

The background of the entire page is a photograph of a textile factory. Large rolls of blue fabric are draped over metal frames. In the background, industrial machinery, including what appears to be a large washing machine or dryer, is visible. Overlaid on the image are three large, light-blue circles, each containing a smaller black circle. These circles are connected by thin, light-blue lines that form a triangular shape, with one circle at the top left, one at the top right, and one at the bottom center.

# INSIGHTS

FROM CHINA'S TEXTILE MANUFACTURERS  
GAPS TO OVERCOME FOR CLEAN & CIRCULAR FASHION

## INSIGHTS FROM CHINA'S TEXTILE MANUFACTURERS: GAPS TO OVERCOME FOR CLEAN & CIRCULAR FASHION

It is a unique period in time for the fashion industry with the convergence of goals between Chinese textile manufacturers and leading fashion brands. Both need to clean-up and want to go circular. Manufacturers are being pushed by the Chinese government to tackle pollution with stringent regulations and to move to a circular economy with national directives. Meanwhile, brands are facing greater scrutiny over their environmental impacts than ever before and uncertainty around future supply of resources. Overlay that the majority of key fashion raw materials are still produced in China and there is an opportunity now to lay the foundations for a clean and circular business model. Yet, despite this, this shift is not progressing as fast as it could - why? With rising disclosure and media coverage we largely know what brands are doing but it is less clear what actions Chinese textile manufacturers are taking. To find out what they are doing and what potential disconnects are hindering this shift, we surveyed over 140 Chinese textile manufactures. 85 of these were complete responses, which we have analysed in this report to provide an on-ground consensus of their key challenges and what assistance they need to deliver clean, compliant and circular fashion. Brands and industry associations can use this report to target their actions on the most pressing issues and as a guide for their engagement with manufacturers to advance the transition to a circular apparel economy.

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### About China Water Risk

**China Water Risk (CWR)** is dedicated to addressing business and environmental risks arising from China's limited water resources. CWR aims to foster efficient and responsible use of China's water resources by engaging the global business and investment communities. As such, it facilitates discussion amongst industry leaders, investors, experts & scientists on understanding and managing water risks so that we can make better decisions today for a water-secure tomorrow. At a micro-level CWR works toward embedding water risks into the financial valuation of a company thereby influencing capital flow to responsible users and on a macro-level by wedding provincial/national water resource management to economic planning. In addition to this, we also explore global exposure risks through the Made in China supply chain. CWR has thus co-published policy briefs with government-related bodies in China and globally. It also has been commissioned by financial institutions to conduct research analysing the impact of water risks on the Power, Mining, Agricultural, Textiles and the Food & Beverage sectors. These briefs and reports have been considered ground-breaking and instrumental in understanding China's water challenges. CWR is an initiative of the ADM Capital Foundation and is funded by the Rockefeller Brothers Fund and RS Group. Join the conversation at <http://www.chinawaterrisk.org>



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The views expressed in this report are those of China Water Risk only and not of any sponsor or contributor.

## FOREWORD



**Leslie Johnston**

Executive Director,  
C&A Foundation

At C&A Foundation, we believe fashion can be a force for good. We believe it is time to rethink apparel and move towards a new kind of industry. One that uses and reuses safe materials, restores and regenerates ecosystems, and provides dignified work for people making products that are “made to be made again”.

As with China Water Risk, we believe that to reach this vision we need to transform the entire system. Each part of the business model must change and every actor has a role to play. Now is the time to lay the foundation for a new industry and we must examine what we are doing and what still needs to be done.

C&A Foundation is excited to partner with China Water Risk in this study of China's textile manufacturers. China Water Risk has extensive expertise on the topic of water in China's industrial sector, notably textiles and apparel, and this study builds on its previous analyses and opinion pieces on the sector. But more importantly, we believe that this study represents an important step in China's journey towards a circular economy in fashion.

We hope that this report will successfully raise awareness of manufacturers' needs and enable industry actors to further identify and scale up practical solutions to tackle the challenges in the transition to a clean and circular model and quickly take advantage of current opportunities.

## FOREWORD



**Debra Tan**

Director,  
China Water Risk

China Water Risk has long worked to highlight water risks embedded along the fashion industry's supply chain, all the way from raw materials to the finished product. It has been a key focus of ours as the Textiles, Apparel & Footwear industry is not only water intensive but among the most polluting industries in China. We are therefore very pleased to be working with the C&A Foundation to present insights from China's textile manufacturers in this report. Naturally, we are grateful to the manufacturers for sharing their insights, but we would also like to take this opportunity to thank our collaborators which include brands, environmental consultancies, industry experts and NGOs. This report would not be possible without their valuable input.

The water risk conversation today is very different from that back in 2011 when China Water Risk was established. Today, with a war on pollution and the march towards 'Beautiful China', the nation is not only cleaning up but also gearing up for Industry 5.0. Advanced manufacturing industries will dominate 'Made in China 2025' as the country plans for its "old industries", like textiles, to go circular. It is important to understand that these strategic changes are vital to China so it can continue to achieve economic growth as well as food and energy security with limited water resources. China's water-nomics landscape means that these regulatory changes are here to stay. While good for China in the long term, they can be disruptive and even black swans for multiple industries. The global fashion industry is one such.

We warned three years ago, in a report written for the investment community, that these changes are imminent and that the global fashion industry will be blindsided by China water wars. Our views have not changed; in fact they are now more resolute. Pollution regulations can have material and imminent impacts, so much so that even Chinese banks are starting to factor these into their loan portfolios. We currently work with China's Green Finance Committee to quantify such risks; not surprisingly, textile is a target sector.

It is evident from the survey findings set out in this report that regulatory, operational and reputational risks are abound and should be addressed urgently. Manufacturers have also made their "wishes" clear to various actors. Brands, industry associations and manufacturers must work together to close knowledge gaps and overcome these challenges. However, these insights also raise the fundamental question of whether the current business model of low prices and thin margins is sustainable given the regulatory changes.

We believe that China's dominance in fashion raw materials and manufacturing presents the global fashion industry with a unique opportunity: to work with China's manufacturers to transition to clean and circular fashion future. If China can help build the fast fashion business, it can facilitate its change. However, it remains to be seen if the various actors will seize this opportunity. Innovation and disruption are key for a clean and circular fashion future. In this regard, we hope that actors, be they brands, industry associations, manufacturers or even the regulators, can leverage the insights set out in this report to bridge the gaps identified to fast track the move to the new paradigm. We look forward to working with all of you to achieve this; so we can continue to make sound decisions today, for water tomorrow.

## EXECUTIVE SUMMARY

This is a unique period in time for the global fashion industry as the goals of Chinese textile manufacturers and leading fashion brands are converging; both need to clean-up and want to go circular. Overlay the fact that China is still a major supplier of key raw materials and there is an opportunity now to lay the foundations for a clean and circular business model. Yet, despite this, the shift to a clean and circular model is not progressing as fast as it could - why? With rising disclosure and media coverage we largely know where brands stand but what is less clear, is what Chinese textile manufacturers are doing.

To find out what they are doing, we conducted an online survey of Chinese textile manufacturers. To get honest insights the survey was anonymous. We received over 140 responses of which 85 were complete and analysed in this report. The survey was comprehensive, taking around an hour to complete and so we are pleased to see 85 complete responses. These 85 come from China's key textile regions and span various manufacturing processes & products and so represent a broad range of on-ground voices. We are grateful to all the 140+ manufacturers that took part in the survey.

Positively, we found from the survey that manufacturers are largely on track on going clean and tackling their water risks, as well as starting to move circular. Indeed, 98% say they are taking actions to be green, 74% are recycling water, 88% have upgraded their wastewater equipment and 84% upgraded equipment for chemicals. As for the circular economy, 68% have heard of it and positively 72% see business benefit in moving to it.

While manufacturers are clearly moving towards the clean and circular model, they still face significant challenges and gaps as our survey identified. They believe these challenges and gaps need input from brands, as well as industry associations to be overcome. Manufacturers also say the Chinese government can help.

Our survey identified three overarching wishes from manufacturers to help overcome their challenges. They are: 1) more training, 2) more help with sourcing, and 3) more financial support. Manufacturers also have wishes outside of these, that are targeted at specific stakeholders.

On training, manufacturers want more relevant and solutions focused training across wastewater, chemicals and regulations. Throughout these they also want more technical guidance, including: technological options with corresponding cost information and how-to-use guides. Regarding wastewater training, though overall positive there is room for improvement with 28% saying training was only "a little or not helpful" and 21% who have not had training. Moreover, there are clear operational and reputational risks to both brands and manufacturers since 13% and 18% admit they are not compliant with China's indirect and direct discharge wastewater standards. As for chemicals training, though 91% have had training and 87% said it was "a lot helpful", manufacturers overwhelmingly asked for more. Knowing what substitution chemicals can be used in regards to the MRSL is one of their biggest requests with only 19% who say they know which substitution chemicals can be used and 64% wanting to know more.

Regulations have hit manufacturers hard; 88% say they have had to upgrade their factory to avoid being shutdown. Their comments show they want training on both Chinese regulations, which they feel are always changing, as well as international standards. Manufacturers identified Zero Discharge of Harmful Chemicals and the Water Ten as the No.1 and No.2 most challenging standards respectively.

Knowing where to source cost-effective, safe and environmentally friendly raw materials is another key wish from manufacturers. This is particularly the case for chemicals, which only 3% say is not a priority.

As for manufacturers' specific wishes to individual stakeholders, the main ones include: a unified production and assessment criteria from brands, as well as more transparency around the results of factory assessments. As for industry associations, manufacturers want more communication from them and also for them to organise more dialogue between the various stakeholders. Meanwhile, manufacturers would like to see increased enforcement and strengthened wastewater capacity, as well as supervision from the Chinese government. This shows they want a level playing, but one in the new cleaner and circular model.

The underlying issue common to all of manufacturers' challenges and wishes is how to be compliant within the current low-price business model.

Indeed, as our survey found brand and government standards and regulations are increasing costs for manufacturers but prices offered by brands/sourcing agents are not reflecting this. As a result, manufacturers are being squeezed through low margins and the majority are currently carrying the costs of shifting to cleaner and circular production. Indeed, over 50% of respondents have made significant CAPEX investments of more than RMB2 million (~USD300,000) to upgrade their factories. A RMB2 million investment can be a sizeable chunk of a manufacturer's annual profit. This data points to fewer and more consolidated manufacturers, which mean less choice and higher prices for brands.

As a result of these CAPEX investments, the majority of manufacturers are reporting material impacts on operating costs. 31% of respondents say their operating costs increased by 0-20% and 28% by 20-40%. Moreover, 81% say they have plans for future investment. Numbers like this clearly highlight the fundamental question: how sustainable is this current business model?

Given the above and that China's war on pollution isn't going away and neither are the raw material risks, brands need to decide if they are committed to the shift to a clean and circular model. Because, if so, surely it makes sense to work with these manufacturers and build on the investment already made rather than move to countries with laxer regulations.

While there are clear questions around the long-term business model, especially around potential cost sharing by brands and consumers, there are also shorter-term actions that can be done in the meantime to tackle the gaps in moving to a clean and circular model.

We are grateful to the manufacturers for helping us understand their challenges and the on-ground situation. Indeed, manufactures as well as brands both face challenges in the transition to a clean and circular model but there are also opportunities. These include being a market leader to shoring-up future supply and protecting brand reputation to exploiting untapped markets. The time to capitalise on these opportunities is now, while there is this convergence of goals between both groups. We can start by overcoming the gaps highlighted in this report.

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## CONTEXT

The global fashion industry is facing greater scrutiny over its environmental impact than ever before, which is not surprising given how dirty, thirsty and wasteful it is. Global resource constraints are hitting textiles, especially when it comes to virgin materials such as cotton. Meanwhile, as purchasing power and target markets shift to younger generations like millennials; a new consumer is emerging, a more sustainability conscious one. All of these developments point to the need for a new fashion business model.

On the environmental front, water in particular has risen up the agenda with many in the industry recognising the severe water risks they face globally. China Water Risk and other organisations have been part of the group pushing this conversation across stakeholders from farms to financial intuitions. Indeed, industry actions on water are being seen along the supply chain, especially by brands and industry organisations. Meanwhile, recognition among investors is increasing. When asked which sector they would like to see assessed for water risks, textiles topped the list, ranking above agriculture as we found in our 2016 report, *“Towards Water Risk Valuation”*.

A more recent industry focus is the transition to a circular economy. As a non-strategic industry in China, unlike food or energy, textiles resource requirements are less imperative and will outstrip supply if current consumption levels continue. A circular economy should help with the industry’s polluting and wasteful ways but it is not a silver bullet. Moreover, there is no model to copy and paste so innovation is key. Again, actions in this area are being seen though not enough. This time, along with brands, the Chinese government is also involved.

In China, not only are water and circular economy national directives but also regulatory requirements for the textile industry, which have hit manufacturers hard. These priorities are not unexpected given that in China textiles, apparel and leather combined discharge more than 1.5x wastewater than the coal industry<sup>1</sup> and the government has identified textiles as one of the ten industries that needs to transition to a circular economy<sup>2</sup>. Moreover, its GDP contribution is falling, accounting for 2.5% in 2015 and forecasted to drop to 1.7% by 2022<sup>3</sup>.

Another factor to consider is the high levels of key fashion raw materials that are still produced or processed in China. 65% of the world’s synthetic fibres were produced in China in 2014<sup>4</sup>. These levels mean that whether one is active in China is irrelevant; the entire fashion industry is exposed.

The result of all of the above is a convergence of goals between brands and Chinese textile manufacturers; both need to clean-up and go circular. This presents a unique opportunity for the global fashion industry to start building this new business model and truly deliver clean, compliant and circular fashion – the ultimate goal. Yet, despite this, progress on this shift is not happening as fast as it could - why?

To find out, we spoke with various stakeholders in the industry and decided the best way forward was to survey Chinese textile manufacturers. The reason for this is that they are a crucial factor in the ultimate goal but less is known about their actions and the situation on-ground. Comparatively, for brands, through disclosure and media coverage, we largely know what they are doing.

To this end we conducted an online survey that was open for three weeks. The survey was anonymous so to facilitate open and honest feedback. Given the anonymous nature, answers have not been verified. Positively, the survey received over 140 responses. Of these, 85 were complete and were thus analysed to form this report. The fact that there were 85 complete responses is very encouraging as the survey was comprehensive and took between 45 minutes to an hour to complete. Manufacturers clearly wanted their voices heard.

The purpose of the survey was two-fold. First, identify a consensus on key challenges facing Chinese textile manufacturers and showcase on-ground views. Second, to identify what assistance manufacturers want (their “wishlists”) and from who, so to overcome their challenges and move to towards the ultimate goal.

The results from the survey are set out in this report, which also includes action points for stakeholders and best practice tips. Brands and industry associations can use this report to target their actions on the most pressing issues and as a guide for their engagement with manufacturers, as well as to re-examine their practices and business model so as to accelerate the transition to a clean and circular economy.

Finally, please note that while this report is focused on China, it is likely that some of the survey findings could also be applicable to other key textile geographies.

## WHO ARE THE 85 THAT ANSWERED THE SURVEY?

We are delighted to see that the 85 complete survey responses we received came from a wide spectrum of Chinese textile manufacturers and so represent a broad range of on-ground voices. The survey was conducted online to preserve the anonymity of respondents to facilitate open and honest feedback. The survey was open from June 13<sup>th</sup> to July 3<sup>rd</sup> 2017.

**Geographic location** - The clear majority of respondents, 81%, are located in the Yangtze River Delta (YRD) or Pearl River Delta (PRD). These two deltas are China's two economic powerhouses and two key textile regions. Combined, they account for 76% of China's synthetic fibre production in 2015<sup>5</sup>.

Rapid development has brought on rampant pollution along the two delta's waterways. According to the China Ministry of Environmental Protection's 2016 State of Environment Report, the proportion of water in Yangtze 'unfit for human contact' (due to pollution) is 17.6% and 10.2% for the Pearl River<sup>6</sup>. Heavy metals and untreated hazardous chemicals are common pollution issues.

Given the above, it is clear why both these regions are target areas in several of China's latest environmental regulations and plans, in particular the Water Pollution Prevention and Control Action Plan ("Water Ten Plan"). The Water Ten Plan has not only meant new stringent regulations for the textile industry but even more so for the YRD and PRD, which also face tighter compliance deadlines compared to other regions in China. Released in April 2015, the Water Ten Plan stated that small textile factories in these two regions had to comply with national policy, standards and industry regulations by the end of 2016 or be shutdown<sup>7</sup>. Also by 2016, all industrial clusters and parks in the regions needed to have centralised treatment facilities and real time monitoring of pollution discharge. We look more at the Water Ten Plan's impact on manufacturers later.

Further development and industrial mix adjustments are expected in both deltas as China forges ahead on its 'War on Pollution', which Premier Li Keqiang announced in his 2014 Work Report Speech<sup>8</sup>. The YRD particularly will see substantial change with Chinese President Xi Jinping stressing "*green development*" along the river in January 2016<sup>9</sup>. More change will come as China implements its 'Go-West' strategy<sup>10</sup>, which is intended to promote growth in the less developed West but also to help tackle pollution in the more developed Eastern coastal areas. In 2016 China announced it wants to shift textiles out of the PRD and create one million textile jobs in Xinjiang province by 2023<sup>11</sup>. Xinjiang produced 63% of China's cotton and China produced 27% of the world's cotton in 2015<sup>12</sup>. The Xinjiang textile hub is also part of China's 'One Belt, One Road' initiative.

**Who answered** – Encouragingly, most survey responses were completed by those in senior positions including factory/environmental health & safety managers and in some cases, the factory owners themselves. Moreover, the 'other' category contained specialists, including chemical/clean production managers and technical/system specialists.

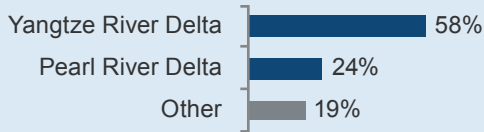
**Factory ownership** – As for factory ownership, the clear majority was local privately owned. Interestingly, wholly owned foreign enterprise was the next most common (see chart right). A small share is state-owned.

**Factory type** – For this question, multiple answers could be selected. The results show a wide range of factory types from dye houses to spinners and fibre suppliers to washing. This helped build a rounded on-ground consensus.

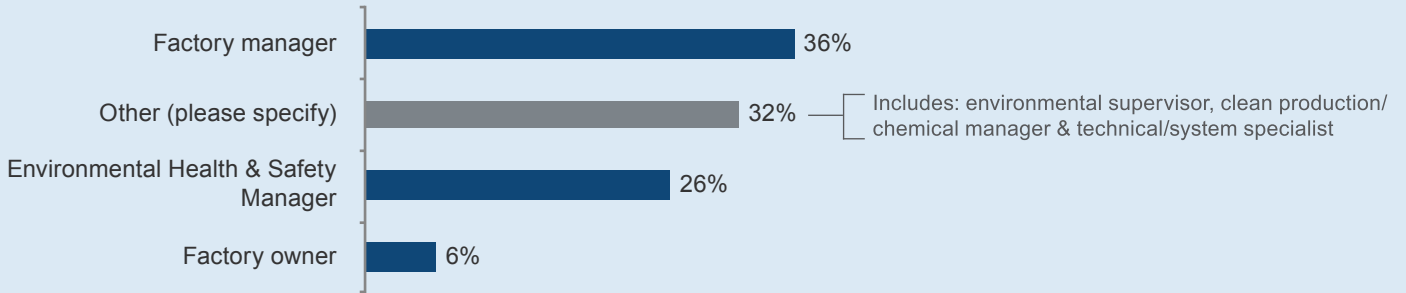
**Products produced** – Multiple answers could be selected for this question. Again, there was a wide range of products produced by the 85 respondents, which also helped build a rounded on-ground consensus since each product has its own challenges. While apparel was the most common, in the 'other' category there was yarn/wool/thread, denim, outdoor textiles, leather, lace and more; see bottom chart right for all products.

## THE 85 AT A GLANCE

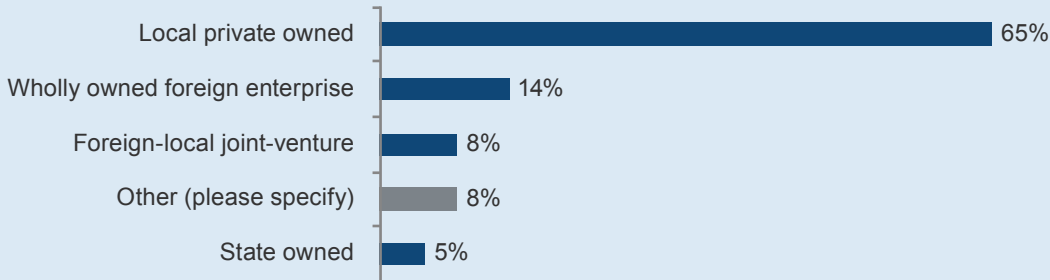
### WHERE ARE THEY FROM?



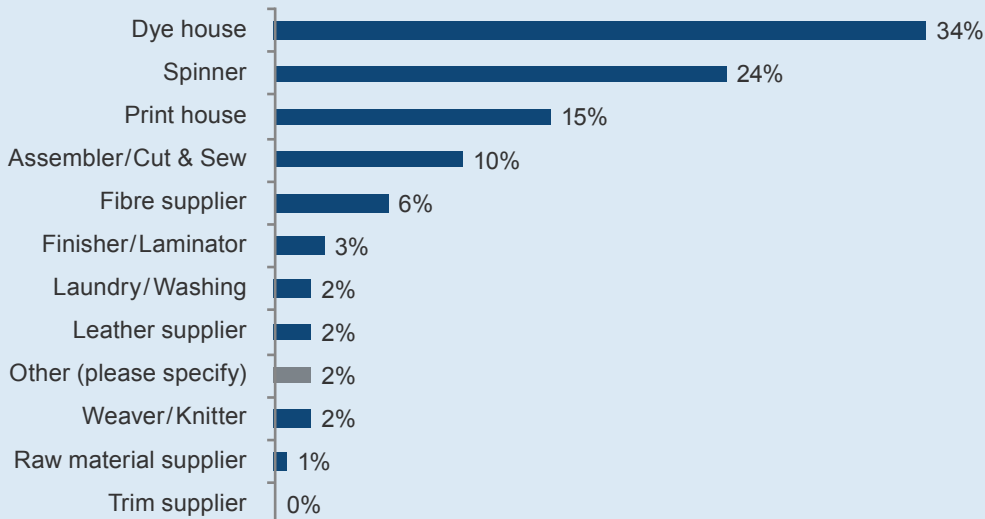
### WHO ARE THEY?



### FACTORY OWNERSHIP



### \*FACTORY TYPE



### \*PRODUCTS PRODUCED

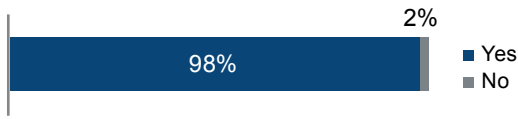


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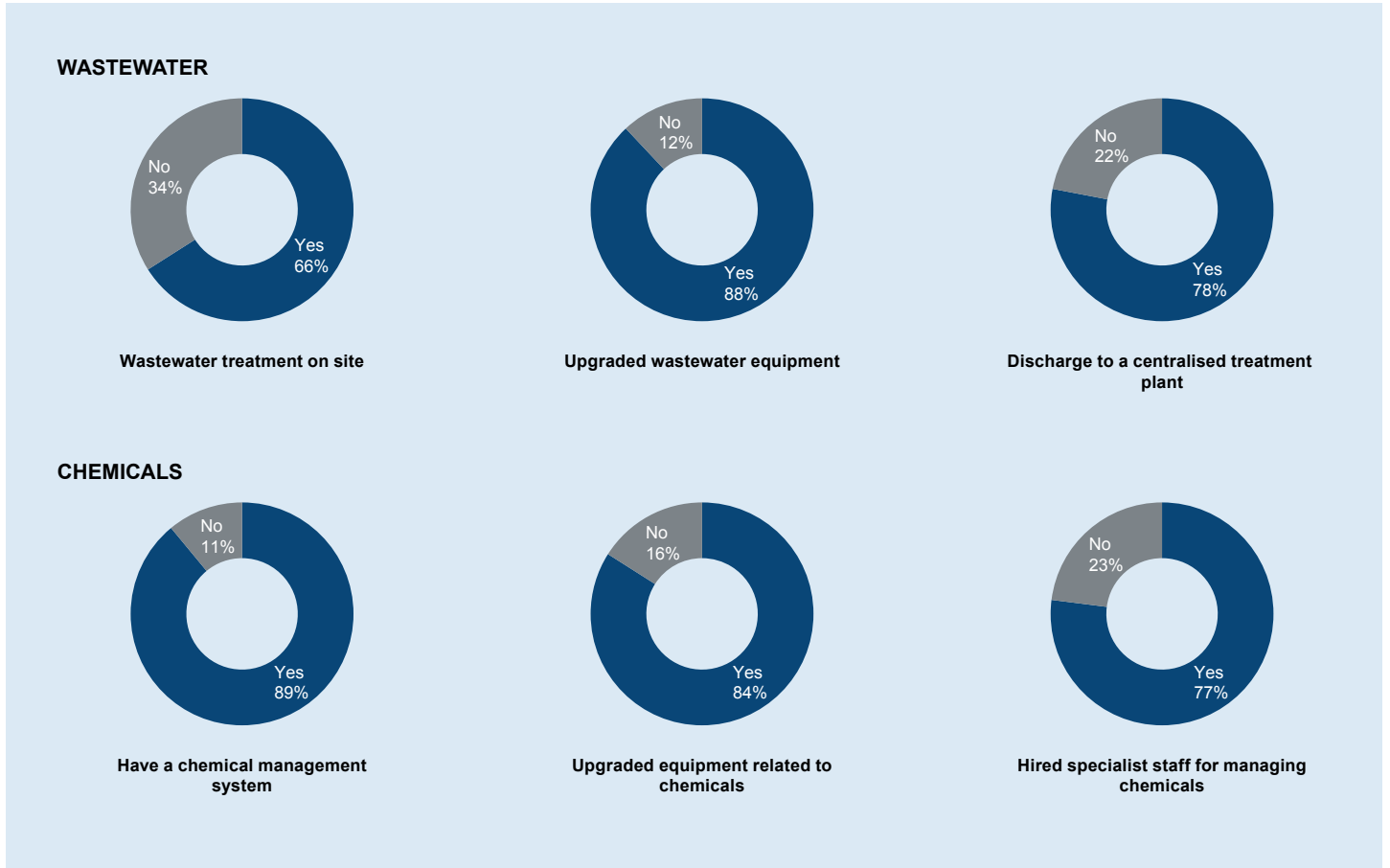
## ATTITUDES & ACTIONS OF CHINA'S TEXTILE MANUFACTURERS

### Manufacturers taking action to become green...

Positive news from our survey is that 98% of respondents said their factory is taking action to become green (clean and compliant). Also positive are the high response rates on efforts being taken on wastewater and chemicals, see charts below. This data shows that manufacturers are largely on track to cleaning-up.



### Well on the way to becoming clean



### Also on the way to a circular economy

#### Manufacturers that have heard of the circular economy...

More positive news from our survey is that 68% of manufacturers are aware of the circular economy and many of their comments on what it means to them show a holistic understanding of it (see box below). Also to be noted though, is that some shared that they did not know that much about it and others that they are only just at the start.



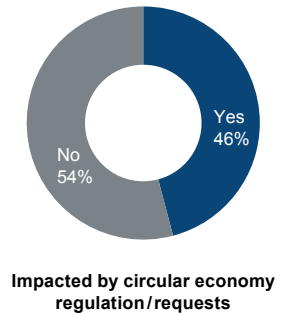
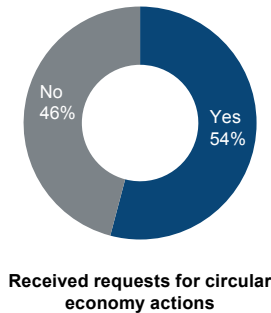
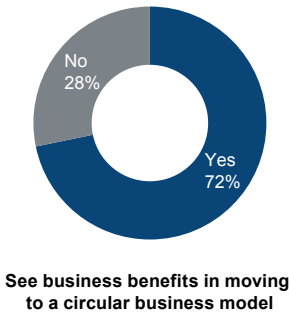
#### Manufacturers' comments on what the circular economy means to them...

*"Circular economy is similar to sustainable development, emphasise on harmonious environment between social and economic system and natural system. It's a systematic project combining economy, technology and society."*

*"Textile consumes much energy, raw materials and water resource, if green economy can be realised it will be good. Circular economy can rationally recycle waste clothing and raw materials, to a great extent avoid wasting and consuming of energy and materials, very important to environmental protection and energy saving."*

### Manufacturers on business benefits from going circular

Also encouraging is that 72% of respondents see business benefits from moving to the circular model (circular: products designed and manufactured for a biological and technical cycle that moves to close the loop) (see chart left below). See their comments on why they think this is in the box below.



**Manufacturers on what business benefits they see from the circular economy...**

*“Reduce energy consumption and reduce cost, increase producing efficiency.”*

*“More brands ask for only circular economy mode, and therefore can serve international brands more efficiently.”*

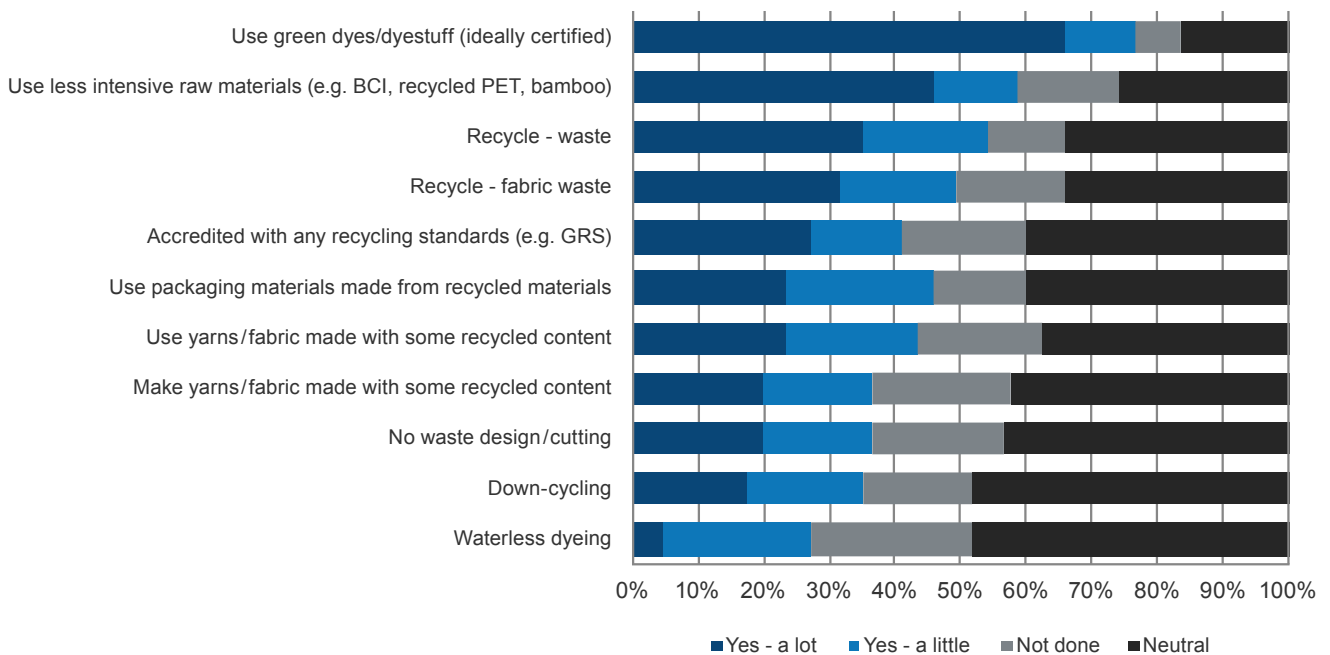
*“Explore new product development direction, increasing additive value to products.”*

### Circular economy actions taken so far

Already 54% of respondents have received requests for circular economy actions (see middle chart above). Many manufacturers commented that they have changed their operations in response to these requests. These comments were reflected in the survey with 46% saying their operations have been impacted by circular economy regulation and/or requests (see chart above). Indeed, our survey shows some manufacturers are already taking circular action. Using green dyes/dyestuff (ideally certified) was the most common circular action with over 60% of respondents saying they do this. Next and encouragingly is that over 50% are using less intensive raw materials such as recycled PET or bamboo. See the chart below for details on the circular actions manufacturers are doing.

### \*Manufacturers on what circular economy actions they are doing...

*\*Multiple answers could be selected*





**CHAPTER ONE:  
MANUFACTURERS ON THEIR KEY CHALLENGES**

## MANUFACTURERS ON THEIR KEY CHALLENGES

- Wastewater, chemicals and circular economy top challenges faced by China's textile manufacturers to going green. These Top Three Challenges are prevalent throughout survey responses and featured heavily in manufacturers' comments.
- Manufacturers are largely on top of their water risks. Encouragingly, 74% of respondents are recycling water and 81% see water as an area to gain competitive advantage. Given this, it makes sense that they see water as the least challenging issue.
- International brands, regulations and the Chinese government are identified as the biggest sources of manufacturers' challenges. NGOs and local communities come next, indicating that they are sensitive to reputational risk, making it important to actively manage image.
- Regulations have hit manufacturers hard. 88% have upgraded factory to avoid shutdown, 74% report feeling more pressure over the last two years and 14% feel they face shutdown risk. Yet, surprisingly only 25% of respondents said their operations have been impacted by the Water Pollution & Prevention Control Action Plan ("Water Ten"). This could point to knowledge gaps on China's regulations.
- Indeed, manufacturers ranked the Water Ten Plan as the No.2 most challenging regulation/standard, after Zero Discharge of Harmful Chemicals at No.1.

## WASTEWATER, CHEMICALS & CIRCULAR ECONOMY TOP CHALLENGES

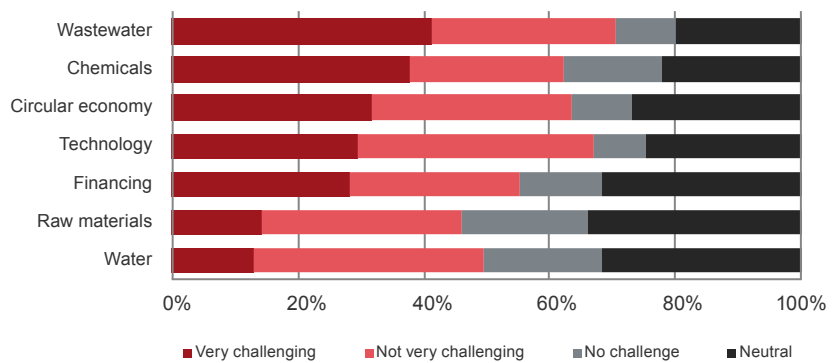
Top green challenges: wastewater, chemicals & circular economy

Water is the least challenging issue = manufacturers largely on top of their water risks

We asked manufacturers on their key challenges to being green (clean and compliant) across eight categories (see chart below for details). Note that multiple answers could be selected. The results show that wastewater, chemicals and circular economy are their top challenges (“Top Three Challenges”). These Top Three Challenges were prevalent throughout survey responses and featured heavily in manufacturers’ comments.

Another finding worth noting is that water is considered their least challenging issue to becoming green. This, along with other survey results shows that manufacturers are largely on top of their water risk exposure, which is encouraging. More on their views around water in “Attitudes, Actions & Challenges on Water” on the next page.

\*Manufacturers on their biggest challenges to being green...

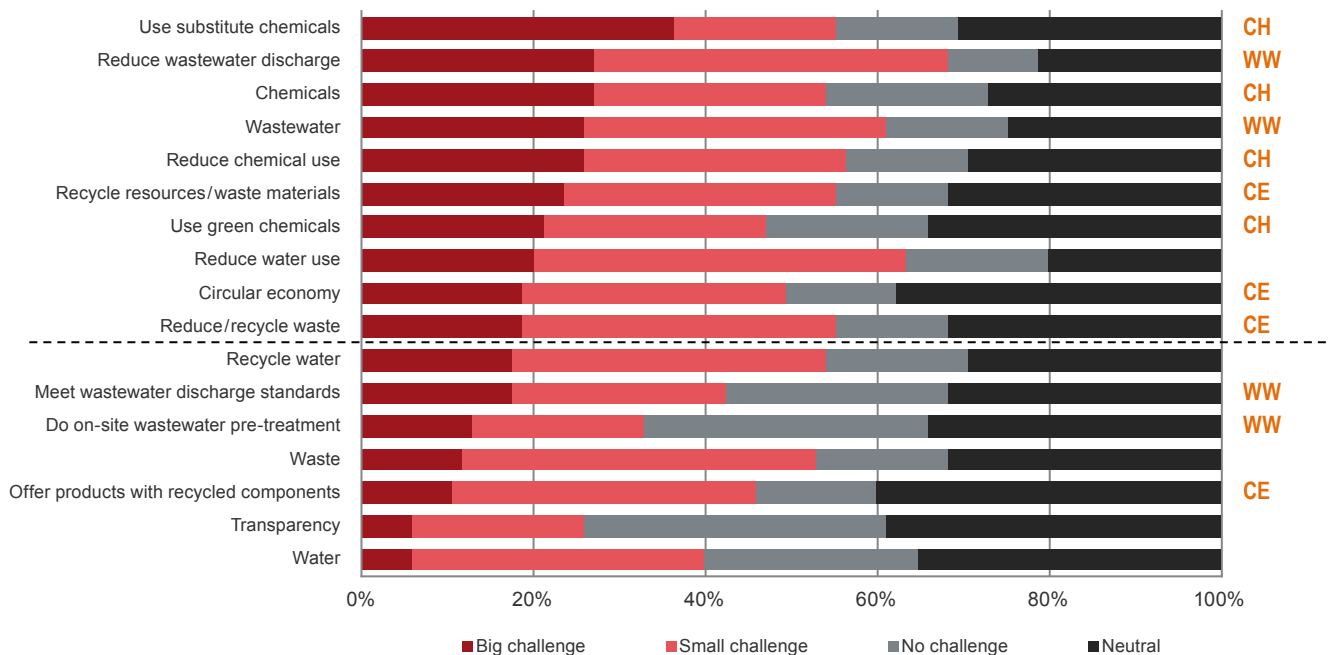


\*Multiple answers could be selected

Top Three Challenges also reflected in deeper dive

To get more details around their challenges we dove deeper by asking manufacturers on more specific challenges (shown in the chart below). Multiple answers could be selected. The Top Three Challenges dominated with 9 out the 10 top ten detail challenges relating to them. This has been highlighted on the right side of the chart below with either “WW” for wastewater, “CH” for chemicals or “CE” for circular economy. The remaining challenges focused mainly around water, then waste and transparency.

\*Diving deeper on manufacturers’ challenges...

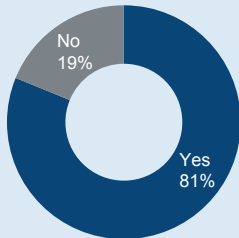


\*Multiple answers could be selected



## ATTITUDES & ACTIONS OF CHINA'S TEXTILE MANUFACTURERS

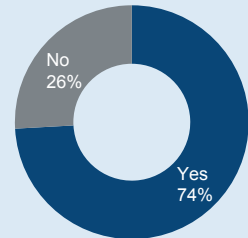
As part of the survey we asked manufacturers on their views and challenges on water. Positively, 81% said that they thought water was an area that can help produce green products and/or gain competitive advantage. The main reasons for this can largely be grouped into the following categories: reduce water use/water quota pressure/water costs, increase competitiveness, increase efficiency and improve brand image. See individual comments below. Moreover, 74% responded that they are recycling water at their factories.



See water as an area to gain competitive advantage

*“Lower water consumption can increase enterprise’s competitiveness & reduce pressure on water quota.”*

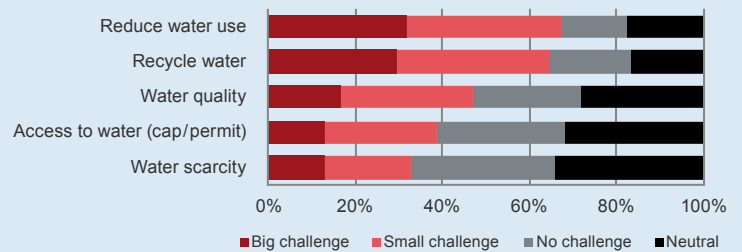
*“Reduce production cost & meet brands’ ask for environmentally friendly production.”*



Recycle water

As for manufacturers’ challenges regarding water, reducing water use and recycling water rank the highest (see chart right). It is worth noting that though access to water and water scarcity are the lowest ranked, these topics were specifically mentioned in manufacturers comments. Also mentioned, was water price hikes and overall increased costs.

### \*Manufacturers on their biggest water challenges...

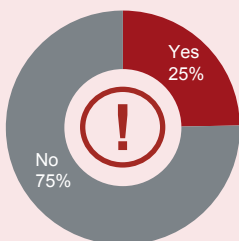


\*Multiple answers could be selected

The Water Ten Plan is the most significant water regulation recently released in China. The Plan is comprehensive with 238 specific actions and many with tight compliance deadlines. It is important to note that it is an umbrella plan, connecting various regulatory aspects across sectors. Textiles is one of the most targeted industries in the Plan. Impacts given by manufacturers can be largely grouped into the following categories: increased investment, increased costs, need to reduce wastewater/emissions, need to upgrade technology and stricter supervision. See comments below.



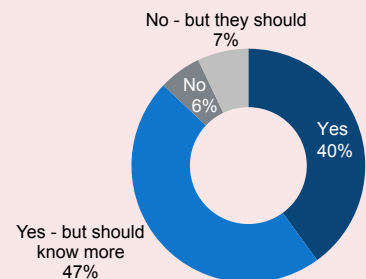
Surprisingly despite reporting the above impacts and 74% reporting that they have felt increased regulatory pressure over the last two years, only 25% of respondents said their operations had been impacted by the Plan. This could be because while the Water Ten as a whole is well known, the full extent of its actions and its umbrella nature are less so. Thus, manufacturers may not be aware that the pressure they report feeling is actually coming from the Water Ten. We look at their regulatory pressures including ZDHC in the next chapter.



Been impacted by the Water Ten Plan

*“Big investment in treatment equipment & increasing costs.”*

*“Need to reduce wastewater discharge, improve technology & reduce emission.”*



Brand awareness on stringent Chinese textile regulations

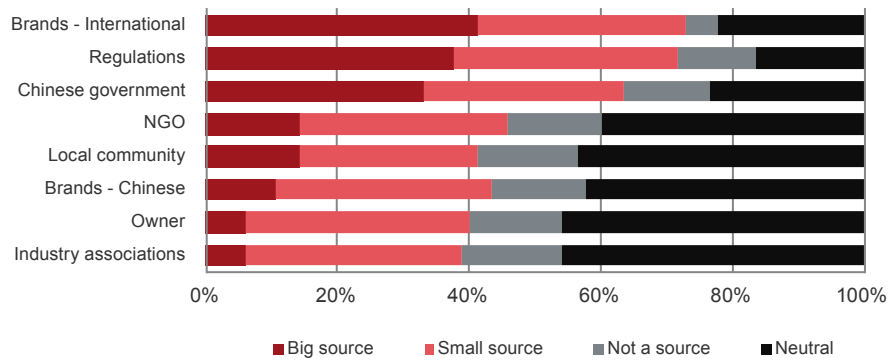
Though it is manufacturers that bear the brunt from the Water Ten Plan and other stringent regulations a sustainable fashion business model requires that all stakeholders to be aware of market forces, including brands. From our engagement it seems that it is more common for international brands to be less aware of such regulations. Indeed, 13% of survey respondents thought that brands are not aware of the Water Ten and other regulations they are facing. Of the remaining 87%, over half thought brands could know more.

**International brands, regulations & Chinese government are the biggest sources of challenges**

**Who are the sources of your challenges?**

Continuing on their challenges, we asked manufacturers who their biggest sources of challenges are (multiple answers could be selected). Their responses show that international brands, regulations and the Chinese government are the biggest sources. This is clearly shown in the chart below, with all three registering around or not far from 80%. As for their challenges around regulations, we look at this in the next section.

**\*Manufacturers on who their biggest sources of challenges are...**



*\*Multiple answers could be selected*

**NGOs & local communities are the next biggest = high reputational risk**

Interestingly, NGOs and local communities are the next biggest sources of challenges, which mean reputational risk levels are high. Manufacturers and brands need to actively work to ensure their image and avoid potential negative incidents. This is particularly important as emissions (air, wastewater etc.) data becomes increasingly more transparent though pollution watchdogs like the Institute of Public & Environmental Affairs in China and their real-time emissions platform, and as brands publicly release details of their supply chain.

**Owners surprisingly low source but could change with increasing enforcement**

The second least source of challenges is owners (as shown in the chart above). This is surprising given the amended Chinese Environmental Protection Law in 2015, which means that not only does one face unlimited daily fines but also potentially jail time for violations. Thus, this dynamic could change as China continues to clean-up and with it, increase enforcement.

**MANUFACTURERS' BIGGEST SOURCES OF CHALLENGES**



**International Brands**  
**41%**



**Regulations**  
**38%**



**Chinese Government**  
**33%**



**NGO**  
**14%**



**Local Community**  
**14%**



**Chinese Brands**  
**11%**



**Owner**  
**6%**



**Industry Associations**  
**6%**



**Manufacturers**

China's cleaning-up has shaken up textiles...

...14% feel they face shutdown risk & 74% felt more pressure from regulations...

...88% have upgraded to avoid shutdown

ZDHC is the No. 1 most challenging standard with a 58% response rate...

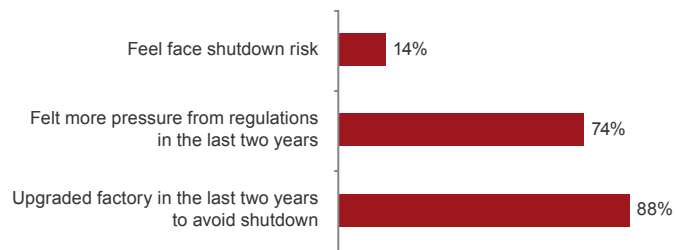
...then Water Ten at No. 2 with 37%

**Which regulations & standards are the most challenging?**

As China forges ahead on its clean-up mission, it has released numerous laws, regulations and standards that have significantly impacted and in some cases specifically targeted the textile sector. The results: factories closing their doors, fines and consolidations, an overall shake-up of the industry.

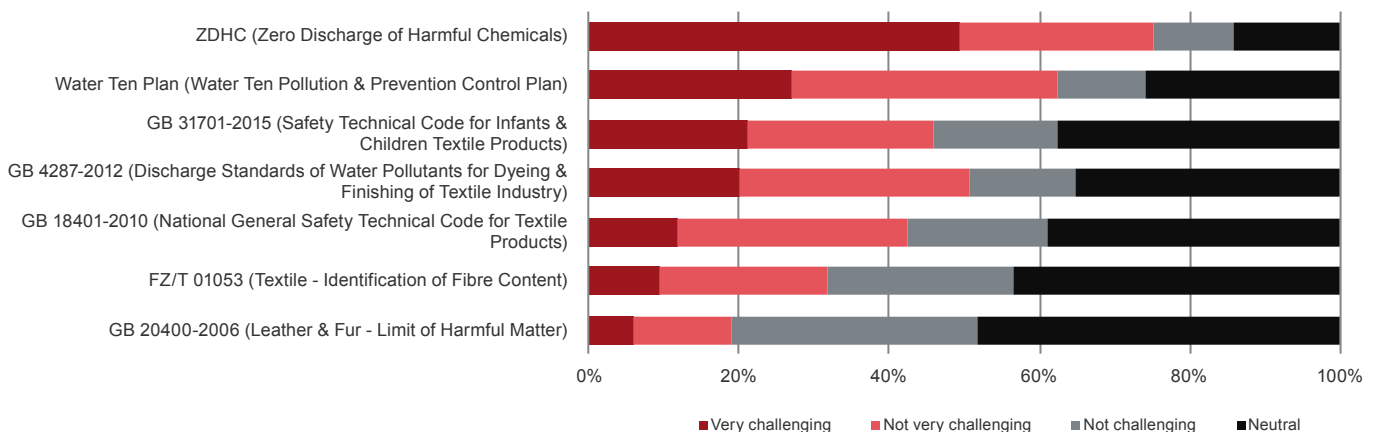
Indeed, this is reflected in our survey with 14% saying they feel they face shutdown risk and 74% saying they have felt more pressure from regulations over the last two years. Because of this pressure and to avoid being shutdown, 88% have had to upgrade their factory (see chart below). We look at investment and financial considerations in more detail in chapter two, in section: "Financial support: to meet higher costs of compliance & brand requests".

Manufacturers on the pressure from regulations...



We asked manufacturers which are the most challenging regulations/standards for them. As can be seen from the chart below, the No.1 most challenging is Zero Discharge of Harmful Chemicals (ZDHC) with 58% of respondents categorising this as a "very big challenge". We look at this in more detail in chapter three, in section: "Brand wishlist: targeted training needed, unified criteria, more transparency & longer deadlines"; in particular around the challenges and understanding of the Manufacturing Restricted Substances List (MRSL). The No. 2 most challenging regulation/standard is the Water Ten Plan at 37%. We covered manufacturers' views and impacts from the Water Ten Plan in the water insert on page 17.

**\*Manufacturers on the most challenging regulations/standards...**



\*Multiple answers could be selected



**CHAPTER TWO:  
MANUFACTURERS' THREE OVERARCHING WISHES**

## MANUFACTURERS' THREE OVERARCHING WISHES

- Analysis of manufacturers' wants dropped out three overarching wishes that apply to both brands and industry associations, and although there is some overlap they differ in importance between the two groups. These three are: 1) More training, 2) More help with sourcing and 3) More financial support.
- Training: Manufacturers were clear, they want more relevant and solutions focused training for three target areas listed below. Additionally, they want more technical guidance across these areas including: technological options with corresponding cost information and how-to-use guidelines.
  - Wastewater: Though overall positive there is room for improvement with 28% saying training was only *"a little or not helpful"* and 21% who have not had training. Moreover, there are clear operational and reputational risks to both brands and manufacturers since 13% and 18% admit they are not compliant with China's indirect and direct discharge wastewater standards.
  - Chemicals: Though 91% have had chemicals training and 87% said it was *"a lot helpful"*, manufacturers overwhelmingly asked for more. What they want here are practical tips on how to manage, use and source that are cost-effective given the current low-price business model. If this isn't possible then a more practical solution here may be to just exclude certain chemicals from production altogether now (even sooner than the 2020 ZDHC deadline).
  - Regulations: Stakeholders should not assume that manufacturers know all the Chinese regulations, which they say are always changing. Manufacturers want training on both Chinese and international regulations, as well on any updates to them. This is an opportunity for greater engagement between brands, manufacturers, the Chinese government and industry associations.
- Sourcing: Indeed, a big wish from manufacturers is to know where to source cost-effective, safe and environmentally friendly raw materials, particularly chemicals; which only 3% say is not a priority. They also want raw material suppliers to improve communication and information around their products to help with issues like fake certificates, and for brands and industry associations to push for this. The "ZDHC Chemical Gateway" and CNTAC's "Chemical Improvement Exchange" platform both launched in 2016 should help.
- Financial support: It is evident from the survey that manufacturers want more financial support from brands with concern over being squeezed by low margins and rising costs. Manufacturers are currently carrying the cost of clean and circular production. Over 50% of surveyed manufacturers invested upfront CAPEX of >RMB2 million (~USD300,000) to upgrade their factories, with 28% reporting a 20% - 40% increase in operating costs accordingly. Moreover, 21% have invested >RMB1 million (~USD150,000) on circular actions.
- Clearly manufacturers are making the necessary investments to move towards clean, compliant and circular fashion and 81% say they have plans for future investment, but what about brands? China's cleaning-up isn't going away, neither are the risks so surely it make sense to support the manufacturers on this transition and not move to countries with laxer regulations?

## MANUFACTURERS WANT: MORE TRAINING, ASSISTANCE ON SOURCING & FINANCIAL SUPPORT

Analysis of manufacturers' wants to help them overcome their challenges dropped out three clear overarching wishes:

1. More training;
2. More help with sourcing; and
3. More financial support.

Some overlap between brands & industry associations but different priorities

We explore these three wishes individually in this chapter but before we do, it needs to be noted that these apply to both brands and industry associations. However, according to the survey feedback, although there is some overlap, they differ in importance between the two groups as shown in the table below:

Brands	Industry associations
1. Financial support	=1. Training
2. Training	=1. Sourcing
3. Sourcing	

Specific wishes outside of overarching ones are detailed by stakeholder

There are two points to note from the table above: 1) all three overarching wishes apply to brands, and 2) only two of the three wishes apply to industry associations but are ranked equally. Manufacturers did have other wishes that fell outside of the three overarching ones. These specific wishes are covered in the next chapter where we also look at how manufacturers scored assistance from brands, industry associations and the Chinese government. In addition, we expand on how manufacturers think the Chinese government can help them in overcoming their challenges.

### 1. TRAINING: MORE BUT NEEDS TO BE RELEVANT & SOLUTIONS FOCUSED

Training needs to more relevant & solutions focused

The survey results show consensus among manufacturers on wanting more training with comments like *"More Training and support"* and *"Need to improve staff skills."* However, they are very clear that the training needs to be more relevant and solutions focused as reflected by the comments in the box below. Some mentioned that training should be free, though the majority didn't comment either way.

**Manufacturers want more relevant & solutions focused training...**

*"Need specialist support, we lack talent."*

*"Don't be arbitrary, be practical."*

*"Be more practical and publish plans that can really help enterprises."*

*"Provide effective training and advices, not just shut downs."*

*"More solutions."*

Technical guidance also wanted across all training areas

Desired training by manufacturers includes three broad topics: wastewater, chemicals and regulations. It should also be noted that manufactures want more technical guides across all these three topics. Specifically, technological options with corresponding cost information and how-to-use guides. Accordingly, it would be beneficial to factor this into training plans. The gaps highlighted by manufacturers in each of these three desired areas of training are set out below.

**Wastewater: 28% say training was “not or a little helpful” + 13% to 18% are still not meeting standards**

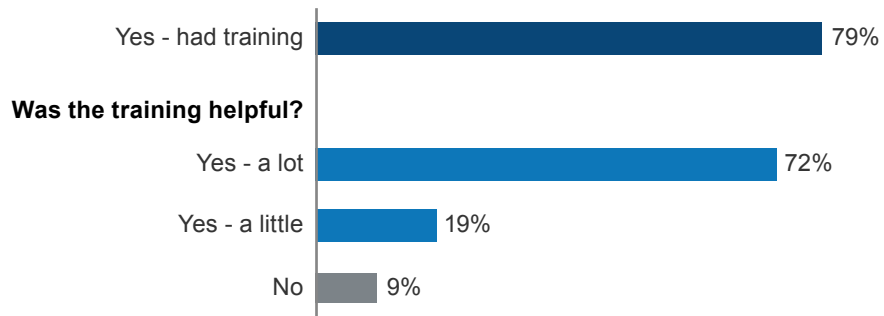
Overall positive but room for improvement...

...28% say training “not or a little helpful” & 21% not had training

**Training can be more targeted**

79% of survey respondents have had training on wastewater. While 72% found training “a lot helpful”, 19% only found their training “a little helpful” and 9% “not helpful”. Clearly, although responses were overall positive, there is room for improvement. The survey did ask manufacturers to expand on why they found training only “a little helpful” or “not helpful” but there were no responses. Moreover, 21% of them stated that they have not had any training. These results are shown in the chart below.

**Manufacturers share their wastewater training experiences...**



**Non-compliance increases operational and reputational risks**

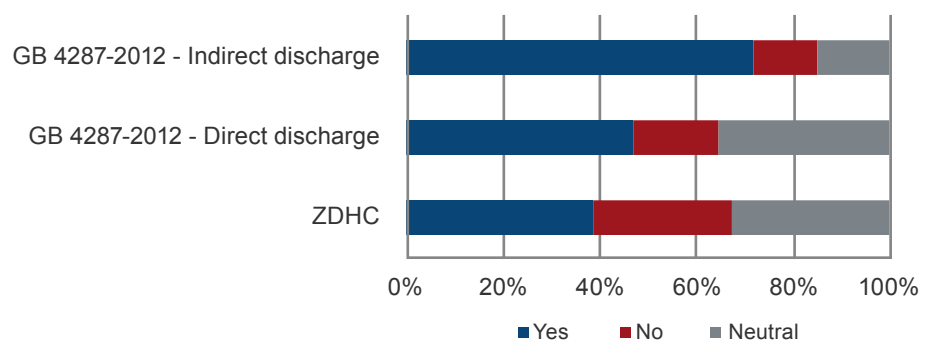
When we asked about compliance with the main three relevant wastewater standards it became clear why training on wastewater was wanted. On average only 59% of respondents are compliant with China’s key wastewater discharge regulation, GB4287-2012. This drops to 47% for compliance with the direct discharge standards within the regulation. As for compliance with the ZDHC wastewater guidelines, this was the lowest of the three standards at only 39%. These results are shown in the chart below.

On average only 59% compliant with Chinese wastewater discharge regulations...

...even lower for ZDHC at 39%

= clear operational & reputational risks...

**Manufacturers on whether they meet all of the wastewater requirements for the standards below...**



...risks could increase if pause on more relaxed indirect discharge is lifted

Clearly, 13% say they are not in compliance with the indirect discharge standard; what’s worse is that 18% say they are not compliant with the direct discharge standard. This raises operational and reputational risks for both the manufacturers and brands. These risks and clearly costs could increase in the future if the Chinese government lifts its pause in June 2015 on more stringent regulations for indirect discharge<sup>13</sup>.

### Responsibility shift in indirect discharge creates murky area & more risks...

With indirect discharge it is important to note that the responsibility for compliance shifts to the centralised treatment plant. This creates a murky area of responsibility and is not necessarily a cure-all for pollution issues (see excerpt box below). This further exposes manufacturers and brands to operational and reputational risks.

#### Is centralised treatment an effective treatment method for China's textile wastewater?

Our survey suggests parts of centralised printing and dyeing wastewater treatment has serious problems and so should not be considered a cure-all.

These problems lie in:

1. Vague responsibilities between enterprises generating wastewater and wastewater treatment companies;
2. Lack of effective supervision and management on pre-treatment by factories, which leads to excessive discharge by centralised plants; and
3. Lack of effective supervision and treatment at the centralised treatment plants.

As a result, centralised treatment brings centralised pollution.

*Source: China Water Risk article, "Risks Shifting Beyond the Wall", by Ma Yingying, Institute of Public & Environmental Affairs, February 2015*

### ...some manufacturers unsure if treatment plant is compliant & others relying on government & EIAs

Indeed, this murkiness was reflected in our survey. When asked how manufacturers knew that treatment plants they discharge to are compliant, several responded that they didn't know if the treatment plant was compliant and for those that did, it was either because: it's checked by the government or through Environmental Impact Assessments (EIA). Clearly there are issues around extended compliance risks that need attention, especially before the full GB4287-2012 regulation (with the indirect discharge pause lifted) is released.

### Main reasons for non-compliance: unsure & tricky pollutants – particularly heavy metals

As for why manufacturers are not compliant with standards, survey results identified two main responses: 1) they are unsure why, and 2) they are having issues with pollutants in particular heavy metals, which they find the most challenging to tackle (more on their request for chemicals training on the next page).

Regardless of which standard is not being complied with, greater monitoring is key to reducing non-compliance levels. Encouragingly, in the survey, manufacturers expressed wants around training on monitoring systems with a view to improve compliance.

### Monitoring key to higher compliance levels...

#### Want help to set-up monitoring systems

Manufacturers' wants on monitoring systems are holistic from how to set up monitoring systems to what equipment is needed and how to manage it all. This is an important area to cover in order to move closer to compliant and clean production. Indeed, without training this could become a problem area, particularly for indirect discharge as discussed above.

### ...positively, manufacturers asked for training on this



**Chemicals: disconnect between current training & cost-effective implementation**

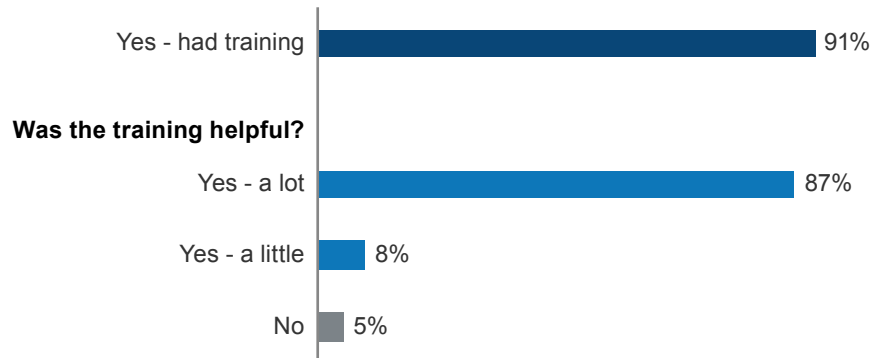
91% have had chemicals training but still say they need more...

...they say training not relevant in enough

**Had training, was useful, but still need more**

As much as 91% of survey respondents have had training on chemicals. 87% of which said it was “a lot helpful”, 8% “a little helpful” and 5% “not helpful”. While these numbers are encouraging the majority of comments regarding training were on chemicals so it appears that there is a disconnect with current chemical training and its effectiveness. When asked why the training was not helpful, manufacturers only said it was not relevant enough. These results are shown in the chart below.

**Manufacturers share their chemicals training experiences...**



Below are comments from manufacturers that show the general sentiment of respondents on chemicals.

**Manufacturers' sentiment on chemicals...**

*“Lack of knowledge on chemical management/storage/safety.”*

*“Need special knowledge about chemicals.”*

*“Correct use of chemicals in production, and strict training on chemicals.”*

Their challenges with chemicals are reflected in their wastewater compliance issues, which are discussed in the previous section.

Practical guides on chemicals wanted but need to be cost-effective

What manufacturers want here are practical guides on steps forward (manage/use/source) on chemicals but that are cost-effective. Brands/sourcing agents are still pushing low prices, which significantly limits what manufacturers can do around clean chemicals as we look at later in this section.

Only 3% say not a priority to find cost-effective, safe & environmentally friendly chemicals

**Practical & cost-effective how-to guides wanted across the board**

The biggest wish on chemicals training was how to find cost-effective, safe and environmental friendly chemicals. Indeed, only 3% say this isn't a priority. Since this is primarily a sourcing issue than a training issue, we look at this in more detail in the following sourcing section. However, given the priority of this among manufacturers it should ideally be worked into future trainings.

Other wishes related to chemicals include (listed in order of priority):

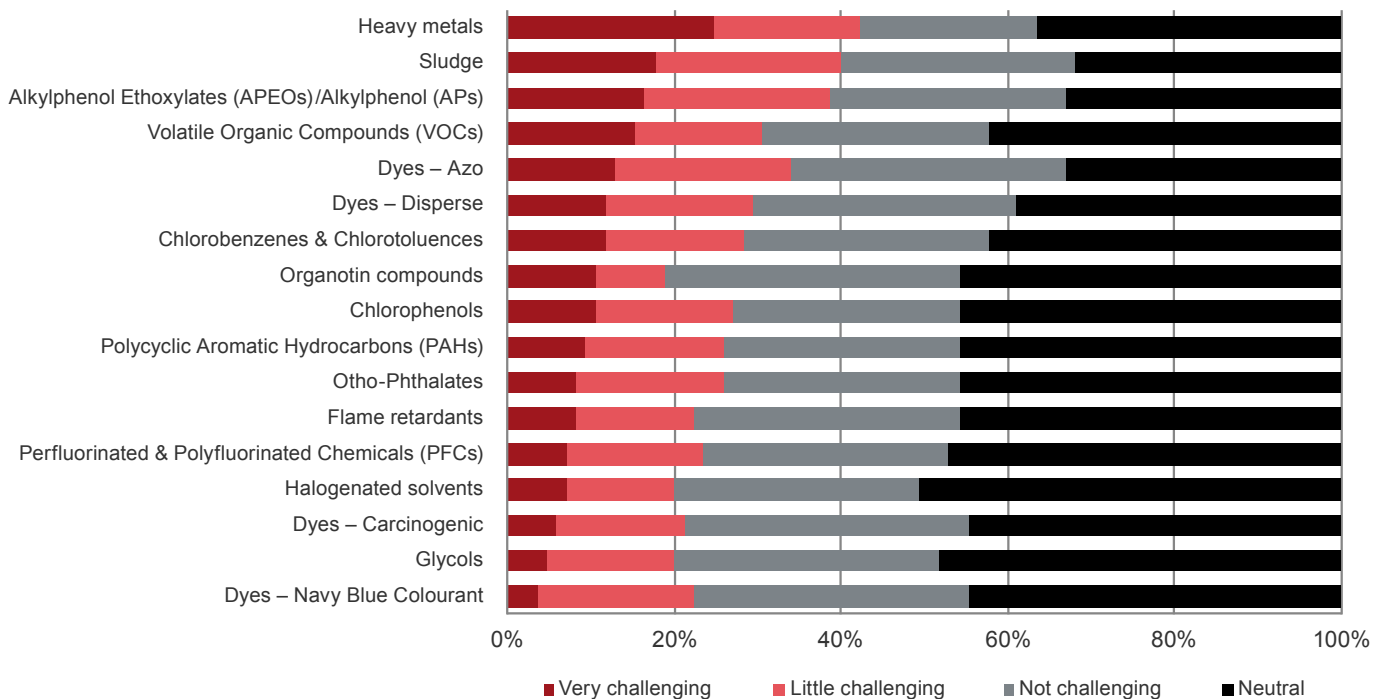
- Training on the relationship between chemicals and wastewater;
- How to set-up a chemical management system; and
- Training on testing methods and requirements.

**Most challenging chemicals/compounds are: heavy metals, APEOs/APs & VOCs**

Through our survey we have also identified the most challenging chemicals/compounds for manufacturers (see chart below). Three of the top five as per the chart below, were also reflected in the manufacturers' comments with specific requests for more training around them. The three are:

- Heavy metals;
- APEOs/APs; and
- VOCs.

**\*Manufacturers on the most challenging chemicals/compounds...**



*\*Multiple answers could be selected*

**Regulations: cover both Chinese & international**

**Don't assume manufacturers know all the Chinese regulations...**

While the wish for more training on regulations was clear, it needs to be noted that this is for both Chinese regulations and international ones, such as ZDHC and MRSLs. Brands should not assume that since the manufacturers are Chinese that they know all and understand all about Chinese regulations. For example, 88% of manufacturers say they have upgraded to avoid shutdown but only 25% report impact from the Water Ten Plan, pointing a knowledge gap in regulations.

**...more training required on both Chinese & international regulations**

As mentioned by manufacturers in the survey, regulations are always changing and therefore training should be updated accordingly. An example of this would be the issues around indirect and direct wastewater discharge.

Below are comments from manufacturers showing their sentiment on training and regulations.

**Manufacturers' sentiment on training & regulations...**

*"Study and training on relevant regulations."*

*"Best technical guidance on new regulations."*

*"Explanations about new regulations and corresponding technological instruction."*

*"Government policies always change."*

This training wish presents an opportunity for brands to engage with manufacturers, the Chinese government and industry associations to gain more knowledge on Chinese regulations and what impact they have on operations. As a result, there should be more open flows of communication between stakeholders and a more equal understanding on the operating conditions in China.

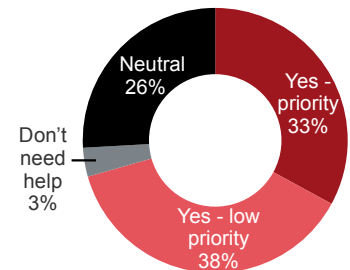
## 2. SOURCING: DON'T KNOW WHERE TO FIND COST-EFFECTIVE, SAFE & ENVIRONMENTALLY FRIENDLY MATERIALS

The sourcing wish, while applicable to both brands and industry associations, is of particular priority for industry associations according to manufacturers.

Manufacturers' wish was simple, where to source cost-effective, safe and environmentally friendly raw materials from yarn to fabric to chemicals.

The most requested sourcing information was on cost-effective, safe and environmentally friendly chemicals, as reflected in the previous chemicals training section. Indeed, 71% of survey respondents said this was a priority of which 33% said it was a high priority. This can be seen in the chart right.

**Priority of sourcing cost-effective, safe & environmentally friendly chemicals**



**71% of manufacturers say it is a priority to find cost-effective, safe & environmentally friendly chemicals**

See the box below for comments from manufacturers.

**Manufacturers' voice difficulty over cost-effective & clean sourcing...**

*"[Don't know] How to find good cheap and environmental friendly replacement."*

*"Need more sources for green chemical suppliers."*

*"Seeking good and cheap replacement/safe chemicals."*

**Other sourcing wishes: for raw material suppliers to improve product information...**

Manufacturers had two other wishes around sourcing. These are:

- **For raw material suppliers** to improve their communication and product information services; and
- **For brands and industry associations** to monitor and to push suppliers to act on the above (reduce incidents of fake certificates etc.).

**...& for brands & industry associations to push suppliers on the above**

Again, comments around these wishes were primarily around but not limited to chemicals. See box below.

**Manufacturers on the issues & help they want with raw material suppliers...**

*"Some suppliers are not willing to provide ingredient list."*

*"Need suppliers to provide MSDS to compare with MRSL's limit and requirements."*

*"Press chemical suppliers, help factories get corresponding information."*

*"Although suppliers provide certificate, wastewater still can be tested out harmful materials."*

*"Not accurate supplier certificates."*

*"Provide information about compliant suppliers for reference."*

*"Strictly check chemical suppliers."*

**ZDHC's "Chemical Gateway" will help manufacturers' sourcing wishes...**

Some good news for manufacturers on this wish is the "ZDHC Chemical Gateway", which was launched by the ZDHC Foundation in 2016. This open database is an online search tool that will help chemical buyers to choose safer options with details on the product compliance. It is open for formulators and suppliers around the world.

**...so should CNTAC's "Chemical Improvement Exchange" platform**

Another initiative that should help is the "Chemicals Improvement Exchange" (CiE) that is run by the China National Textile & Apparel Council (CNTAC) and also launched in 2016<sup>14</sup>. CiE differs from the Gateway as it is only China centric and is an application tool as opposed to a database. CiE connects with the Gateway<sup>15</sup>.

More collaboration between CNTAC and the ZDHC Foundation is expected as the two announced their strategic partnership in 2016<sup>16</sup>.

Further support around sourcing and more broadly with chemicals will come from CNTAC's "Chemicals Stewardship Initiative 2020", which was launched in 2016 and supported by the China Textile Information Centre. The initiative was launched to minimise significant impacts on human health and the environment from the textile industry. It does this through a framework to guide action around chemical risk management in the textile supply chain over five years (2016-2020)<sup>17</sup>. The 2020 goal was adopted in the 13<sup>th</sup> Five Year Plan for Chinese Textile Development.

**The question here is: are there cost-effective solutions or do certain chemicals need to be excluded sooner than 2020**

It is clear from manufacturers' comments above that they are facing numerous and substantial challenges on chemicals. However, the most significant and prevailing challenge throughout them all is cost-effectiveness. The question here then is if there are cost-effective ways to overcome their chemical challenges in the current low margin business model? As we show in the next section, manufacturers are making significant CAPEX investment to tackle these challenges and become greener but it's unlikely that this can continue if brands/sourcing agents continue to push low prices. If there are no cost-effective solutions and prices remain low then a more practical solution here may be to just exclude certain chemicals from production altogether now (sooner than the 2020 ZDHC deadline).

### 3. FINANCIAL SUPPORT: TO MEET HIGHER COSTS OF COMPLIANCE & BRAND REQUESTS

Manufacturers are carrying cost of move to cleaner & circular production...

It is evident from the survey that manufacturers want more financial support from brands. They are concerned over the low margins and the fact that they are squeezed by rising costs and the low prices offered by brands/sourcing agents. The survey results set out in the following page clearly show that the majority of manufacturers are currently carrying the cost of moving to clean and circular production:

...over half invested >RMB2 mn to upgrade....

- **Significant green CAPEX investment:** Over half of the manufacturers surveyed invested upfront CAPEX of >RMB 2 million to upgrade their factories;
- **Material increase in clean production costs:** 31% of manufacturers say that operating costs have risen 0-20% while another 28% say that costs are up 20-40% post upgrade; and
- **More money also spent on circular actions:** 53% say they spent under RMB1mn while 20% say they spent more than RMB1 million.

Should brands pay for clean and circular fashion? See manufacturers' thoughts on this below.

#### Manufacturers' concerns around low prices & being squeezed...

*"Processing cost increased but product selling price didn't, less and less profit."*

*"Price for green chemical is too expensive."*

*"Enterprise needs a very long time to cover the cost, large pressure from money side."*

*"Mainly outsourced factories can't upgrade considering cost."*

*"When setting the target price, take full consideration of the large investment of factories in environmental protection."*

*"Give better price for green production factories."*

*"More effort means more investment, facing existing economic condition, more pressure for more investment."*

It follows then that prices need to increase but brands/sourcing agents aren't adjusting

Less polluting chemicals and dyes cost more than those that are more polluting; recycling, reusing and being compliant usually require technological upgrades, hiring specialist staff and other actions, all of which require more money and investment by manufactures. Indeed, as our surveyed showed, manufacturers are making these financial and personnel investments. It follows then that prices offered by brands/sourcing agents should increase to reflect these investments for clean and circular production but as we heard from respondents this is not happening.

The old, low price model though good for shareholders is short-term & counterproductive to brands' goals of clean & circular fashion

So it appears brands are still operating on the old, low price model, despite their public announcements of moving to clean and circular fashion. While advantageous to their financial performance, this approach is short-term and counterproductive if they actually want to make good on their announcements. This approach is further questionable since as our survey shows, Chinese textile manufacturers are well on their way to cleaning up and starting to move circular. Many have made significant investments as we look at on the next page and 81% say they have plans for future investment. Surely given these actions and investments it makes sense to work with manufacturers and help them make the transition, rather than to move to countries with more lax regulations and where less investment has been made.

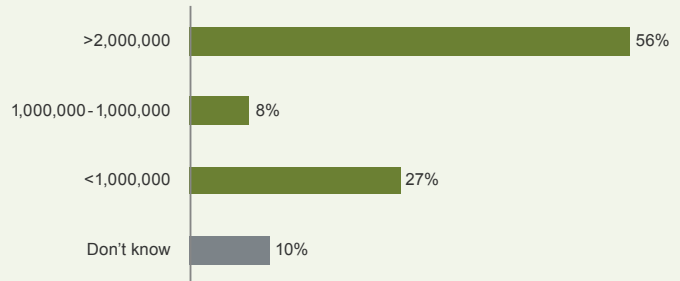
## CHINESE MANUFACTURERS CURRENTLY CARRYING COSTS OF GOING GREEN

### Majority of upfront CAPEX made by manufactures >RMB 2 million

Of the survey respondents that have recently made investments, 56% invested more than RMB2 million (~USD300,000) to upgrade their factories (as seen in the chart right). The upgrades made from this investment can be grouped into the below categories:

- Dyeing & dyestuff related technology;
- Environmental Impact Assessment related;
- Recycling;
- Upgrade boiler/heat recover/heat steam recycle; and
- Wastewater related.

Investments made by manufacturers to upgrade factories... (RMB)



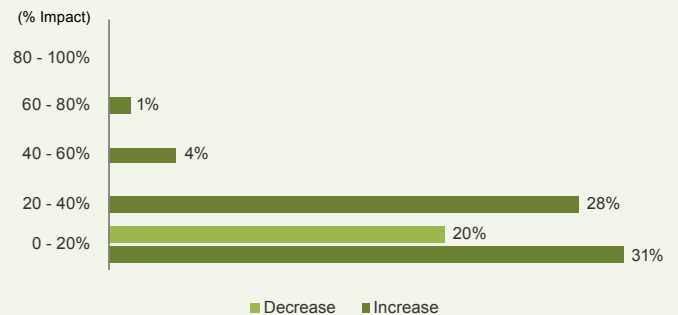
A RMB2 million investment is equivalent to 39% of the average annual profit for a small textile manufacturing enterprise in 2012. Comparatively, this is equivalent to 7% of the annual profit of a large manufacturing enterprise. Given this, it is unlikely that small enterprises will be able to sustain such investment and shutdown. As for larger enterprises, they may be able to sustain investments though not indefinitely given the low margins. Ultimately this points to fewer and more consolidated manufacturers, which mean less choice and higher prices for brands. (Note: profit data sourced from CLSA-CWR 2014 report "Dirty Thirsty Fashion")

### Material impacts on operating costs following investment: 28% report 20-40% increase

According to manufacturers, their investments have mostly increased operating costs. However, around 20% reported that operating costs actually decreased, which is positive. This can be seen in the chart right.

Of those that reported an increase, 31% said operating costs increased between 0-20% and 28% reported a 20-40% increase, clearly material. Even more, 4% reported an increase between 40-60% and 1% between 60-80%.

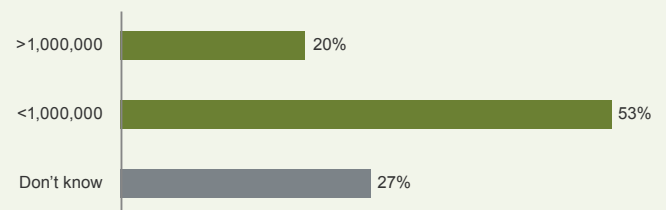
Percentage impact on manufacturers' operating costs from making investments...



### Additional costs incurred to manufacturers from circular economy actions

When asked specifically on costs incurred from circular economy actions, 73% reported additional costs. While the majority of respondents report less than RMB1 million (~USD150,000), 20% did report increased costs of over RMB1,000,000 (as shown in chart right).

Additional cost according to manufacturers for doing circular economy actions... (RMB)



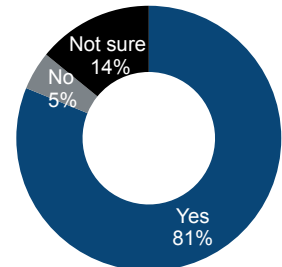
**Despite carrying the costs, 81% of manufacturers have plans for future investment**

**Brands need to act: 81% of manufacturers say more investments ahead**

It's clear that manufacturers are making investments to move towards clean and circular production and that the majority are currently carrying the costs. Looking to the future, 81% say they have plans to make more investments.

However, if the current low price model continues it could potentially impact such future investments as there will be little incentive for manufacturers to upgrade beyond compliance with Chinese regulations. As a result, brands could find engagement with Chinese suppliers more difficult in the future.

**Have plans for future investments at factory**



**The solution isn't to continue to push low prices or move to cheaper countries...**

If the end goal is clean and circular fashion then the solution here isn't to push for the lowest prices (which isn't a sustainable long-term business model, neither does it align with brand's public announcements), or to move to countries with more lax regulations. As we have discussed there is a unique opportunity in China now to lay the foundations for the clean and circular model.

**...brands need to step-up & take their part in covering costs; maybe consumers too...**

What is needed is for brands to step up on covering costs. The easiest way to do this is by paying the higher prices for products. This will clearly have impacts on brand's finances and will likely require for the prices of their products to increase. This is not easy or a small matter as consumers are hooked on the low prices but something has to give. The industry and its beneficiaries can't transition to clean and circular for free. These higher prices are something that consumers are going to have to accept if they don't want fashion that is polluting, thirsty and wasteful.

**the easiest way is to pay the higher prices...**

Other ways brands can act is by offering financing options for manufactures to make upgrades etc., which if not directly from the brands can be from development bodies like the International Finance Corporation (IFC) or a mix of both. The IFC and other organisations have already been operating these financing models for years now. In June 2017, IFC and the Natural Resources Defense Council released results from their Green Textile City initiative in China. 23 textile mills implemented 138 factory projects which saved USD8.4 million in water, energy and chemical operating costs<sup>18</sup>.

**...other options include providing financing & research funds**

Brands can also invest in research and development for innovations that reduce costs and environmental impacts, after all there is no circular model to copy and paste.

**Brands will benefit in the long run**

Benefits for brands from taking on cost coverage include shoring-up future supply, as well as their reputation. There was wide-spread global media coverage in June 2017 on major fashion brands including, Inditex, H&M and M&S, sourcing viscose from factories linked to causing severe pollution<sup>19</sup>. We looked at the high reputational risk levels for fashion brands and the industry overall in our previous report, *"Today's Fight For The Future Of Fashion"*, published in August 2016.

Ultimately it is clear that whether it is training, sourcing or investment it all comes down to not being able to meet regulations and standards within the current pricing model. Cost-effectiveness is what is driving manufacturers' decisions and so ultimately the transition to the clean and circular model. Brands have a big role in how this transition goes, though industry associations can also play a role in helping manufacturers to look for financial support. What manufacturers really want and need are cost-effective practical guides, which they make evident in their wishlists, which we explore in the next chapter.



**CHAPTER THREE:  
WISHLISTS TO BRANDS & INDUSTRY ASSOCIATIONS**



## WISHLISTS TO BRANDS & INDUSTRY ASSOCIATIONS

- Manufacturers scored assistance from three stakeholders. The results: No.1 brands, No.2 Chinese government, and No.3 industry associations.
- In addition to the three overarching wishes from manufacturers detailed in chapter two, they made specific wishes/ requests/suggestions for brands, industry associations and the Chinese government.
- Manufacturers' wishlist to brands:
  - Targeted training covering ZDHC, in particular MRSL: manufacturers particularly want to know which substitution chemicals they can use with only 19% saying they know. Another issue is that while 85% of manufacturers say they know why there is a MRSL only 49% see benefit in producing accordingly, pointing to a possible knowledge gap;
  - Unified criteria for production & assessment: this is an area that the industry itself is working to resolve thus it is not surprising that 52% of manufacturers say they receive varied requirements, 14% of which "vary a lot" and that 85% said it would be easier if there were unified criteria;
  - More transparency around assessment results: this shows that manufacturers want to make improvements, as well as a willingness to do so to meet brands' wants - a good opportunity to establish mutually beneficial development plans; and
  - Longer deadlines to meet requirements: while not ideal for brands to hear, their requests and China's regulations mean manufacturers need to make significant operational changes, which takes time.
- Manufacturers' wishlist to industry associations:
  - More communication from industry associations on regulations and updates, as well as facilitating more communication between stakeholders, particularly brands and the Chinese government;
  - Promote clean and compliant production: this is to help level the playing field and push the new cleaner and circular model; and
  - Foster new business development opportunities including products and markets.
- In addition to their three overarching wishes, manufacturers would like to see the Chinese government help with:
  - Financial support: provide more subsidies and financial rewards around environmental protection, as well as invest more in the circular economy;
  - Increase enforcement: which reflects their wish for industry associations to promote clean and compliant production to level the playing field; and
  - Strengthen wastewater management: in particular capacity and network but also supervision, this again reflects their desire for a level playing field.
- While there are clear challenges to both manufacturers and brands in the transition to a clean and circular model there are also many opportunities. The time to capitalise on these is now, while there is this convergence of goals between both groups.

## MANUFACTURERS SCORE ASSISTANCE FROM THEIR STAKEHOLDERS

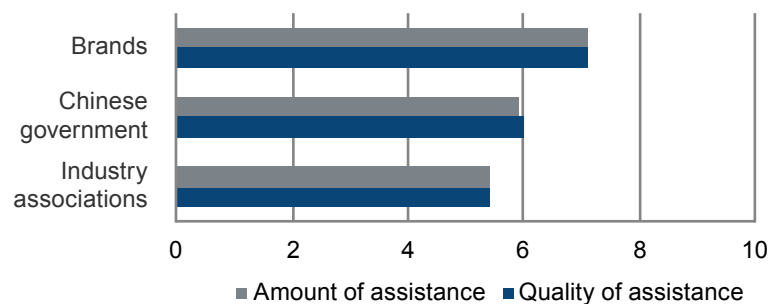
Before we dive into manufacturers' wishlists, we look at how they scored the amount and quality of assistance from brands, industry associations and the Chinese government. These scores are shown in the chart below. For point of reference, 1 is the lowest (poor) and 10 is the highest (excellent).

**Manufacturers scored brands the highest on assistance...**

**...next the Chinese government & industry associations the lowest**

Brands scored the highest for both assistance amount and quality, with 7.1 for both. This is encouraging as there is much that brands can help manufacturers with and so it bodes well for future engagement that manufacturers think highly of their assistance. The Chinese government scored next highest, with scores close to 6. Scoring the lowest and somewhat surprising since many are very active in China is industry associations at around 5.

**Manufacturers score amount & quality of assistance from various stakeholders**



**Additionally to brands & industry associations' wishlists, we look at how manufacturers think the Chinese government can help**

In the rest of this chapter we look at what has made the wishlists to brands and industry associations. Additionally, we look at manufacturers' comments on how they think the Chinese government can help them. After all, the Chinese government scored higher on assistance than industry associations so they see benefit in assistance from them.

## BRAND WISHLIST: TARGETED TRAINING, UNIFIED CRITERIA, MORE TRANSPARENCY & LONGER DEADLINES

In addition to their three overarching wishes (covered in chapter two), manufacturers had specific wishes/wants to brands. In this section we cover the four leading ones:

1. More training around ZDHC, specifically MRSLs;
2. Unified criteria for production & assessment;
3. Longer deadlines to meet requirements; and
4. More transparency around assessment results.

### Closing knowledge gaps in ZDHC, specifically MRSLs

It is crucial for manufacturers to have a good understanding of ZDHC and MRSLs if they are to deliver products in accordance to them, which is what brands want. So, clearly it is in their interest to act on these wishes.

**More training on ZDHC, particularly on MRSLs needed to close knowledge gaps**

Indeed, more training on ZDHC was one of manufacturers' specific wishes to brands (in addition to the training covered in chapter two). Reflecting this, survey results show knowledge gaps in ZDHC, particularly MRSLs. Regarding ZDHC, comments from our survey show an overall unfamiliarity with it but also that manufacturers feel the standards within ZDHC are too high. See box on next page.

**Manufacturers' unfamiliarity with ZDHC...**

*"I don't know much about ZDHC, so cannot answer the real situation."*

*"Not yet understood ZDHC."*

*"[Not sure] how to meet ZDHC by what kinds of lower cost technology."*

*"ZDHC too high."*

The above should be taken into account as brands develop and conduct their trainings. Also worth remembering is that the ZDHC wastewater standard was the least complied with by manufacturers (see chapter two, section "Wastewater: 28% say training was "not or a little helpful" + 13% to 18% are still not meeting standards). As for MRSLs, there was much more feedback around them so we look at it in more detail below.

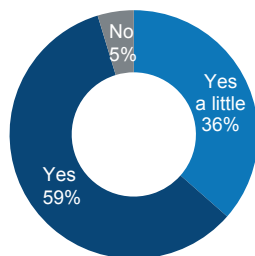
**MRSLs: need to modify trainings to be more personable & cover substitution chemicals**

Before we dive into what brands should to consider for MRSL trainings, we look at manufacturers' knowledge around the MRSL (ZDHC & brand specific).

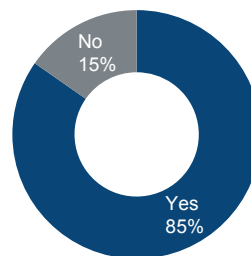
**Positively, 95% of respondents say they know what a MRSL is...**

**... & 85% why there is a MRSL**

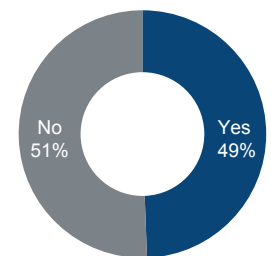
Positively, 95% of respondents say they know what a MRSL is (see left chart below). However, 36% of which say "a little", so there is still room for improvement. Indeed, 69% said training on MRSLs is a priority. Also encouraging is that 85% say they know why there are MRSLs and their comments largely align with that from MRSLs guidance (see middle chart below).



**Know what a MRSL is**



**Know why there is a MRSL**



**See benefit in producing products according to MRSLs**

**However, only 49% see benefit in producing products according to MRSL...**

However, despite this positive data only 49% see benefit in producing products according to MRSLs (see chart right above). Given this, it appears there is a disconnect between training around MRSLs and manufacturers' views on their benefits. This could be a case where manufacturers are retaining information from trainings and so are able to describe what a MRSL is but are not fully understanding why there are MRSLs and its benefits.

**...points to a disconnect between training & manufacturers' views**

It may be that the relationship between the manufactures' operational outputs and their living environment need to be more clearly shown, particularly if there are issues with compliance and so pollution concerns for surrounding waterways and land. It is important that manufacturers have a more holistic understanding of the MRSL so to get their buy in, which should help move closer to being clean and compliant.

**Manufacturers’ main MRSL wish: what substitution chemicals can we use?**

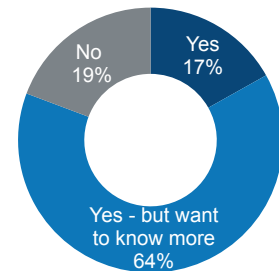
**Manufacturers’ chief MRSL wish is to know which substitution chemicals can be used...**

**...19% don’t know & 64% said they want to know more**

The main wish from manufacturers regarding MRSLs is on which substitution chemicals (including MRSL compliant formulations) can be used. Our surveyed showed that 19% don’t know which substitution chemicals can be used and although 64% said they know, they want to know more (see chart below).

This is a particularly important issue to address as manufacturers’ dissatisfaction around this has been clear, not only in this survey but also our broader engagement with them. They have commented that while MRSLs do pose challenges to their operations, be it financial, capacity or knowledge, they are taking it on board as an operating norm but what is causing the dissatisfaction is that brands, through the MRSLs are saying you can’t use chemicals X, Y & Z and then leaving it to the manufacturers to figure out which they can use in their place. See comments in the box below.

**Know which substitution chemicals can be used**



**Manufacturers want to know which substitution chemicals to use...**

*“Provide replacement for prohibited chemicals.”*

*“Provide materials instructions/list.”*

**Many manufacturers have hired specialised staff but not always enough**

Substitution chemicals and their use are not common knowledge, particularly in textile factories in China. Many manufacturers have had to hire specialised staff but even this in many cases is not enough to overcome challenges. If brands want MRSL compliant products, as they are requesting, this is a clear area for them to improve and do trainings around.

**Other wishes: provide more relevant info on MRSL requirements & updates to MRSL**

Other wishes on MRSL trainings from manufacturers are listed below:

- Provide more relevant information on MRSL requirements; and
- Notify manufacturers of updates to MRSL requirements.

The above will help tackle comments on MRSLs like in the box below.

**Manufacturers unfamiliarity with MRSL requirements...**

*“Not familiar with MRSL’s requirement.”*

*“The factory responsible doesn’t know the meaning of MRSL.”*

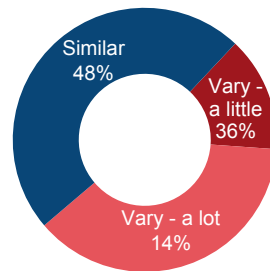
*“[Hard to] Keep track of MRSL’s update, remove unqualified chemicals in time.”*

### Unified criteria for production and assessment

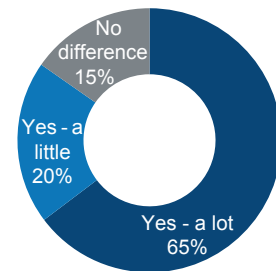
It is not surprising that manufacturers have asked for unified criteria for production and assessment. Indeed, brands and the industry itself have been discussing this point for some time though to no one solution. While the Higg Index is widely used each brand tends to have their own way of using it, along with their own additional questions. This individual use issues also apply to the MRSLs.

52% say requirements vary, 14% of which “vary – a lot”...  
...80% say it would be easier if more similar, 65% “a lot” easier

Our survey found that 52% of manufacturers experience varied requirements from brands/customers; 14% of which “vary – a lot” (see left chart below). 80% said that it would be easier if requirements were more similar, 65% saying “a lot” easier (see right chart below). Brands should continue working together and with the industry to find the one solution.



Variation of requirements from brands/customers



Impact if brand/customer requirements were more similar

Comments around wanting greater transparency show manufacturers truly want to improve...

### More transparency around assessment results

A sign that China’s textile manufacturers truly want to improve their operations and move towards clean and compliant production are their comments around wanting greater transparency from brands. In particular, they want more disclosure on the results from factory assessments. See comments in box below.

**Manufacturers’ wishes for more transparency from brands...**

*“Objectively disclose the results of the investigation on suppliers.”*

*“Objectively and fair order distribution according to the investigation results.”*

*“More information and communication exchange.”*

...also shows a willingness to meet brands’ requests

Moreover, these comments show willingness from manufacturers to make improvements according to what brands want. This is a good opportunity for the two groups to work together and align their future direction.

### Longer deadlines to meet requirements

There were several comments from manufacturers asking brands to give them longer deadlines to meet their requirements, see comments in the box below.

#### Manufacturers on wanting more time to make changes...

*"Give more time for manufacturers to improve."*

*"Product delivery time issues."*

**Brand requirements & Chinese textile regulations mean significant operational changes for manufacturers...**

While this may not be ideal for brands to hear with the ZHDC 2020 deadline looming and pressure to clean-up mounting it is however a reasonable and realistic wish given that their requirements and China's stringent standards mean significant changes to manufacturers operations. These changes are neither easy, nor cheap and take time to be executed, from securing capital to then installing equipment and implementing the upgrades.

**...changes that takes time**

Such changes in operations are being hampered by the issue of high CAPEX, increased OPEX requirements and low prices.

Below is a summary of manufacturers' wishes to brands.

### Manufacturers' Wishlist To Brands

#### Training

- More relevant & solutions focused across three target areas listed, as well as technical guidance including: technological options with corresponding cost information & how-to-use guidelines
- Wastewater: 1) more targeted training, 2) cover both Chinese & international standards
- Chemicals: 1) provide practical & cost-effective how-to-guides
- Regulations: 1) cover both Chinese & international standards, 2) more training on MRSL substitution chemicals & MRSL benefits

#### Sourcing

- Offer information where to source cost-effective, safe & environmentally raw materials, particularly chemicals
- Push raw material suppliers to provide accurate & more information on their products

#### Financial support

- Support manufactures' going clean & circular by accepting higher prices that are needed to cover increased costs
- Offer financing options for upgrades, if not directly, through a development organisation &/or research funds

#### Unified criteria for production & assessment

- Work towards a unified industry standard with little, if any, individual modification

#### More transparency

- Provide more transparency on results from assessments of manufacturers
- Increase engagement with manufacturers around results to capitalise on their current willingness to make changes according to your requests

#### Longer deadlines to meet requirements

- Engage with manufacturers to agree on feasible and mutually beneficial timelines to meet requirements

## INDUSTRY ASSOCIATIONS WISHLIST: MORE COMMUNICATION, PROMOTE CLEAN & CIRCULAR PRODUCTION & FOSTER NEW OPPORTUNITIES

In addition to the training and sourcing overarching wishes from manufacturers (covered in chapter two), there are additional specific wishes/requests to industry associations. The main ones are:

- More communication and facilitate more communication between stakeholders;
- Promote importance of clean and compliant production; and
- Foster new development opportunities.

We look at these individually below.

### More communication and facilitate more communication between stakeholders

Manufacturers want more communication from industry associations, particularly around government policies and helpful resources. They also want industry associations to facilitate more communication between manufacturers and other stakeholders in the industry. The Chinese government and brands were specifically mentioned. See box below for comments around these.

Manufacturers want more communication from industry associations on policies & updates...

...also for them to facilitate more communication between stakeholders...

... particularly brands & the government

**Manufacturers' wants on communication by industry associations...**

*"More communications, import new resource."*

*"More communications with enterprises."*

*"Provide more opportunities in mutual communication between Government and factory owners."*

*"More engagement with government, help enterprises."*

*"Know about enterprises, voice for them."*

### Promote importance of clean and compliant production

This wish aligns with others made to increase enforcement, which we look at in the next section. It shows that some manufacturers want a level playing field, a playing field that operates under the clean and circular model.

Promoting clean & compliant production helps level the playing field

**Manufacturers want industry associations to promote clean & compliant production...**

*"Promote importance of clean and compliant product."*

*"Help with inspection and control."*

**With the industry changing manufacturers' want help on developing new business streams**

**Foster new development opportunities**

With the old fast fashion model changing, it makes sense that manufactures asked for assistance from industry associations to help foster new development opportunities. They specifically mentioned new products and markets. Beyond this, manufacturers did not specify any details. See comments in the box below.

**Manufacturers' ideas on how industry associations can help them develop...**

*"Bring members to explore new markets and develop new products."*

*"Bring more enterprises to participate."*

Below is a summary of the wishlist to industry associations.

**Manufacturers' Wishlist To Industry Associations**

Training

- More relevant & solutions focused across three target areas listed, as well as technical guidance including: technological options with corresponding cost information & how-to-use guidelines
- Wastewater: 1) more targeted training, 2) cover both Chinese & international standards
- Chemicals: 1) provide practical & cost-effective how-to-guides
- Regulations: 1) cover both Chinese & international standards

Sourcing

- Provide information where to source cost-effective, safe & environmentally raw materials, particularly chemicals
- Push raw material suppliers to provide accurate & more information on their products

Communication

- Increase communication to manufacturers on regulations & any updates
- Facilitate more communication exchanges between stakeholders in the industry, particularly with brands & Chinese government

Promote clean & compliant production

- This is important to do in order to support manufacturers that are making efforts to become cleaner & circular, as well as grow Chinese companies bargaining power in the global fashion industry

Foster new development opportunities

- Provide support & guidance around new business streams
- Connect enterprises so they can explore new development opportunities



## MANUFACTURERS ON HOW THE CHINESE GOVERNMENT CAN HELP

**Manufacturers think the Chinese government can help them...**

**...they would like: financial support, increasing enforcement & strengthening wastewater operations**

In our survey manufacturers did comment as to how the Chinese government can help them with their challenges. Their comments touched on all three of their overarching wishes, though their wish regarding financial support was different to that for brands. They focused around subsidies and more investment in the circular economy as opposed to financial support through paying the higher but necessary prices.

Manufacturers also had comments beyond the overarching three of which the main ones are:

- Increasing enforcement; and
- Strengthening wastewater management.

We look at these individually below.

### More financial support & investment in the circular economy

Manufacturers' comments around financial support can be split into two groups:

- Provide financial support (subsidies, rewards etc.); and
- Increase investment in the circular economy.

**Interestingly, some comments referenced financial support with environmental protection & as a reward**

Given the higher CAPEX and OPEX demands for cleaning-up and going circular, these requests are not surprising. Interestingly though, some of the comments specifically mention financial support around environmental protection and as a reward, which indicates a business understanding that the future of textiles is cleaner. See comments in box below.

#### Manufacturers' reflections on financial support opportunities for the Chinese government...

*"Training and subsidies."*

*"Provide subsidies in environmental protection".*

*"Financial support for reward."*

*"Circular economy needs more investment from the government, the government should organise enterprises, enlarge the platform."*

**Emerging industries are clearly key to future economic growth...**

The Chinese government is investing significant funds into emerging industries from artificial intelligence to biopharmaceuticals, and a number of local authorities are rolling out corresponding supportive policies. In June 2017, the National Development and Reform Commission signed an agreement with the China Development Bank that secured RMB1.5 trillion of loans by 2020 for these emerging sectors<sup>20</sup>.

**...but for textiles to transition to a circular economy, financial support & investment must also be made**

However, while some local governments like Shanghai are providing financial support for the circular transition and around textiles, it is far less than that for emerging sectors. While emerging sectors are understandably important for future economic development, since China wants to keep textiles but as a higher-value manufacturing sector and shift it to a circular economy, financial support is also needed to do this.

**Wishes for more enforcement should not be surprising...**

**.... without it, those who have not made upgrades can offer low prices, which disadvantage those going clean & circular**

**Wastewater capacity, network & supervision improvements wanted**

**More enforcement**

Maybe surprising to some are the comments from manufacturers asking the government to improve enforcement, like *“Improve enforcement and punishment on violation/s.”*

However, such comments should not necessarily be surprising as without enforcement the lowest-price business model thrives, which favours those who have not made upgrades as they can offer low prices as they have no investment pay-back considerations. But as seen in our survey many manufacturers have made significant investments in order to move towards compliance and so are essentially at a disadvantage for following regulations and requests from the government and from brands. After all, without enforcement what are the motivations for manufacturers to make investments to clean-up and go circular if not to keep their doors open and win orders? They want a level playing field.

**Strengthen wastewater operations**

Another desire by manufacturers was that the Chinese government strengthen wastewater management, including capacity and network. They also saw room for increasing supervision, which aligns with their want for increased enforcement. See comments in the box below.

**Manufacturers’ wants on strengthening wastewater operations...**

*“Increase wastewater treatment capacity.”*

*“Strengthen supervision on wastewater discharge.”*

*“Improve water network in industrial parks.”*

Wastewater is key in tackling pollution and with China’s environmental regulations it is a clear exposure point for enterprises to financial and other penalties for failure to comply. Thus, it is logical that they want improved wastewater operations to decrease this exposure.

**TAPPING OPPORTUNITIES IN THIS CONVERGENCE OF GOALS BETWEEN MANUFACTURERS & BRANDS**

As said at the beginning of the report this is a unique point in time for the fashion industry with the convergence of goals between China’s textile manufacturers and leading brands. The transition to a clean, compliant and circular model is not without challenges but opportunities are also abound, and the time to capitalise on them are now.

**Both manufacturers & brands have made investments in the new model...**

**...it’s now time for everyone to go all in**

As seen in our survey many manufacturers are indeed well on their way to becoming clean and are starting to move circular. Moreover, many have made significant investment, the majority over RMB2 million and 81% say they have plans for future investment. Brands have also made investments through years of training and internal action. The hard part of making a start has been done. It’s now time to push ahead, which is possible with the wishes from manufacturers and gaps identified in this report.

**Even with rising costs  
there are many lucrative  
opportunities for both  
manufacturers & brands**

The biggest challenge to overcome in actually changing the business model is cost-effectiveness and to do this everyone needs to be all in, no one foot out of the door to another more lax country. Even with rising costs there are many lucrative opportunities for both manufacturers and brands:

- Be a leader in the new circular model – There is no market leader in this space yet;
- Exploit untapped business opportunities and discover future revenue streams – For example, a potential revenue estimate for the Chinese market for the recycling of second-hand clothes of RMB60 billion<sup>21</sup>;
- Shore-up future supply and business opportunities;
- Increase market share in the next generation of spenders, which are more sustainability conscious;
- Be ahead of changes by the investment community as sustainability rises up their agenda; and
- Protect brand image and reputation by delivering on environmental and circular public announcements.



**APPENDIX:  
BEST PRACTICE TIPS**

## BEST PRACTICE TIPS

In this section we showcase a selection of best practice tips to help tackle the water-related challenges manufacturers have voiced in our survey. Other best practice guides are widely available with other organisations, brands and leading manufacturers having released such information. Such as the ZDHC wastewater guidelines. Give the wealth of information it is somewhat surprising that some manufacturers commented in our survey that they have yet to come across sufficient best practice examples. Also, one comment showed a want for more information around sectoral benchmarking, see box below.

### Manufacturers still want best practice examples & industry benchmarking...

*“No good examples of this sector for us to learn from.”*

*“Share good examples in the industry.”*

*“Make more efforts to be sectoral benchmark enterprise.”*

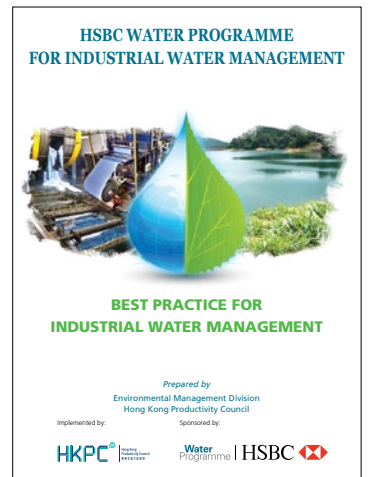
The following best practice tips have been sourced from, with their kind permission, HSBC’s Water Programme For Industrial Water Management recent report titled *“Best Practice for Industrial Water Management”*. These tips are the result of engagement with textile factories in China and thus are clearly relevant.

More specifically, the report summarises key findings from their project in which 36 factories in mainland China from three target industries, (textile and leather, electronics and metal finishing) were selected to have their water resources management assessed. Six of these factories also underwent an in-depth technical assessment with corresponding recommendations made.

The following best practice tips are not comprehensive. They are intended to provide guidance on key water management aspects, which can then be further developed. There are clear applications for manufacturers but these tips can also be useful for brands and industry associations.

As per the report, the following tips are broken down into three sections:

- Water use;
- Water pollution; and
- Water recycling.



## BEST PRACTICE TIPS: WATER USE

### Improve water efficiency through benchmarking

- Calculate and monitor the unit water consumption of the production, and benchmark it against some cleaner production standards, provincial norms of water use, or industry standards (see tables below)
- Identify areas of water wastage and develop measures to improve the water efficiency
- Implement counter flow/cascade washing so as to minimize the water consumption
- Introduce new production processes or machinery with higher water efficiency to realise water reduction

#### Cleaner production standards for textile industry

Ranking	Target Specification on each technical classification	Textile water consumption (m <sup>3</sup> /100m)
Level 1	International advanced level cleaner production	≤2.0
Level 2	National advanced level cleaner production	≤3.0
Level 3	National fundamental level cleaner production	≤3.8
Unclassified	N/A	N/A

#### Discharge standards of water pollutants for dyeing and finishing of textile industry (GB4287-2012)

Fabric type	Wastewater discharge per unit production (m <sup>3</sup> /t Standard Product)	
Cotton, hemp, chemical fibre & blended woven fabric	14	Measurement of wastewater discharge is conducted at the same location as the pollutant monitoring location
Silk woven fabric	300	
Yarns, knitted fabrics	85	
Combed fabric	500	
Woollen fabric	575	

### Organise water distribution system with adequate water metering

- Review all major points of water use for the factory
- Reorganise the water supply system to remove unnecessary piping and connections if necessary
- Maintain an updated plan of the water distribution system
- Apart from the main meter (Tier 1) of the factory, provide adequate sub-meters (Tier 2) for all major water consuming processes to facilitate monitoring of the water consumption
- Check the meters' accuracy regularly and repair/replace faulty meters to avoid overcharge of the water supply

Example: An apparel factory has a clear water supply system and regular meter recording



A textile factory has a Tier 1 water meter to record the total water supply to the factory and Tier 2 water meters covering all water usage points, including production lines, dormitories, canteens, and boilers. The sum of the water records of all the Tier 2 meters matches with that of the Tier 1 meter. No water loss is found.

## BEST PRACTICE TIPS: WATER POLLUTION

### Proper planning and design of wastewater treatment facilities

- Review all major points of water use for the factory
- Employ qualified wastewater treatment consultants with good experience in treating textile and leather wastewater to design and build the wastewater treatment facilities
- Collect sufficient factory information, including wastewater discharge volume and characteristics, as well as the effluent discharge standards, to formulate the correct design basis for designing the wastewater treatment facilities
- Take into consideration the future production plan when formulating the design basis
- Design the water recycling scheme prior to designing the wastewater treatment facilities
- Compare different treatment options in terms of the treatment efficiency, operation requirements, capital investment, operational costs and space requirements in order to select the most suitable treatment scheme
- Proper equipment selection and sufficient redundancy to avoid frequent equipment breakdowns and system downtime
- Sufficient instrumentation and process control to ensure reliable plant operation
- Adequate level of automation and system control to reduce labour work and the risk of human error
- Reasonable plant layout design to ensure ease of operation
- Sufficient supervision to ensure good workmanship for the system installation
- Treatment plants should go through proper testing and commissioning so that they are adjusted and set at the optimum operating conditions for the actual wastewater
- Keep abreast of the latest developments in the government's environmental policies as well as the international environmental requirements in order to reduce the risk of any non-compliance and determine if any plant upgrade is necessary

Example: An apparel factory has built two wastewater treatment plants for garment washing wastewater. The plants were upgraded in 2009 with a design basis of COD about 800 mg/L. However, three years later when they produced more and more woollen products, the wastewater COD shot up to 1,000-2,000 mg/L for more than half a year.

As a result, the treatment performance was poor due to plant overload. Finally, the wastewater treatment plants had to be further upgraded in 2015. If the factory had had better knowledge on the wastewater characteristics and forward planning, the plant would have been upgraded once only to cater for the worst wastewater quality.

**Appropriate wastewater segregation**

- Design an appropriate wastewater segregation scheme when designing the wastewater treatment facilities
- Segregate highly concentrated wastewater from the dilute wastewater to avoid excessive fluctuation in the feed to the wastewater treatment plant
- Segregate incompatible wastewater streams for separate treatment
- Segregate wastewater streams which are targeted for recycling or waste recovery
- Segregate wastewater containing problematic pollutants for dedicated treatment to avoid contamination to other wastewater streams
- Design a control mechanism to prevent wastewater streams from discharging into wrong collection pipes
- Regular sampling of various segregated wastewater streams to ensure correct wastewater segregation
- Modify the wastewater segregation timely to match with any production changes

Example: Wastewater containing chromium is segregated for separate treatment in a leather factory



A leather factory has segregated wastewater containing chromium for dedicated chromium removal by means of chemical precipitation prior to mixing with other wastewater for combined treatment. This can greatly minimize the generation of chromium laden sludge for disposal. Furthermore, the wastewater segregation is monitored regularly by analysing wastewater samples from the non-chromium stream to ensure no contamination to the non-chromium stream.

**Treatment facilities managed by qualified and experienced operators**

- Employ a qualified wastewater treatment company with good experience in treating textile and leather wastewater to operate the wastewater treatment facilities
- Monitor the performance of the appointed operator company by regular checking of the daily operation records, especially the volume of wastewater treated, treated effluent quality, chemical consumption, sludge generation and power consumption, as well as random sampling of the treated effluent

Example: Random sampling worksheet for wastewater treatment plants

An apparel factory has engaged a third party to operate its wastewater treatment plants. The factory has established a system and an experienced team to oversee the work by the operators. Regular inspection and random sampling will be carried out to verify the operators' performance.

废水每日化验记录

日期	取样时间	洗水原水池			洗水混凝池		生活废水				一级厌氧			一级好氧			砂滤池			排放口出水				
		PH	COD mg/l	氨氮 mg/l	TP mg/l	COD mg/l	氨氮 mg/l	COD mg/l	氨氮 mg/l	TP mg/l	COD mg/l	氨氮 mg/l	TP mg/l	COD mg/l	氨氮 mg/l	TP mg/l	COD mg/l	氨氮 mg/l	TP mg/l	PH	COD mg/l	氨氮 mg/l	TP mg/l	
11.02	15:00		796.4	11.5		462.9	10.2		24.5													###	0.2	
11.14	15:00		886.9			445.3	15.4		20.7															
11.20	9:00																							
	15:00					197.3	17.0	216.8	13.7	0.4	206.7	25.6	0.46											
11.21	15:00		印432	印0.24	印10.9	印108	印0.2			印14.7														
	15:00		596.1	7.28	0.81	306.5	0.4				7.28													
11.22	9:00																							
	15:00		831.2			485.2																		
11.25	9:00																							
	15:00		798.4			483.3																		
11.26	9:00																							
	15:00		833.6			496.5																		
11.27	9:00																							
	15:00					160.0																###		
11.28	9:00																							
	15:00		507.0																				###	

Source: HSBC-HKPC "Best Practice for Industrial Water Management" report, 2017



## BEST PRACTICE TIPS: WATER RECYCLING

### Explore water recycling potential

- RO reject, softener backwash water, or boiler blow down etc. can be easily reused for non-critical areas, such as toilet flushing or exhaust gas scrubber, to reduce the use of fresh water
- Examine all the water-using points in the water balance diagram of the factory
- Identify areas in the factory, especially the non-critical areas, like toilet flushing, irrigation and general cleaning, that fresh water can probably be replaced by less polluted wastewater or recycled water
- Determine the specific water use requirements, including the water usage pattern and water quality required, of all these target areas
- Assess the potential impacts on the production when implementing water recycling and try to avoid experimenting water recycling in critical areas/processes without having a clear idea about the specific water use requirements and the quality of the recycled water
- Verify the feasibility of reusing less polluted wastewater or recycled water at these target areas through pilot trials if necessary Install necessary water recycling facilities and/or modify the existing pipework to implement the water recycling

### Example: RO system in a textile factory



A textile factory has a reverse osmosis (RO) system to produce pure water for steam generation. About 30% of water entering the RO system (i.e. 220 m<sup>3</sup>/day) is wasted as reject water and discharged into the treatment plant. In fact, the RO reject water can be reused for toilet flushing (13m<sup>3</sup>/day), irrigation (25 m<sup>3</sup>/day), and softener use (173 m<sup>3</sup>/day), resulting in a reduction of 211 m<sup>3</sup>/day fresh water consumption as well as the same amount of reduction in wastewater discharge.

### Explore water recycling potential

- Review the water use requirements of different production processes and other water consuming areas in the factory so as to define what types of recycled water are required
- If no detailed requirements on the composition of the supplied water are available, the water supply to the factory can be broadly categorized into city water, filtered water, softened water, UF water, RO water, etc.
- Design water recycling facilities to provide recycled water that can match the quality requirements of the existing supplied water
- As the majority of the supplied water will be city water, water recycling facilities can be simply designed to produce recycled water that is comparable to or better than city water
- Understand the water usage pattern of different water consuming processes and provide adequate tank buffers in the water recycling facilities

### Example: RO system in a textile factory



A textile factory has a wastewater recycling system consisting of subsequent treatment for reuse in production lines. To match the demand pattern for recycled water, they have designed a system with an operation period of 12 hours per day. An alternative way to match the demand is to build a larger buffer tank to store the recycled water but a recycling system of smaller capacity. Consumption as well as the same amount of reduction in wastewater discharge.

## ABBREVIATIONS

CAPEX	Capital expenditures
CNTAC	China National Textile & Apparel Council
EIA	Environmental Impact Assessment
IFC	International Finance Cooperation
MEP	Ministry of Environmental Protection
MDSL	Manufacturing Restricted Substances List
OPEX	Operating expenditures
ZDHC	Zero Discharge of Harmful Chemicals

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## NOTES

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