eliminate water stress (Appendix A2), so as not to double count.
- All eight companies disclosed commitments for wastewater treatment in the value chain and so a decrease of 50% was applied to the wastewater that needed to be treated.
- A tertiary treatment standard was assumed for the industrial sector (WRI 2020), which, according to subject matter experts, though may be overestimating treatment costs at a global scale, is reasonable for textile manufacturers operating in water stressed areas.

### B4. Fabric Preparation Water Withdrawals

Method: $C_4 = C_{Wind} * P_{(bws\ textiles)} * W_{fabric}$

In which,

$C_4$ = Total cost of reducing water withdrawals from fabric preparation to eliminate water stress ($/year)

$C_{Wind}$ = Cost of reducing water withdrawals in the industrial sector ($/m$^3$)

$P_{bws\ textiles}$ = Percent withdrawal reduction required to eliminate water stress in the top 10 textile exporting countries (%)

$W_{yarn}$ = Water withdrawals from fabric preparation for each company (m$^3$/year)

The methods from Appendix B2 were applied with a focus on the percentage of fabric preparation water withdrawals in the value chain in place of yarn preparation water withdrawals.

### B5. Fabric Preparation Wastewater Discharge

Method: $C_5 = C_{WWind} * WW_{fabric}$

In which,

$C_5$ = Total cost of treating wastewater discharge from fabric preparation ($/year)

$C_{WWind}$ = Cost of treating industrial wastewater to tertiary standards ($/m$^3$)

$WW_{fabric}$ = Wastewater discharge from fabric preparation for each company (m$^3$/year)

The methods from Appendix B3 were applied with a focus on fabric preparation water withdrawals in place of yarn preparation water withdrawals.

### B6. Dyeing & Finishing Water Withdrawals

Method: $C_6 = C_{Wind} * P_{bws\ textiles} * W_{dye}$

In which,

$C_6$ = Total cost of reducing water withdrawals from dyeing & finishing to eliminate water stress ($/year)

$C_{Wind}$ = Cost of reducing water withdrawals in the industrial sector ($/m³)

$P_{bws\ textiles}$ = Percent withdrawal reduction required to eliminate water stress in the top 10 textile exporting countries (%)

$W_{dye}$ = Water withdrawals from dyeing & finishing for each company (m³/year)

The methods from Appendix B2 were applied with a focus on the percentage of dyeing & finishing water withdrawals in the value chain in place of yarn preparation water withdrawals.

### B7. Dyeing & Finishing Wastewater Discharge

Method: $C_7 = C_{WWind} * WW_{dye}$

In which,

$C_7$ = Total cost of treating wastewater discharge from dyeing & finishing ($/year)

$C_{WWind}$ = Cost of treating industrial wastewater to tertiary standards ($/m³)

$WW_{dye}$ = Wastewater discharge from dyeing & finishing for each company (m³/year)

The methods from Appendix B3 were applied with a focus on dyeing & finishing water withdrawals in place of yarn preparation water withdrawals.

### B8. Assembly & Distribution Water Withdrawals

Method: $C_8 = C_{Wind} * P_{bws\ clothing} * W_{assembly}$

In which,

$C_8$ = Total cost of reducing water withdrawals from assembly and distribution to eliminate water stress ($/year)

$C_{Wind}$ = Cost of reducing water withdrawals in the industrial sector ($/m³)

$P_{bws\ clothing}$ = Percent withdrawal reduction required to eliminate water stress in the top 10 clothing exporting countries (%)

Wassembly = Water withdrawals from assembly and distribution for each company (m³/year)

Water withdrawals from assembly and distribution for each company were determined from each company's direct water withdrawals (S&P Global Trucost, [Data as of July 25, 2021]). The water withdrawal reduction target was calculated based on the percentage of the top 10 clothing exporting countries (comprising 83% of total clothing exports) (WTO 2020) in water stressed areas weighted for the industrial sector (WRI 2019) and the reduction in withdrawals required to eliminate the stress. Solution costs were determined from integrated solution cost curves for the industrial sector to reduce a cubic meter of water (WRI 2020).

Assumptions

- Company direct water use was assumed to come from owned facilities that focus on assembly and distribution.
- A baseline of 10% water use reduction was assumed for all companies that disclosed a target to reduce water use unless the company explicitly disclosed otherwise.
- The assembly and distribution locations for all companies were assumed to be from the top 10 clothing exporting countries in the world.

### B9. Assembly & Distribution Wastewater Discharge

Method: $C_9 = C_{WWind} * WW_{assembly}$

In which,

$C_9$ = Total cost of treating wastewater discharge from assembly & distribution ($/year)

$C_{WWind}$ = Cost of treating industrial wastewater to tertiary standards ($/m³)

$WW_{assembly}$ = Wastewater discharge from assembly & distribution for each company (m³/year)

The methods from Appendix B3 were applied with a focus on assembly & distribution water withdrawals in place of yarn preparation water withdrawals. In addition, solution costs were determined for the top 10 clothing exporting countries (WTO 2020) in place of textile exporting countries.

### B10. Assumptions and Limitations

**Value chain water-related externalities**

- There are multiple life-cycle assessments completed for the apparel industry, including those by Levi Strauss & Co 2015 and Cotton Incorporated 2016. These may show different results to the life-cycle assessment used to inform this brief (Quantis 2018) and were discarded because they estimated total water consumption and not total water withdrawals across the industry value chain and/or included indirect water withdrawals, such as those associated with energy production, which were outside the scope of this research.

- For fiber production we estimated water withdrawals based on the volumes of cotton sourced. For all other sections of the value chain, we used a life-cycle assessment approach that aggregated information at an industry-level and considers water withdrawals associated with processing all fibers, including synthetics, cotton, cellulosic fibers, and other natural fibers such as linen, providing a more representative estimate of the water withdrawals across the value chain for the companies assessed in this brief.
- We excluded externalities attributed to leather production and footwear.

**Fiber production**

- We included only cotton in the fiber production stage because the companies evaluated in this brief disclosed that cotton is the most significant raw material they source, and multiple companies disclosed the weight of cotton sourced per year. Furthermore, cotton is responsible for the highest volume of water withdrawals during the fiber production stage. We recognize that other fibers play a critical role in the apparel industry and should be incorporated in future research when data is available.

**Sourcing regions**

- Due to limited visibility into company sourcing regions, we assumed all companies sourced from the same cotton, textile, and finished garment product sourcing countries, using the top 10 producing countries for each product. This approach masked differences in sourcing regions between the companies but provides an overall magnitude of the impact by allowing for contextual characterization of water stress in sourcing regions.

**Value chain water withdrawal estimates**

- Some of the companies covered in this brief have disclosed water withdrawals and/or consumption across different sections of the value chain, some of which may differ to the results presented herein. Unfortunately, the methods and metrics used to disclose water withdrawals and/or consumption are not consistent across companies. In response, the method provided here was developed to apply the same principles and assumptions consistently across the eight companies and provide a foundation for comparison and an indication of the magnitude of the externalities. Companies are encouraged to assess their water-related externalities and share them using detailed geographic data to strengthen stakeholder understanding and reduce uncertainties associated with corporate water-related externalities.

## Appendix C: CROCI methodology

CROCI© ("Cash Return on Capital Invested") is a proprietary company analysis and valuation platform of DWS Investments UK Limited and/or its affiliates ("DWS"). Founded in 1996, CROCI© seeks to achieve a full understanding of companies' economic assets, value chain and cash profitability – the goal is to put companies across countries and different sectors on a level playing field where their fundamental data can be directly compared without the imbalances that different accounting standards or business models might introduce. The heart of CROCI© is a dedicated company analyst research team of approx. 50 members covering over 800 large cap companies around the world. Originating in research, CROCI© analysis continues to be used for bottom-up analysis of equity markets but has also been employed in dedicated investment products since 2004: these are primarily systematic, rules-based strategies seeking exposure to concentrated value (i.e., systematically investing in companies with attractive economic valuation based on CROCI© analysis). The CROCI© analysis model is standardized in the sense that there are clear guidelines for how to reconstruct corporate balance sheets including off-balance sheet liabilities; how to measure the key economic assets of a company and their useful life; and how to measure the cash profitability of a company. However, the analysis model is flexible enough to provide the option of sensitivity analysis based on different hypothetical assumptions or parameters – and this is how CROCI© has contributed to this study: by modelling how the cash profitability, valuation and other fundamentals of specific companies would change under different assumptions regarding the increased expense to companies when bearing the cost of their water externalities in part or full.

Although information for CROCI© metrics has been obtained from sources believed to be reliable, we do not guarantee its accuracy, completeness or fairness, and it should not be relied upon as such. All CROCI© metrics reflect our judgment on a certain date and are subject to change without notice and involve a number of assumptions which may not prove valid.

DWS is not responsible for, and expresses no opinion in relation to, any of the analysis or numerical data which are not a direct result from the use of the CROCI© methodology, including, but not limited to, those included in Parts 1-3.

This document does not create any legally binding obligations on DWS. Without limitation, this document does not constitute an offer, an invitation to offer or a recommendation to enter into any transaction or purchase any financial product.

## Appendix D: CROCI Valuation results[13]

Impact of the annual cost to address externalities on the valuation of eight apparel companies using DWS's CROCI Framework (based on fiscal year 2019).

| Before incorporating the annual cost to address externalities | Economic P/E | Accounting P/E | CROCI cash return[14] | CROCI Cash Flows (US$ M) | Adj. EBITDA (US$ M) | Adj. Net Profit (US$ M) |
|---|---|---|---|---|---|---|
| **Burberry Group plc** | 36.5x | 30.6x | 8.8% | 999 | 891 | 337 |
| **Hennes & Mauritz AB** | 26.7x | 19.8x | 9.0% | 3,938 | 3,013 | 1,449 |
| **Hanesbrands Inc.** | 17.8x | 9.7x | 16.6% | 1,169 | 1,182 | 602 |
| **Inditex SA** | 29.3x | 23.3x | 20.0% | 7,352 | 8,481 | 4,082 |
| **PVH Corp.** | 19.8x | 11.6x | 11.9% | 1,805 | 1,577 | 637 |
| **Ralph Lauren Corp.** | 42.0x | 21.2x | 5.3% | 1,205 | 1,020 | 390 |
| **The Gap, Inc.** | 33.2x | 14.3x | 3.6% | 2,271 | 2,547 | 530 |
| **V.F. Corporation** | 37.4x | 36.0x | 18.7% | 2,232 | 1,954 | 944 |
| **After incorporating the annual cost to address externalities** | **Economic P/E** | **Accounting P/E** | **CROCI cash return** | **CROCI Cash Flows (US$ M)** | **Adj. EBITDA (US$ M)** | **Adj. Net Profit (US$ M)** |
| **Burberry Group plc** | 62.9x | 54.3x | 5.1% | 852 | 701 | 189 |
| **Hennes & Mauritz AB** | 61.4x | 48.9x | 3.9% | 3,075 | 1,909 | 586 |
| **Hanesbrands Inc.** | 47.7x | 33.7x | 6.2% | 741 | 678 | 174 |
| **Inditex SA** | 42.2x | 35.2x | 13.9% | 5,973 | 6,715 | 2,702 |
| **PVH Corp.** | NM | NM | 1.2% | 1,180 | 838 | 12 |
| **Ralph Lauren Corp.** | NM | 75.5x | -0.6% | 925 | 683 | 110 |
| **The Gap, Inc.** | NM | NM | -1.6% | 1,600 | 1,636 | -142 |
| **V.F. Corporation** | 91.7x | NM | 7.6% | 1,502 | 1,079 | 213 |
| **Impact of the annual cost to address externalities** | **Economic P/E** | **Accounting P/E** | **CROCI cash return(pp)** | **CROCI Cash Flows** | **Adj. EBITDA** | **Adj. Net Profit** |
| **Burberry Group plc** | 26.5x | 23.7x | -3.7% | -15% | -21% | -44% |
| **Hennes & Mauritz AB** | 34.7x | 29.1x | -5.1% | -22% | -37% | -60% |
| **Hanesbrands Inc.** | 29.9x | 24.0x | -10.4% | -37% | -43% | -71% |
| **Inditex SA** | 12.9x | 11.9x | -6.1% | -19% | -21% | -34% |
| **PVH Corp.** | NM | NM | -10.6% | -35% | -47% | -98% |
| **Ralph Lauren Corp.** | NM | 54.3x | -5.9% | -23% | -33% | -72% |
| **The Gap, Inc.** | NM | NM | -5.2% | -30% | -36% | -127% |
| **V.F. Corporation** | 54.3x | NM | -11.0% | -33% | -45% | -77% |

Source: DWS CROCI, Ceres/Bluerisk, company data

13. Although information for this analysis has been obtained from sources believed to be reliable, we do not guarantee its accuracy, completeness or fairness, and it should not be relied upon as such. All opinions and estimates herein reflect our judgment on the date of this document and are subject to change without notice and involve a number of assumptions which may not prove valid.
14. CROCI cash return is the equivalent of profitability (return on equity) in the CROCI© framework.

# S&P Global Important Information

DISCLAIMER



These materials have been prepared solely for information purposes based upon information generally available to the public and from sources believed to be reliable. No content (including index data, ratings, credit-related analyses and data, research, model, software or other application or output therefrom) or any part thereof (Content) may be modified, reverse engineered, reproduced or distributed in any form by any means, or stored in a database or retrieval system, without the prior written permission of S&P Global. The Content shall not be used for any unlawful or unauthorized purposes. S&P Global and any third-party providers, (collectively S&P Global Parties) do not guarantee the accuracy, completeness, timeliness or availability of the Content. S&P Global Parties are not responsible for any errors or omissions, regardless of the cause, for the results obtained from the use of the Content. THE CONTENT IS PROVIDED ON "AS IS" BASIS. S&P GLOBAL PARTIES DISCLAIM ANY AND ALL EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE, FREEDOM FROM BUGS, SOFTWARE ERRORS OR DEFECTS, THAT THE CONTENT'S FUNCTIONING WILL BE UNINTERRUPTED OR THAT THE CONTENT WILL OPERATE WITH ANY SOFTWARE OR HARDWARE CONFIGURATION. In no event shall S&P Global Parties be liable to any party for any direct, indirect, incidental, exemplary, compensatory, punitive, special or consequential damages, costs, expenses, legal fees, or losses (including, without limitation, lost income or lost profits and opportunity costs or losses caused by negligence) in connection with any use of the Content even if advised of the possibility of such damages.

S&P Global's opinions, quotes and credit-related and other analyses are statements of opinion as of the date they are expressed and not statements of fact or recommendations to purchase, hold, or sell any securities or to make any investment decisions, and do not address the suitability of any security. S&P Global may provide index data. Direct investment in an index is not possible. Exposure to an asset class represented by an index is available through investable instruments based on that index. S&P Global assumes no obligation to update the Content following publication in any form or format. The Content should not be relied on and is not a substitute for the skill, judgment and experience of the user, its management, employees, advisors and/or clients when making investment and other business decisions. S&P Global does not endorse companies, technologies, products, services, or solutions.

S&P Global keeps certain activities of its divisions separate from each other in order to preserve the independence and objectivity of their respective activities. As a result, certain divisions of S&P Global may have information that is not available to other S&P Global divisions. S&P Global has established policies and procedures to maintain the confidentiality of certain non-public information received in connection with each analytical process.

S&P Global may receive compensation for its ratings and certain analyses, normally from issuers or underwriters of securities or from obligors. S&P Global reserves the right to disseminate its opinions and analyses. S&P Global's public ratings and analyses are made available on its Web sites, www.standardandpoors.com (free of charge) and www.ratingsdirect.com (subscription), and may be distributed through other means, including via S&P Global publications and third-party redistributors. Additional information about our ratings fees is available at www.standardandpoors.com/usratingsfees