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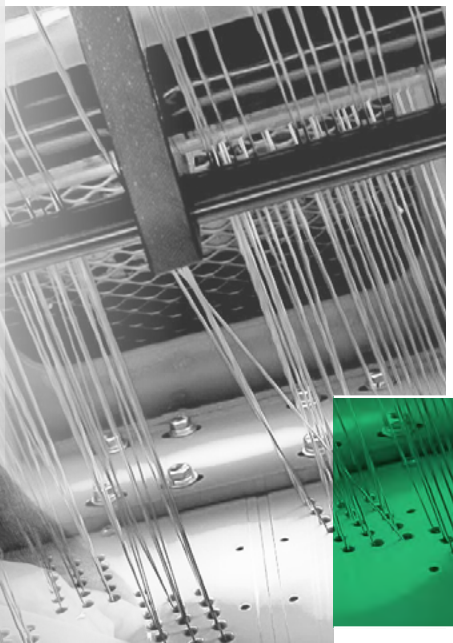
FASHION FOR GOOD

FINANCING the Transformation in the Fashion Industry

Unlocking Investment to Scale Innovation



2020

FASHION FOR GOOD

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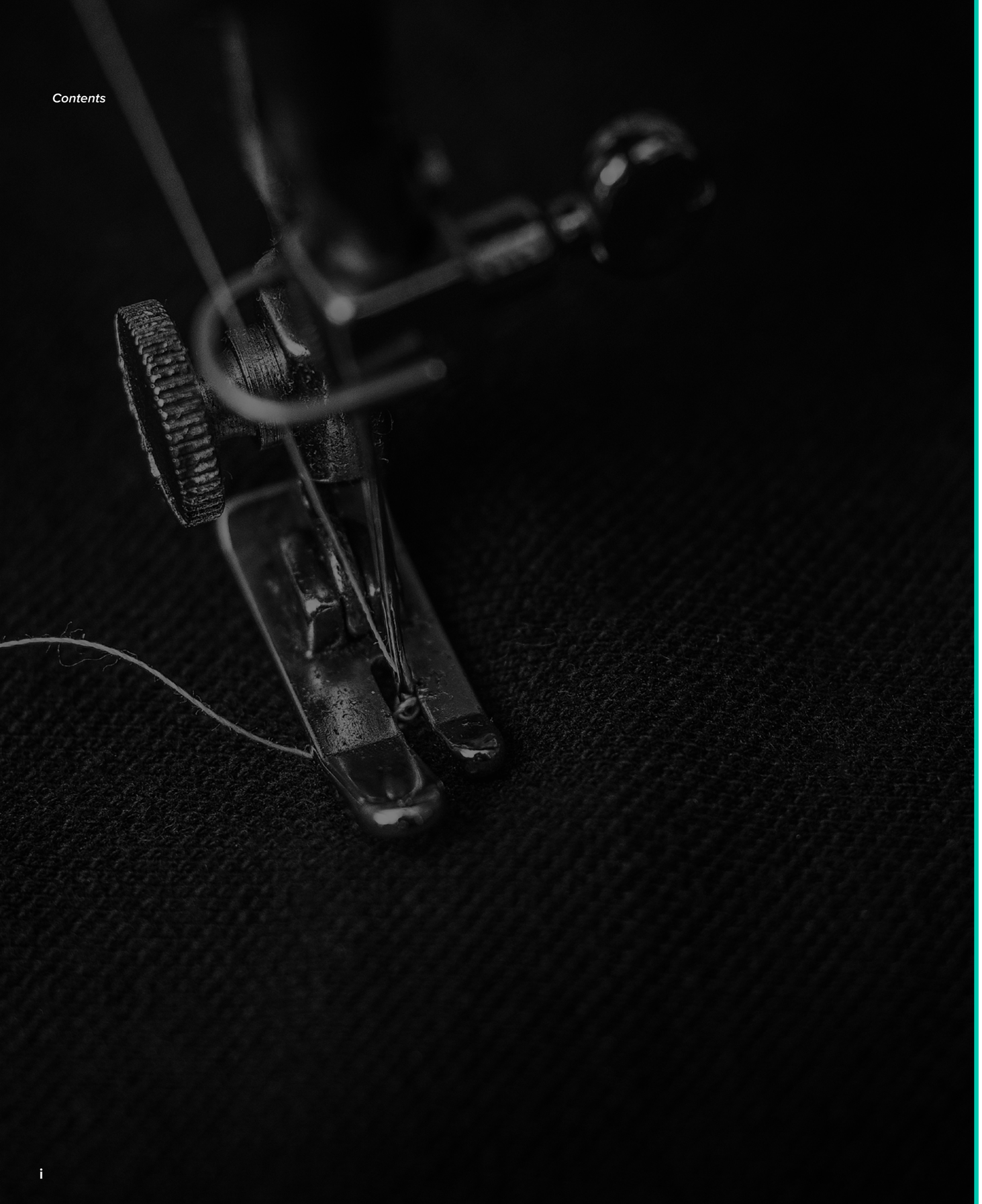

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ABOUT

Fashion for Good is the pioneer of collaborative innovation in the fashion industry. Its Innovation Platform connects brands, manufacturers, innovators, and funders to jointly transform the industry and to bring new ideas and technologies from niche to norm. Fashion for Good's programs are supported by founding partner C&A Foundation, cofounder William McDonough, and corporate partners adidas, Bestseller, C&A, Chanel, Galeries Lafayette Group, Kering, Otto Group, PVH Corp., Stella McCartney, Target, and Zalando, affiliate partners Arvind, Norrøna, Vivobarefoot, and Welspun, as well as organizations such as the Ellen MacArthur Foundation, Sustainable Apparel Coalition, and ZDHC.

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1. INNOVATION Will Unlock Transformation in the Fashion Industry

In 2020, sustainability is at the top of the fashion industry's agenda. Industry leaders recognize the urgent need for responsible practices, as consumer demand and regulatory pressure grow. The fashion industry must take bigger and bolder steps than ever before toward delivering on its environmental and social targets. The question now is how the industry will transform to achieve a sustainable operating model. Upgrading current processes and products with existing solutions will not deliver progress quickly enough. Instead, the industry needs new solutions that lead to transformative change. The challenge is not a lack of disruptive ideas, but rather a need to accelerate the pace of change. One critical lever is the inflow of capital needed to scale new solutions.

In this report, we examine the barriers that hinder bringing innovative ideas to scale. Our analysis—which draws from extensive research and interviews and our work with leading industry players and innovators—reveals that despite abundant innovation and untapped value, the need for investment remains unmet, slowing the commercialization of new technologies in the fashion industry. We analyze the investment needed to spur innovation, and we propose a path forward for all stakeholders to unlock funding, accelerate innovation, and capture the value of the industry's transformation.

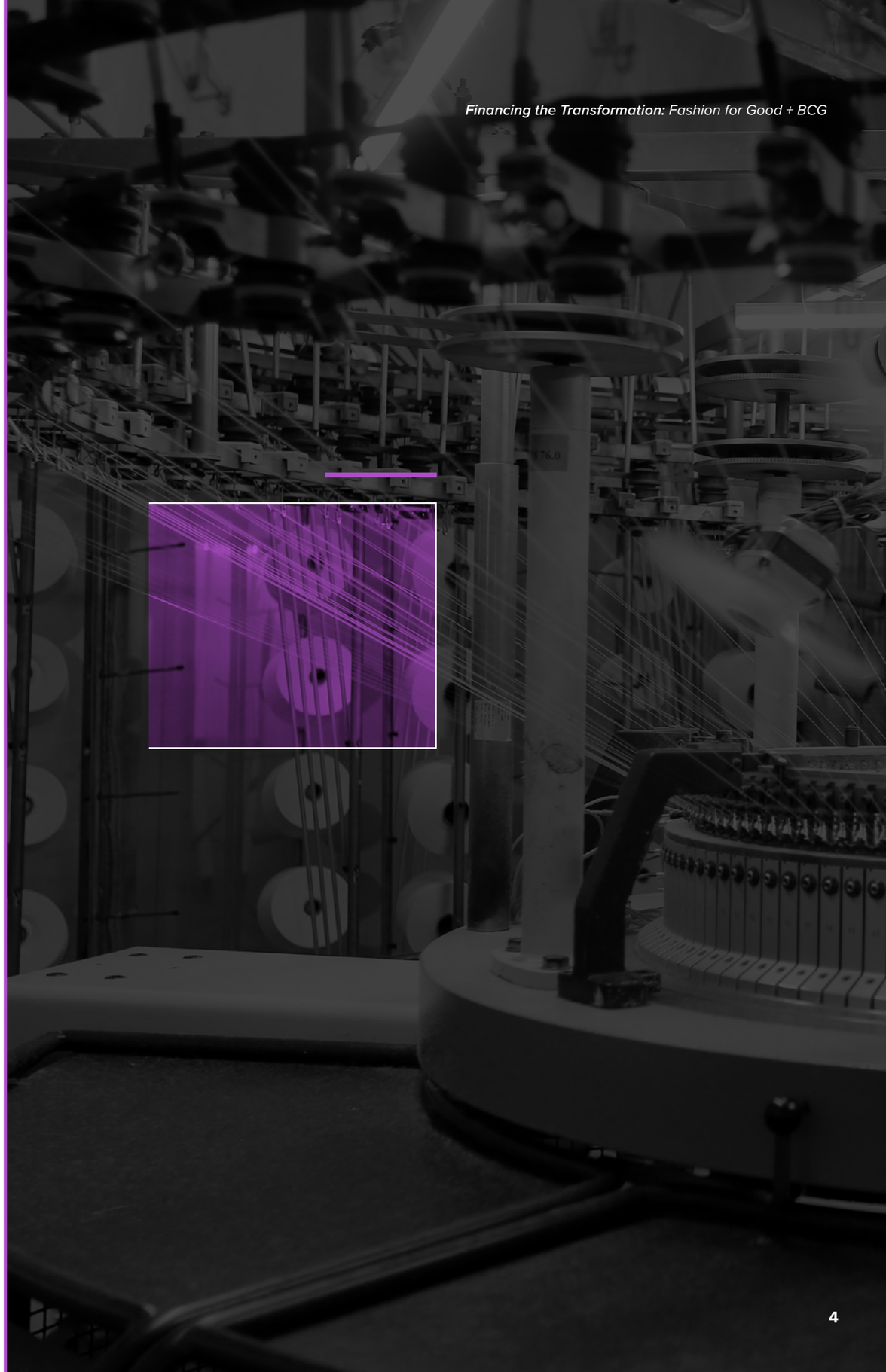
The issue of sustainability is rising on the global agenda across all industries, prompting companies to use resources more responsibly in order to future-proof their business models in line with global guidelines and ambitions such as the Paris Agreement.[1] For example, the energy sector has seen a boom in clean energy investment in the past decade; the automotive industry is investing heavily in electric vehicles; and more recently, clean food and agriculture have attracted increasing investment.

A similar transformation has yet to truly take root in the fashion industry. With a $2 trillion market size, the fashion industry is one of the world's major manufacturing sectors, offering vast opportunities for positive disruption.[2] While some fashion companies have made progress, the industry as a whole has not yet undertaken the degree of systemic change necessary to keep pace with global climate goals, stakeholder demands, and regulatory headwinds. In fact, most stakeholders have only begun to increase their understanding of the extent of the industry's social and environmental impact. Brands and supply chain actors face the concrete task of finding and bringing to scale the solutions that will enable the transformation to circularity and sustainability.

With its $2 trillion market size, the fashion industry offers major untapped opportunities for investors and companies to lead an industry transformation.

As described in the Pulse Curve—a tool that charts the trajectory of the industry's advances toward sustainability—the path toward increasing social and environmental performance follows distinct stages.[3] Progress during the first three stages comes when companies adopt and implement existing solutions that have already been proven to generate substantial impact. At a certain point, however, the effect of adopting existing solutions levels off. (See Appendix A.) From that point forward, maintaining momentum and launching the transformation to more responsible practices require new technologies and solutions that transform traditional business models. For example, more than 50% of the fashion industry's environmental footprint lies in the raw materials stage, but companies have yet to develop significantly improved or high-quality alternatives at competitive prices and market scale.[4] Another major contributor to the industry's environmental impact is the end-of-use stage: while demand for recycled and fully circular products is rapidly rising, the necessary underlying infrastructure of garment collection, recycling, and recycled-fiber spinning systems is not yet available at scale and needs significant funding and support before it can be deployed as a mass-market solution. No universal and comprehensive definition exists yet for the fashion industry's target state of sustainability. In this report, we use the "Five Goods" framework developed by Fashion for Good and William McDonough as a reference, along with the 2030 ambitions laid out by the United Nations Sustainable Development Goals (SDGs) and other specific targets for high-impact areas. (See Appendix B.)

> **"The fashion industry can transition beyond better practices all the way to good practices. It's wonderful to help fashion companies generate positive impact along the Five Goods because we can then truly speak of sustainability."**
>
> **William McDonough**
> CEO, McDonough Innovation
> Cofounder, Fashion for Good



2. A STRONG Innovation Landscape Takes Shape

Innovators have identified many impactful venture opportunities and have started developing solutions to address these key possibilities along the fashion value chain. The result is an emerging innovation landscape that extends from new and alternative materials to processing technologies and digital platforms.[5] For example, technologies that explore waterless or closed-loop processing methods improve water usage and quality, but they also have the potential to disrupt business models by decoupling production sites from water sources. In the retail-and-use stage, circular solutions are emerging beyond well-known rental and resale marketplaces to prolong the garment life cycle. In addition, emerging digital B2B innovations are helping to increase transparency and traceability across the entire supply chain, enabling companies to monitor and communicate progress toward sustainability goals. (See Appendix C.)

> **"In recent years, innovation in fashion has accelerated rapidly across the value chain. We must work together to ensure these innovations can become market-scale solutions."**
>
> **Melanie Steiner**
> Chief Risk Officer, PVH Corp.

Soft Tech and Hard Tech: Different Commercialization Trajectories

Emerging innovations can be sorted into soft technologies and hard technologies, which are defined by the degree of digitization and asset intensity they involve. Soft tech includes mainly digital solutions—either business to business (B2B) or business to consumer (B2C)—and asset-light technologies such as recommerce platforms and traceability software. Hard tech includes endeavors that require developing physical, capital-intensive assets such as dyeing machinery, new fiber production lines, and recycling infrastructure. (See Exhibit 1.)

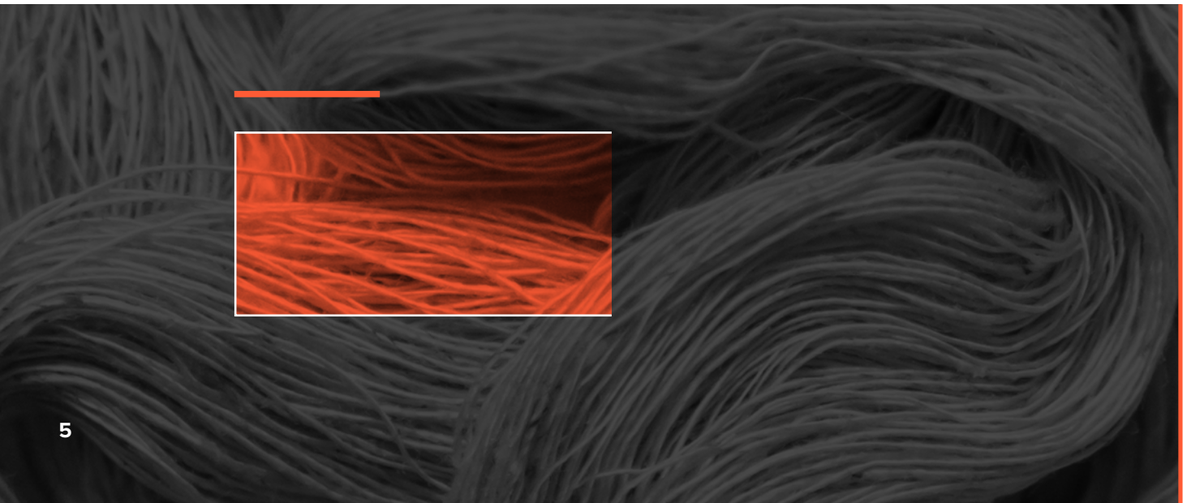
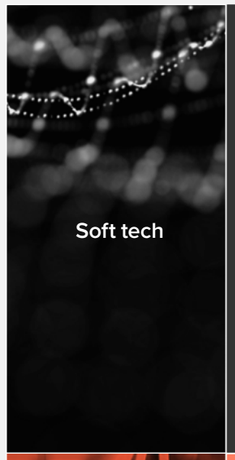


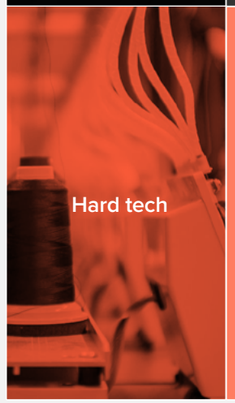
Exhibit 1 | *Two Categories of Technologies: Soft Tech and Hard Tech*

Key differences between soft tech and hard tech are driven by the degree of digitization and asset intensity.



Digital, software-based technology

		Examples
B2C	Business-to-consumer solutions, typically digital platforms enabling circular business models in the retail-and-use stage	• Business-to-consumer solutions for rental; e.g., Rent the runway • Business-to-consumer solutions for resale; e.g., Vestiaire Collective, ThredUp
B2B	Business-to-business solutions that enable brands and suppliers to track impact and develop circular business models	• Circular business models, such as startups providing white-label resale platforms to enable brands to sell their own second-hand items; e.g., Yerdle, and The Renewal Workshop; and white-label rental platforms to facilitate brands in renting out (in and out of season) stock; e.g., Lizee, RE-NT • Transparency and impact-tracking software; e.g., Bext360, Trustrace



Asset-intensive, physical, science-based technology

Lower asset intensity and complexity	Standalone innovations that can be integrated directly into the existing supply chain with a limited, low degree of change to processes or equipment	• Bio-based dyes and fixing processes without harmful chemicals or reliance on fossil fuels; e.g., Nature Coatings, Pili Bio • Novel finishing processes without toxic byproducts, such as PFC-free water repellent
Higher asset intensity and complexity	Complex technologies that require asset-intensive development processes and significant infrastructure or a new system in place for deployment	• Bio-sourced biodegradable yarn; lab-based leather; plant-, fungi-, and fish-based leather alternatives • Chemical recycling and collection scheme

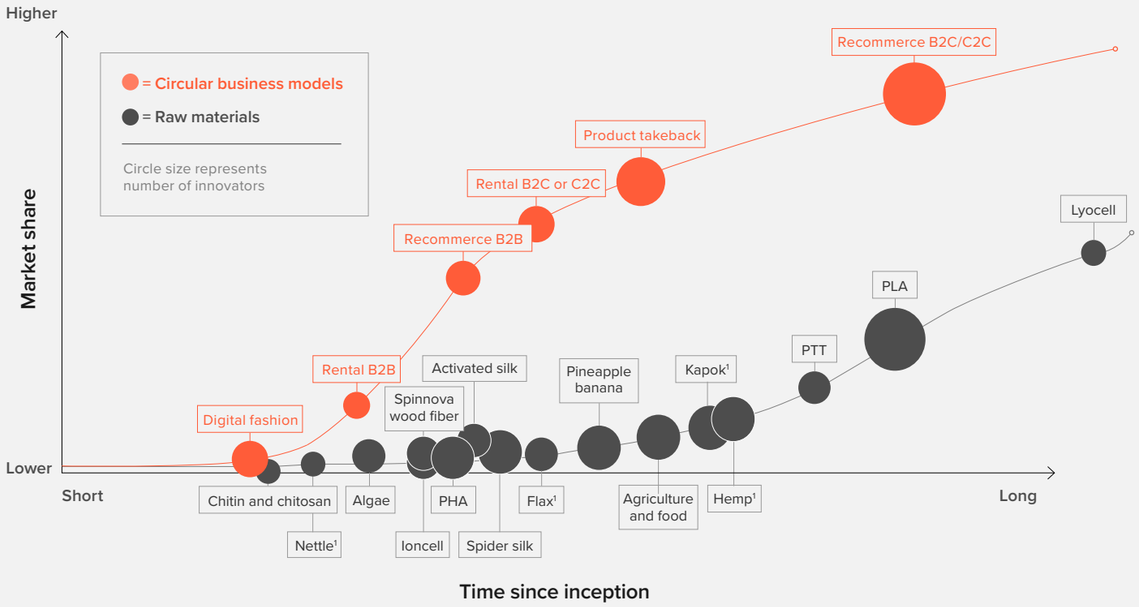
Source: BCG and Fashion for Good analysis.

Asset intensity is an important factor in the pace and path of technology development and scale. Soft-tech innovations usually pass quickly through all development stages, from fundamental research to proof of concept to commercialization. Hard-tech innovations have more complex R&D cycles, and take longer to develop and scale to full commercial readiness. The science and engineering involved in building and deploying hard-tech assets require specialized skill sets, customized tools, and often orchestration of a wide set of stakeholders across the fashion supply chain, including facilities operating in less developed countries. In some instances, bringing hard-tech solutions to market also requires developing underlying infrastructure, such as the garment collection infrastructure needed to feed chemical recycling technologies. Consequently, hard-tech ventures in many cases are less mature, have more substantial capital needs, and offer a different return-on-investment profile than typical soft-tech ventures.

One way to illustrate these differences is to compare the time-to-market curves of circular business models (soft tech) and raw material innovations (hard tech). (See Exhibit 2.)

Exhibit 2 | *Time-to-Market Curve of Circular Business Models Versus Raw Materials Innovation*

Circular business models have reached broader scale, while the full potential of raw materials has yet to be unlocked.



Source: BCG and Fashion for Good analysis.

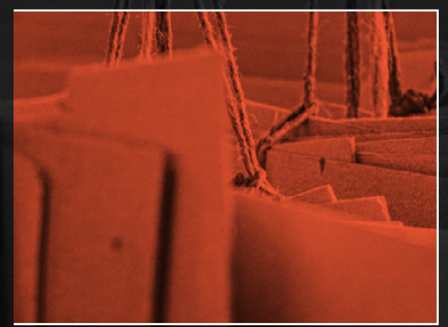
Note: B2B = business to business; B2C = business to consumer; C2C = consumer to consumer; PHA = polyhydroxyalkanoate (natural polyester); PLA = polylactic acid fibers (a form of biodegradable polyester); PTT = polytrimethylene terephthalate fibers (a form of recyclable polyester).

[1]Refers to innovations in quality and efficiency.

Generally, startups that develop new raw materials remain at less mature stages longer and scale at a slower pace. More than 60% of the raw material innovators analyzed were still in early development stages, whereas more than 70% of startups engaged in developing circular business models had already commercialized their solutions and gained considerable market share. The difference in maturity is due to the longer lead time involved in innovating raw materials, in order to develop and test physical, science-based technology and integrate it in the supply chain.

For example, lyocell is among the most mature new raw materials solutions and by some measures could be considered a more sustainable alternative.[6] Although it has been around for decades, its market penetration is less than 1% of the fiber market.[7] In contrast, circular business models have experienced rapid growth and adoption, benefiting from faster development cycles and broader access to capital. Digital or software-based business models have attracted more innovation and investment so far, and consumer-facing innovations have been the most popular. In particular, those that capture customer data have attracted significant financing from investors, further shortening their time to market.

This trend plays out across the entire innovation landscape: soft tech scales faster than hard tech and tends to receive more financing from investors, which further accelerates development. Yet soft-tech solutions accomplish only a portion of the total social and environmental transformation needed by the fashion industry. To achieve full transformation, hard tech is essential. Demand for such solutions—process and recycling technologies, for example—has risen significantly in recent years, and finding ways to finance and speed up the development and scaling of hard-tech innovations is essential.



3. A MULTIBILLION-DOLLAR Financing Opportunity

To calculate the financing needed to scale innovations, we analyzed a comprehensive set of factors, triangulating across multiple top-down and bottom-up methods. These methods take into account the fashion industry's share of the global UN SDG investment needed to reach the 2030 goals, and benchmarking against R&D spending in other industries and calculate a bottom-up view of financing needs across the innovation pipeline.

The Size of the Opportunity

To achieve a step change in sustainability through innovation by 2030, the fashion industry needs $20 billion to $30 billion of financing per year to develop and commercialize disruptive solutions and business models that will meet shifting consumer preferences and regulatory pressures. (See Appendix D.) This range is bounded by a base case in which the current trajectories of investment, regulation, and consumer demand continue, and by an accelerated case in which investment, regulation, and consumer demand escalate the pace of change. The latter case requires innovation to emerge at a faster pace before 2030, which in turn calls for investments to increase by a factor of three or more over their current levels. It is essential to unlock sufficient funding to allow emerging ventures to succeed or fail on their own merits, recognizing that not every innovation will succeed.

Achieving a step change in sustainability by 2030 requires deploying $20 billion to $30 billion in financing per year to develop and scale disruptive innovations and business models.

Potential Impact of Meeting the Financing Need

The fashion industry plays an important role in the world economy, contributing 2% to 2.5% to global GDP. Given its disproportionately large environmental and social footprint, it will play an even bigger role in efforts to reach the 2030 SDGs defined by the United Nations. (See Appendix D.) By reducing its current share of global emissions (5% to 10%), global freshwater extraction (about 5% to 7%), industrial water pollution (nearly 20%), and global waste produced (about 4%), the fashion industry has an immense opportunity to make outsized contributions to SDGs that target, for example, affordable and clean energy, clean water, and sanitation. Accordingly, 60% of the $20 billion to $30 billion financing needed in fashion is required to make progress in the highest-impact areas of energy, water, and waste alone. Alongside other high-impact industries such as food, energy, and transportation, the fashion industry will play a role in unlocking the financing to close the global investment gap of between $5 trillion and $7 trillion it will take annually to achieve the UN's 2030 SDGs.

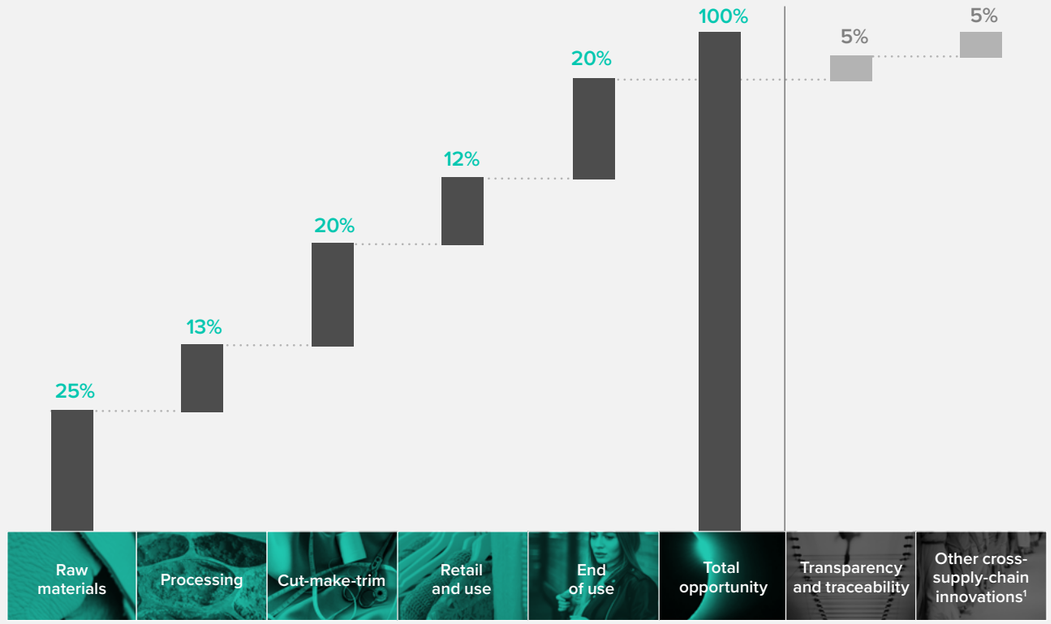
The Biggest Impact and the Largest Financing Opportunity Sit at the Beginning and End of the Value Chain

The need for financing is largest at the beginning and the end of the fashion value chain, in raw materials and end of use (reuse and recycling). Between those two ends of the value chain, processing and manufacturing solutions require the most financing. Innovations addressing the consumer use stage have made the most progress in attracting capital, and therefore require less additional financing. (See Exhibit 3.)

Raw Materials and End of Use. About 45% of the financing demand is driven by raw materials and end-of-use solutions. Technologies in both areas tend to have longer and more capital-intensive time-to-market cycles. Their capital needs reflect such factors as longer fundamental research, iterative development, detailed validation

Exhibit 3 | *Financing Opportunity by Value Chain Step*

The largest needs for financing are concentrated at the beginning and the end of the value chain.



Source: BCG and Fashion for Good analysis.

[1] Includes logistics and transportation innovations, overarching water management solutions, and worker empowerment.

processes, and complex supply chain integration. In many cases, these technologies also require significant additional infrastructure investment to enable the new technologies. For example, scaling innovative processes such as chemical recycling of textile waste requires broader infrastructure investments in collection, and also in sorting and cleaning facilities. Few investors have the technical knowledge to effectively evaluate the potential of these technologies and form an investment decision, leaving a significant financing opportunity unaddressed.

Processing and CMT. Of the overall required financing, 35% is needed to support new solutions in processing and cut-make-trim (CMT)—the manufacturing stage of cutting, assembling, and otherwise processing material into a finished garment. Technologies in this area such as waterless or microbial dyes and fixing agents, enzyme-based pretreatments, and zero-waste manufacturing processes are capital intensive and require extensive scientific development. On the other hand, they target specific applications in the supply chain and therefore scale and commercialize more easily, and for these reasons they tend to attract financing more easily. For example, Jeanologia, the Spanish developer of ecologically sustainable technologies for the denim industry, closed a deal with The Carlyle Group in 2019; and innovators such as Dyecoo, Nature Coatings, and Colorifix have secured funding from IKEA, H&M CO:LAB, Textile Innovation Fund, and others.[9]

Retail and Use, and Transparency and Traceability. Consumer-facing technologies such as recommerce and rental ventures (for example, TheRealReal and Rent the Runway) have typically gained far more liquidity than other innovation areas, so their unmet financing needs are smaller. Digital technologies in this segment have attracted

financing more easily, as they are easier to understand, they scale faster and more predictably, and more investors have experience and expertise with them. Many of the opportunities here center on digital solutions for supply chain transparency and authentication technologies for resale.

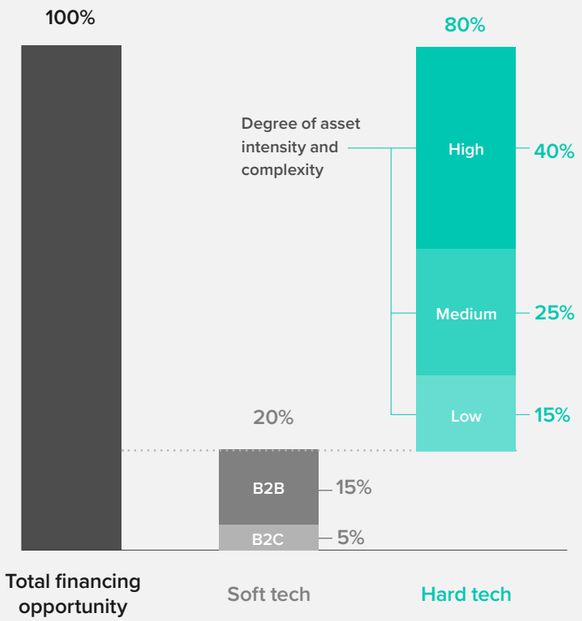
In fashion, nearly half of the financing opportunity lies at the beginning and the end of the value chain, where raw materials and end-of-use solutions have the highest impact potential.

Hard-Tech Solutions Offer a Larger Financing Opportunity

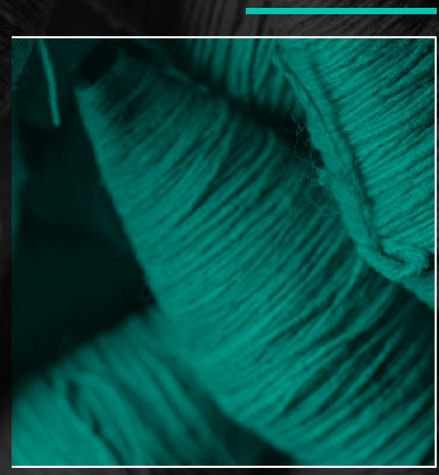
The need for investment is greatest in value chain steps that often call for hard-tech innovation. Due to its asset-intensive nature, hard technology typically requires three to five times more funding than digital solutions do.[10] In many instances, hard-tech development and scaling depend on physical assets such as bespoke machinery, specialized tools to run lab tests, or entirely new testing facilities; and these needs drive a significant part of their capital requirements. Overall, hard tech has a different risk profile and generally a longer time to market, and therefore it needs more financing and support, especially at prerevenue stages. In efforts to scale or commercialize hard technologies, the demand for capital increases rapidly. For example, to gain market share and cater to the large volumes and global operations of multinational fashion companies, chemical recycling innovators need to build several thousand recycling facilities to process the world's annual fiber waste. Orchestrating multiple players is essential not only to meet pure funding needs, but to secure the right support, accumulate order volumes, and install additional infrastructure such as collection schemes for recycling. (See Exhibit 4.)

Exhibit 4 | *Unmet Financing Need, by Technology Category*

Hard tech requires significantly more financing, especially to scale solutions with high asset intensity and complexity to deploy.



Source: BCG and Fashion for Good analysis.



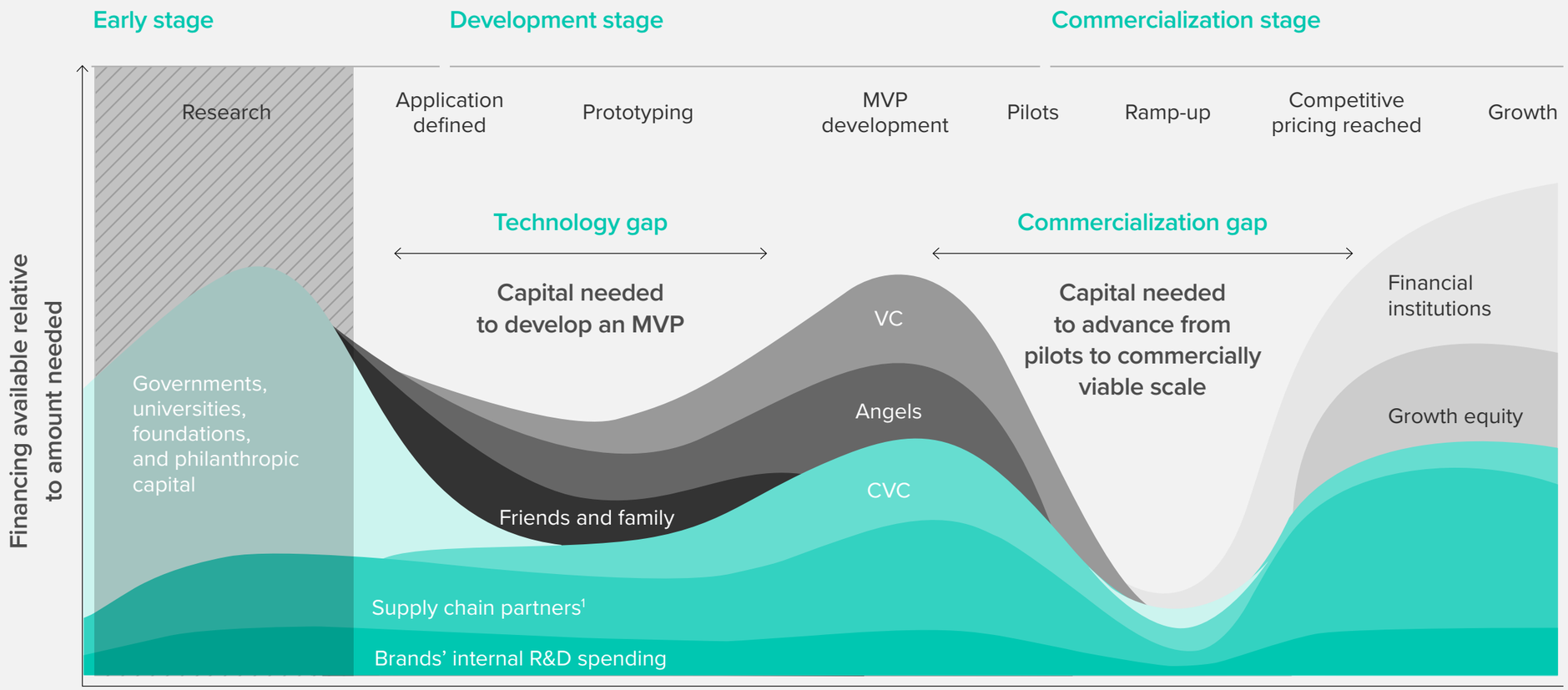
Hard-Tech Innovators Struggle to Bridge Two Critical Gaps

In the process of innovation development and scaling, both hard- and soft-tech innovators must deal with two distinct phases during which capital is less available and accessible. (See Exhibit 5.) In the technology gap, innovators need risk capital to create working technologies and build viable business models with minimum viable products (MVPs); in the commercialization gap, they need a different form of growth capital to advance proven models to commercially viable scale. These two gaps are difficult for all innovators to bridge on the path to commercialization, but they are especially challenging for hard-tech innovators.

> **"Increasingly interesting investment cases are emerging in hard-tech innovations throughout the fashion supply chain. These ventures provide opportunities for investors to catalyze new levels of change in the fashion industry at the intersection of venture capital returns and sustainability."**
>
> **Mark Cupta**
> Partner, Prelude Ventures

Exhibit 5 | *Typical Financing Demand and Supply Landscape for a Hard-Tech Innovator*

For hard-tech innovators, two financing gaps during the development stages are especially challenging to bridge.



Source: BCG and Fashion for Good analysis.

Note: All dollar amounts are in US dollars; actual financing needs may vary. CVC = corporate venture capital; MVP = minimum viable product; VC = venture capital.

[1] Refers to both external investments and internal R&D spending by suppliers.

The Technology Gap. In the early stages of fundamental research, the main funding vehicles available are grants with high risk tolerance, and often no expectation of a return, which usually come from universities, governments, and foundations. Private and philanthropic investors engage in the initial development stage, providing pre-seed or angel funding rounds in the range of $10,000 to $1 million to help innovators develop their business model and technology.[11]

Only a fraction of all available capital has been invested in fashion and textile tech, leaving many innovators stuck in the financing gap.

The need for additional funding constantly arises when innovators refine their technologies, develop an MVP, and expand their business. However, acquiring larger financing rounds becomes more difficult. The large majority of innovators are currently in this development stage, seeking seed and Series A funding typically in the range of $1 million to $10 million. In recent years, however, only a fraction of available investment capital has reached the fashion industry, leaving many innovators stuck in this financing gap.

The most critical roadblocks for innovators in the technology gap are cautious investors' requirements for returns, and fashion brands' lack of incentive to be first movers. Given the limited track record of innovators and the uncertain prospects involved, investors are hesitant at this stage. They base their investment decisions on the quality of the innovator's team, the progress achieved with initial capital, the future market potential and commercial viability of the technology, and the rate at which the technology can scale. Accordingly, fast-scaling, predictable innovations involving an easy-to-understand technology and business model tend to have greater access to available capital, while other innovators have a harder time attracting financing. For hard-tech innovators, the technology gap is exacerbated by the lack of investors with the expertise and risk appetite to invest in asset-intensive solutions. In many cases, potential investors overlook investment opportunities because of a lack of industry or technological expertise, or a lack of strategic investment and scouting approaches.

Most brands currently resist working with early-stage innovators until the technology has been tested and a business case proven. Brands have a limited willingness to experiment because innovation development cycles are long, technologies improve only gradually, and end-consumer tolerance and the future upside for their business model are unclear. Especially in competitive areas such as raw materials, many brands are cautious about endorsing innovators openly or providing any indication of demand or commitment. This creates a challenge for investors, who rely on market and demand signals to confirm the relevance of innovations and the valuation of ventures.

Most hard-tech innovators that have managed to bridge this technology gap have put great effort into securing funding from a limited supply of angels and venture capital (VC) investors. Others have survived primarily on small infusions of capital from government or philanthropic grants, and on informal support from friends and family. A few pioneering brands—including adidas, Bestseller, H&M, and Patagonia—have begun providing early support at this stage through corporate venture capital (CVC) investments.

The Commercialization Gap. Later in the innovation development cycle, innovators with proven technologies require ever-larger rounds of funding to scale and commercialize their technologies. These can be rounds of more than $20 million, particularly for highly asset-intensive hard-tech companies. Even though proofs of concept increase investors' confidence in ventures at this point, the ventures are still prerevenue or precommercialization, and therefore still considered risky by investors. Few players participate in these larger prerevenue financing rounds in the fashion industry, and as a result many innovators struggle to clear the commercialization gap.

The gap becomes most pronounced as technologies grow from pilots to fully commercial scale. At this development stage, innovators require mostly Series B or Series C funding until they can achieve the necessary volume to reach market-viable price points and generate revenues. The financing that an individual hard-tech innovator needs at this point may account for as much as 90% of the innovator's total funding journey from R&D to scaling. At this stage, some hard-tech solutions still face technological risk, as scaling may introduce new and unforeseen challenges, especially when interacting with a complex, fragmented fashion supply chain. In contrast, soft-tech innovations that have reached the commercialization gap do not face the same degree of severity, as

they have more straightforward paths to commercialization that benefit from lower scaling costs, more-predictable trajectories, and shorter time to revenue.

Not only the amount but also the type of capital needed changes in this stage. For high "concrete and steel" capital costs, equity investments even from large VC funds will not cover the innovator's full funding needs on their own, and the demand for other financing vehicles will increase. However, project finance, growth capital, and long-term corporate R&D investments that serve this need in industries such as energy, automotive, and chemicals are not yet present in the fashion sector. Few investors have discovered these opportunities, for a number of reasons: a need for clear demand from brands (for example, in the form of offtake agreements from the brands); a lack of precedents and of awareness of the opportunities in this field; absence of structural incentives for significant corporate R&D; nascent external pressures (resulting from changing regulations, for example); and a scarcity of innovators that meet growth-stage investor criteria with respect to revenues.

Innovators struggle to bridge the "missing middle" of finance between early venture capital and late-stage funding, which prevents solutions from reaching market scale.

> **"There have not yet been successful examples of project financing for fashion innovations, in part due to the lack of precedent. Also, in fashion, brands tend to exercise flexibility over their supply chain. Comparing this to energy, where volume guarantees ensured financing before construction, the fashion industry needs to step up to operate in new ways."**
>
> **Greg Stillman**
> Business Development, Natural Fiber Welding

Taken together, these hurdles slow innovation and the industry's progress toward sustainable business practices, especially in the commercialization gap for innovations. A "missing middle" between VC investors and late-stage and growth equity funding leaves innovators' financing needs unmet. This gap must be bridged for technologies to scale.

4. THE FINANCING Landscape Is Still Nascent

Over the past few decades, if not longer, few methods and processes of production in the fashion industry have undergone fundamental change. Established business models have delivered expected margins under ever-increasing cost pressure, with no significant shifts in consumer behavior to inspire demand for new technologies. As a result, the relatively recent increase in demand for innovation has escaped the attention of many investors, who are unaware of the change in demand and of the broad innovation pipeline that has emerged. Although capital and investors seeking opportunity are plentiful, they have dedicated relatively little investment to innovation in the fashion industry so far. In the early stages of the innovation development cycle, funding for fundamental research comes from both public and private sources, such as governments, universities, and foundations. Later, the share of private capital increases, as innovators advance the development of their technology and require larger rounds of strategic capital. Typically, equity investors, especially VC investors, are most active in the development stage. Growth capital investors and other institutional investors usually enter in later stages to help fund geographical expansion or grow revenue by expanding the venture's customer base.

Philanthropic investors play an important role throughout the innovation development cycle. While most foundations are active in the early stages by providing grants, they also have funds that could support innovators in the later stages. Through direct or indirect investments, they could de-risk subsequent financing from other investors or lenders. However, many philanthropic investors are not yet set up to take on this important role. Many are unfamiliar with supporting the for-profit sector, because it lies outside the scope of their usual activities, and others look to avoid loss of control when co-investing.

Most importantly, funding from within the fashion industry—through fashion brands, manufacturers, and upstream operators—remains a limited source of capital, although these companies would be the greatest beneficiaries of properly capitalized innovation.

> **"So far, only a few foundations take the opportunity to play a more important role in unlocking funding to scale innovation. By adopting a more strategic investment approach, they can de-risk and catalyze private-sector investment."**
>
> **Leslie Johnston**
> Executive Director, C&A Foundation

Venture Capital. To date, relatively few VC investors have discovered the rising investment opportunities in the fashion sector. In 2018, a combined investment of $2 billion in beauty and fashion accounted for approximately 1.5% of total VC investment in the US.[12] Most VC investments have gone into soft-tech areas such as new sustainability-oriented brands that leverage direct-to-consumer models—an area where a few startups recently achieved unicorn status.[13] These types of innovators fit well with VCs' standard risk-return expectations and investment portfolios. To generate attractive returns for VCs, portfolio ventures must deliver significant upside—winners commonly generate more than ten times the investment in five years. VCs typically search for opportunities that have a well-understood business model and the potential to scale fast. For this reason, many VC investors see soft-tech business models, whose underlying economics work fairly similarly to those of other industries, as more attractive investment opportunities. VC managers can easily transfer their existing experience and expertise when evaluating these models.

To overcome the limitations on experience and expertise that hinder traditional investors from pursuing fashion innovation opportunities beyond soft tech, specialized funds have emerged in recent years. For example,

textile-focused funds such as the Textile Innovation Fund, Bombyx Capital, and Alante Capital have invested in hard-tech innovations in textiles, including 3D printing, sustainable dyeing methods, and alternative raw materials. These funds have identified the potential of textile innovation, including hard tech, to deliver both returns and impact, and they have built a specialized knowledge base that enables them to capitalize on the emerging technology transformation.

In addition to funds that specialize in fashion or textile sectors, certain funds from adjacent sectors—such as materials science—and other funds with an impact-oriented investment thesis regarding clean energy or circularity have started paying attention to the fashion industry. As their awareness of fashion's negative social and environmental impact grows, these funds see opportunities to meet their investment thesis. Examples include Closed Loop Ventures, Prelude Ventures, Pangaea Ventures, Generate Capital, The Westly Group, and Breakthrough Energy Ventures. Nevertheless, these investors are still fairly new to the space. Many are on their first or second investments in fashion, and others are just beginning to explore and develop their industry expertise.

Growth Capital and Private Equity. Growth capital typically becomes available to innovators that are advanced in their development but need capital for further scaling and revenue expansion. Allbirds, for example, has raised a Series C round of $50 million at a valuation of $1.4 billion from a set of late-stage, growth capital investors.[14] Private equity—which refers here to investors that invest in large late-stage rounds and normally (but not always) take ownership of the acquired company through a majority buyout—has traditionally been active in buying majority control of mature companies, such as established fashion brands.[15] Recently, growth and private equity investors have also made forays into investing in growing startup brands that have big consumer draw and e-commerce distribution. For example, Permira announced in July 2019 that it had acquired a majority stake in the ethical fashion brand Reformation, and Rothy's raised $35 million from Goldman Sachs Investment Partners in 2018.[16]

Growth equity and traditional private equity firms' interest in developing manufacturing and supply chain innovations is still forming, as the innovation pipeline of potential investment targets starts to mature.[17] The Carlyle Group's March 2019 investment in Jeanologia, for example, was the firm's first investment of its kind in the fashion supply chain. This is an encouraging development, as greater involvement on the part of growth equity and private equity financiers could help close the commercialization gap by providing much-needed medium- to long-term capital at that later stage and by bringing valuable expertise to scaling and internationalizing innovations.

> **"In the same way that Jeanologia's success relies on the ability of its innovative eco-friendly and sustainable technologies to generate very attractive returns on investment for its clients, we believe that equity investment in positive-impact, entrepreneurial, and proven projects such as Jeanologia is possible without compromising at all on the economic returns of that equity investment."**
>
> **Alex Wagenberg**
> Partner & Managing Director, The Carlyle Group

Financial Institutions. Typically, it is difficult for a startup of any kind to get a loan from a commercial bank or lender. Startups cannot offer capital, collateral, a good credit rating, or a track record.[18] Recently, however, some banks have become more open to the idea of financing innovators. For example, HSBC introduced an $880 million technology fund to provide financing to ventures as part of its strategic commitment to helping entrepreneurs in China's Greater Bay Area.[19] This fund aims to help high-growth, early stage companies who have viable business models by providing them with liquidity to finance growth. To assess promising ventures, some banks are beginning to introduce new criteria to account for a venture's growth prospects, the quality of its management team, the strength of its cash-flow plan, and the presence and nature of earlier equity investors. These new funding opportunities can be especially helpful in covering some funding needs in the commercialization gap. For their part, banks benefit from building deep client relationships with growing companies early in their development.

The emergence of green lending has the potential to bring more capital into sustainable solutions in fashion, as well. The European Commission is exploring proposals to ease banking rules on green-friendly lending by reducing capital charges on such loans.[20] Although these proposals face opposition from some banking regulators and may not materialize in their currently drafted form, some type of incentive to spur sustainable lending will probably be implemented soon to help provide more capital to innovators.[21] Currently, such green loans are available only to very late-stage innovators or fashion companies.

Beyond green lending, financial institutions have introduced sustainability-linked loans (SLLs), which can provide general corporate financing tied to sustainability KPIs—unlike green loans, which must be tied to specific projects—and have interest rates that are not contingent on sustainability metrics.[22] The market for SLLs has risen from $5 billion in 2017 to $40 billion in 2018; and in November 2019, Prada became the first fashion company to sign a five-year €50 million SLL, with Crédit Agricole Group, under which Prada can pay a reduced interest rate if it achieves targets related to the number of stores assigned LEED Gold or Platinum Certification, the amount of training hours employees receive, and the use of Prada Re-Nylon (regenerated nylon) in the production of goods.[23] Although SLLs are not directly tied to specific projects, companies have used them to further the development of circular technologies and innovation.[24]

Fashion Industry. Continuous effort and investment by fashion companies across the value chain should be the primary driver in developing and commercializing innovations—but the fashion industry has yet to fully embrace this role. Historically, the industry has reported significantly lower R&D investment than other industries. Typical R&D investment for the fashion industry is less than 1% of sales, compared with about 10% to 15% of sales for consumer electronics companies and about 20% to 30% of sales for pharmaceutical and biotech companies.[25]

Most brands' investments in innovation focus on product design and performance; and since they usually do not own their supply chains, most companies have not strongly encouraged, supported, or invested in major innovation outside their own operations. In the supply chain, manufacturers and other upstream operators have invested primarily in marginally improving the efficiency of fundamentally unchanged industrial processes. Because they operate in a commodity-based, price-pressured industry, manufacturers have limited bandwidth and capital to support improvements. As such, the fashion industry has dedicated only a small share of investment to advancing truly disruptive solutions.

> **"Receiving an endorsement and investment from a brand unlocks more capital and helps get startups 'over the hump.'"**
>
> **Peter Majeranowski**
> President & Cofounder, Tyton BioSciences

However, encouraging moves are happening with greater frequency. Upstream operators such as Lenzing, Marubeni, Sulzer, Fortum, and Royal Golden Eagle have started to invest in promising startups such as Spinnova, Worn Again, Tyton BioSciences, and Infinited Fiber Company.[26] These indications are positive, but closing the financing gap will require more spending—especially from upstream operators, which are uniquely positioned to provide the required expertise, have the resources to do it, and stand to benefit from competitive innovations. Some forward-looking fashion brands and manufacturers have also increased their effort and investment in innovation. Fashion brands such as adidas, Bestseller, C&A, Chanel, Kering, PVH Corp., Stella McCartney, and Target have joined innovation platforms such as Fashion for Good to gain access to and support scaling of promising technologies. Large fashion brands that are leading the innovation and sustainability transformation are at the forefront of creating separate CVC arms, as well. For example, Patagonia founded Tin Shed Ventures in 2013 as a $20 million fund, and H&M CO:LAB has, since its creation in 2014, contributed to investing rounds ranging from $1 million to $20 million.[27] Other companies, such as Aditya Birla, Zalando, and adidas, have formed CVC arms over the past few years, too. In addition to financing, CVC provides crucial value through industry expertise and connections to customers, suppliers, and investors.

> **"Our focus so far has been around improving our existing operations and implementing commercially available solutions. Only a small share of innovation budget and activity is currently directed to developing truly radical solutions. To drive this further, risk capital and an aligned approach between brands and manufactures are required."**
>
> **Punit Lalbhai**
> Executive Director, Arvind

5. SIX BARRIERS to Financing Innovation

Exhibit 6 | *Six Barriers to Financing the Transformation in the Fashion Industry*
Current barriers to financing prevent innovations from reaching scale.

- Misaligned incentives in the fashion industry
- Limited awareness of the opportunity
- Absence of a structured innovation process
- Lack of experience and technical expertise
- Incorrect perceptions regarding pricing and externalities
- Inadequately structured exclusivity

Source: BCG and Fashion for Good analysis.

Six key barriers stand in the way of financing for sustainable fashion innovation and impede the industry's progress toward transformation. (See Exhibit 6.)

Misaligned Incentives

The fashion industry has engaged in a cost-driven race to the bottom, giving little attention to disruptive innovation and overlooking investment opportunities.

Historically, much of the fashion industry has engaged in a race to the bottom, optimizing costs and efficiency in order to operate on narrow margins.[28] Often that race has resulted in short-term relationships between brands and their supply chain partners. This fragmented and fundamentally transactional setup has fostered an environment that is not conducive to investing in R&D and innovation projects. While brands make commitments to undertake more sustainable practices, much of the change must occur at different stages of a highly fragmented supply chain. This creates a situation in which players in the supply chain are often asked to bear the risk, costs, and effort of innovating, with little guarantee that they will be in a position to capitalize on their investment.

The ultimate beneficiaries of innovation are the brands, which reap the rewards of marketing and offering differentiated products to end consumers. Suppliers and manufacturers positioned early in the value chain do not benefit from strategic or branding advantages the way brands do. As a result, they have little incentive to support and use these disruptive technologies, unless companies in subsequent stages of the supply chain are willing to pay more than a marginal surcharge for innovative products. The imbalance can even encourage suppliers to innovate in secret.[29] Companies may covertly scale technologies that reduce manufacturing costs, increase financial margins, and improve efficiency in order to prevent brands from asking for lower prices or assuming that quality has dropped. The lack of long-term, trusted relationships further fuels opacity and misaligned incentives, and limits the industry's opportunities to maximize the overall impact and network gain that innovation could bring to all parties along the value chain.[30]

Industry Comparison: How the Automotive Industry Handles the Incentive to Innovate

The automotive sector benefits from structural elements that promote innovation in the supply chain.

The automotive industry has naturally long development cycles, with innovation at the core of its business. Automakers have extensive R&D departments and well-established development and investment processes. Though the automotive industry's supply chain is fragmented, various factors enable innovation.

One such factor is that many automotive suppliers are spinoffs of automakers, giving them a foundation of strategic, long-lasting, and collaborative relationships. Given the cost, required expertise, and complexity of innovation, automotive companies rely on their suppliers to lead much of their innovation. Another factor is that automakers source or co-develop innovation with suppliers, and even cooperate with direct competitors (as can be seen in collaborations between Volkswagen and Ford, BMW and Jaguar Land Rover, and Daimler and BMW). Because innovating is essential in the auto industry, automakers are willing to pay premium prices for their suppliers' innovations. Also, suppliers deliver a constantly increasing share of a car's value, which creates an incentive for them to innovate further. This is a stark contrast to the fashion industry, where suppliers have not yet benefited much from innovation.

In the automotive industry, the function of cars is evolving in ways that require use of a broader array of technologies. Customers nowadays expect a car infotainment system to offer the same features and ease of use that they get from their smartphones, for example, and this exerts pressure on automakers to innovate and improve their digital offerings and systems. Beyond digital solutions, hard-tech innovations are essential. Electrification of vehicles has pushed automakers to lean on suppliers for battery and e-axle innovation and production. Most automakers have almost no battery cell capabilities in-house, so they rely on suppliers such as CATL, Samsung, and Panasonic to innovate and supply these elements. Similarly, many automakers purchase the e-axle, an essential powertrain component, directly from suppliers, in contrast to the traditional model in which engine development lay at the core of most automakers' value creation.

Limited Awareness of the Opportunity

Fashion has not traditionally been a technology- or innovation-driven industry. Demand for new solutions has accelerated only in the past few years, as brands have started to actively seek outside innovation, and as a result the innovation landscape has started to develop only recently. Few startups have matured enough to become lighthouse cases for innovation in this sector, and no particular hub of fashion industry innovation has emerged where innovators and investors can meet and partner. In other industries, Silicon Valley or prominent universities such as MIT, Carnegie-Mellon, and Stanford function as hubs where investors can discover promising innovators.[31] Similarly, accelerators and platforms for innovators to showcase and present their technologies are fairly new in the fashion industry as compared with those available for digital innovations in other industries. And with few exceptions, fashion brands are not yet acting as a strong catalyst to promote innovations. These factors limit investors' awareness of emerging investment opportunities and offer fewer touch points for discovering innovations. Not only are traditional equity investors unaware of the significant opportunity, but impact investors have not yet seized the chance to increase their presence in fashion by supporting sustainable innovations. Many remain focused on more typical impact investment areas such as food, education, health care, and housing.[32]

Absence of a Structured Innovation Process

Unlike other technology-driven industries such as automotive and aerospace, the fashion industry lacks clear stage gates, standardized processes, and commercialization paths. The absence of these structures causes greater uncertainty and misjudgment of risk, creating a barrier that impedes all stakeholders involved.

From the perspective of an investor, a defined process helps in assessing technology and market risk as well as the time to market of an innovation. Investors typically have a distinct appetite for investing in certain risk-return profiles at specific stages along a startup's development curve. For example, other industries, such as pharmaceuticals and automotive, require innovations to meet predetermined requirements at discrete stage gates before passing on to the next stage of development. This structure helps investors, corporate partners, and innovators understand the state of technological and commercial readiness and what is needed to advance further, so they can make an informed assessment of whether an innovation will succeed and, if so, in what time frame.

From the perspective of a fashion brand and innovator, the lack of a process leads to operational challenges and slows progress. Working with startups is uncharted territory for most fashion companies. Ways of working, agility, and communication are only a few of the many challenges that startups and fashion brands face daily when attempting to collaborate. Also, in most cases, fashion companies do not have dedicated or integrated teams to facilitate cooperation with startups and help build bridges to corporate departments and stakeholders.

> **"The fashion industry is relatively new to working with outside innovators. For startups, that presents a challenge. Working with large fashion companies can be a slow and often unstructured process as teams attempt to navigate large corporations to get the right stakeholders or decision makers on board."**
>
> **Gavin McIntyre**
> Cofounder, Ecovative

The lack of structure and orchestration extends beyond individual relationships between innovators and brands or investors. The entire ecosystem of brands, upstream manufacturers, and investors is inefficiently connected and requires greater orchestration to create a streamlined marketplace for innovation. Here, targeted consortiums would have the power to accelerate progress by combining resources from multiple parties and aligning the key players needed for success in a focused effort.

Lack of Experience and Technical Expertise

Engaging with innovative technologies in the fashion industry typically requires technical expertise. For example, having a background in materials science, chemistry, and fashion manufacturing techniques is often necessary to understand whether a given technology is viable. Investors have expertise in evaluating and optimizing business models and assessing market and growth potential, but many are not deeply familiar with the underlying science, process technologies, and inherent risks of the fashion sector. Especially for hard technologies, such know-how is essential to understanding and valuing the potential of many proposed solutions.[33] Only a few specialized funds

have established in-house expert teams to bring in the required knowledge. For example, Pangaea Ventures specializes in advanced materials across industries and has developed deep expertise in energy, electronics, health, sustainability, and, now, textiles.

Some investors have started to engage with fashion companies to gain access to technical and industry expertise. Both approaches have proven successful and have allowed investors to take a stake in the fashion industry. But most investors have yet to find approaches and build networks to acquire the needed expertise and experience. Besides lacking technical know-how, investors may fear that fashion is driven by unpredictable, fast-moving trends, and may perceive innovations to be a gamble on the vagaries of style.[34] Although this can be true of some innovations, especially in soft-tech areas that involve rapidly evolving digital solutions or trend-driven fashion brands, many innovations that the industry sees have very stable demand.

Inexperience in this space has led to another misperception. Every industry that moves toward better social and environmental practices struggles with what we call the impact-return paradigm—a common misperception that solutions designed to deliver positive social and environmental impact are inevitably associated with lower financial returns or inferior business models.[35] As in any industry, some startups have attractive business cases and others have less appealing ones—and not all will make it to commercial scale, regardless of any sustainability factor that may be involved.[36] The keys to successful investing are the same in fashion as in any other sector. Impact investors, in particular, understand that there is no necessary tradeoff between impact and business returns, and this knowledge should motivate them to invest more in this space. In fact, the broader understanding of impact includes financial impact as well as environmental and social gains, as the scale of positive outcomes can only be expanded through commercially viable solutions. For other investors, the misperception should also diminish as successful investment cases and scaled ventures emerge and as demand from fashion brands for impact-oriented solutions rises.

Incorrect Perceptions Regarding Pricing and Externalities

Innovators that have the potential to gain market share quickly at higher margins than existing, comparable solutions can achieve are highly attractive to investors. High-risk investors such as VC funds especially benefit from fast growth and steep rises in company valuations. A common concern about technologies, especially in the field of new materials, involves the ability to reach competitive pricing compared with commodities such as cotton and polyester. For new materials intended to replace existing materials, competing with the prices of commoditized products is a challenge.

However, prices of key raw materials and inputs are already rising, with even larger increases expected as land use becomes more complicated and as water and energy become more expensive. Higher demand and increased pressure to use sustainable materials will only compound this problem. The result will be yet more pressure on fashion companies' existing business models.[37] Thus, finding and scaling new, renewable alternatives, even if they are not price-competitive against existing commoditized materials in the short run, will be necessary in the long term. To evaluate the emerging alternatives, analysts assessing business cases must factor in future prices and forecasts of raw materials as well as of externalities such as carbon emissions.

Forward-looking investors and companies that believe in the value of a certain technology will invest early, calculating future prices with complete information and taking the risk regardless of the new technology's ability to match commoditized prices in the short term. Once the technology reaches scale, they will benefit by gaining significant market share over competitors. In other industries, investors are already making these moves, but the fashion industry as a whole has yet to adopt a more forward-thinking mindset.

Inadequately Structured Exclusivity

Intense competitive pressure between brands gives exclusivity in contracting and working with innovators a heightened role. Although exclusivity can be very beneficial and can lead to highly committed partnerships dedicated to supporting and investing in a particular innovator, it can also have negative effects when it is not structured well. Some exclusive contracts, especially from brands with smaller volumes, can impose unduly restrictive limitations that hinder broader scaling and rapid commercialization.[38] And if the contracts do not include structures or incentives for rapid commercialization, they can actually slow the progress of startups. In these cases, depending on the outcome of the relationship with a brand, a startup can emerge as a less attractive candidate for subsequent rounds of investment from other sources. The key to successfully structured exclusivity is to ensure that the parties write contracts in a mutually beneficial manner that encourages both brands and startups to commit to rapid progress. This is especially important for raw materials innovations, as these are often subject to exclusivity pressure from a brand that wants to lock in the obvious competitive advantage of a unique solution.

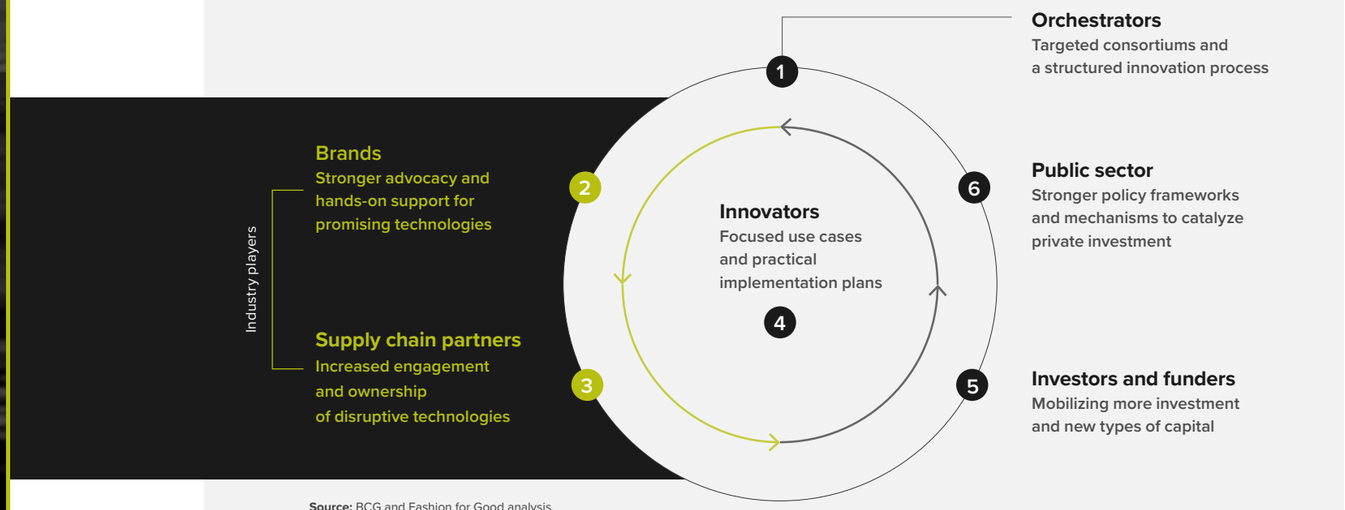
6. A CALL TO ACTION
to All Stakeholders

The clock is ticking, and disruptive technologies must be developed to transform the fashion industry. Industries that are farther ahead in their sustainability transformations have demonstrated how such technology-based transformations can be achieved. In the transition toward clean energy, for example, various levers were introduced to accelerate collaboration and investment, including the creation of specialized funds, common testing grounds to decrease the financial burden for innovators, and strong leadership from the public sector, among other solutions.[39] Now the fashion industry must follow suit. However, there is no single solution. To overcome the barriers to innovation in sustainable fashion, all parties must step up individually and collaboratively to drive systemic change. (See Exhibit 7.)

A perfect storm of innovation and opportunity is forming in fashion—companies and investors that can capitalize on sustainability and impact-driven innovation will transform the industry and ultimately win.

Exhibit 7 | *The Need for Collective Action*

All stakeholders must step up individually and collaboratively to bring disruptive sustainable solutions to scale.



Source: BCG and Fashion for Good analysis.

Orchestrators—Targeted Consortiums and a Structured Innovation Process

No single stakeholder operating on its own can provide all of the capabilities and factors needed to scale innovation, so the fashion industry, investors, and financial institutions must join forces. Brands possess industry expertise, technical knowledge, and the power to pilot technologies. They can drive demand, but they often lack the tools, processes, and capital to support innovators. Investors can provide capital and know-how to help innovators scale their businesses more quickly, but in many cases they lack the technical expertise necessary to correctly evaluate potential investment targets.

Orchestration and consortiums are essential to helping innovators find the right support and financing, giving brands faster access to scalable technologies, and offering investors better opportunities.

These factors work together to stifle innovation. Here, greater orchestration is essential to create a streamlined ecosystem for innovation, with all stakeholders engaged. Such orchestration requires several components: ecosystem-level coordination across many stakeholders, micro-level coordination to support specific technologies or innovators, and internal innovation processes within companies. Innovators will benefit from suitable support and financing, brands will gain faster access to scaled technologies, and investors will have a better chance to invest in a successful venture.

Who Should Lead Orchestration. At the ecosystem level, multistakeholder initiatives and intergovernmental organizations such as the United Nations Framework Convention on Climate Change (UNFCCC), the Fashion Pact, and Fashion for Good are well positioned to drive collaboration, communication, and a structure that promotes innovation. Orchestration is also needed on a micro level to support specific technologies or innovators. For example, forming consortiums of a few brands, supply chain partners, investors, and technical experts that believe in the value of a particular technology allows the participants to concentrate their efforts and share risk, thereby accelerating innovation and commercialization. To accelerate the pace of change, many more targeted consortiums must emerge throughout the industry.

Why Create a Structured Innovation Process. Investors and fashion companies struggle to predict and assess a new technology's commercial potential and timeline for innovation because they lack common definitions and a shared framework to provide clear guidelines on maturity, readiness, impact, and risk. Other industries, such as automotive and pharmaceuticals, have overcome this problem by introducing stage gates and processes that clearly mark distinct phases in the innovation funnel. For example, they have established or adopted concepts such as NASA's technical readiness levels to bring transparency and predictability to their innovation efforts. Fashion must do this, too. Establishing clear guidelines on technical and commercial readiness and on social and environmental impact will enable better understanding of time to market and other critical factors for easily comparing and assessing innovations. It will also provide discrete milestones for innovators to achieve, helping accelerate the pace of work between brands and innovators, and thus solving an important problem for innovators, where a slow pace can mean failure. The importance of having brands and innovators learn to work together cannot be overstated: it is absolutely critical that they adjust their processes and structures so that innovators can discern who they need to work with and how, in order to obtain the support and input they need to bring new technology to market at scale.

> **"In other industries, there are stage-gate processes for innovation that provide structure and greater predictability to the R&D and commercialization process. In the fashion industry, these processes are now being defined, as there is demonstrated appetite for sustainable change. This has created the perfect conditions for high-level innovation to enable major industry transformation to a more sustainable and profitable future."**
>
> **Caroline Brown**
> Managing Director, Closed Loop Partners

Fashion Brands: Stronger Advocacy and Hands-On Support for Promising Technologies

Brands must take a stronger position on innovation to mobilize support and funding. They need to engage the finance community by increasing advocacy, sending clear demand signals, sharing their industry and technological expertise, supporting selected innovations, and even investing in promising ventures.

Signaling Demand. Most fashion brands and manufacturers recognize the new technologies they need in order to improve their social and environmental performance. By signaling interest in and demand for these technologies—for example through letters of support or intent—they give investors the confidence to invest. Brands can amplify their signals by sending them collectively, thereby indicating unified support for certain technologies, and they can pool demand to help innovators reach the necessary sales volumes to succeed. Concentrated support increases the overall likelihood that a particular innovation will make it to market. This kind of precompetitive collaboration in support of innovation needs to become more common in the fashion industry. For example, PVH Corp., Arvind, Bestseller, and C&A are currently collaborating to test and fund development of SeaChange Technologies, an industrial wastewater processing solution. The brands are collaborating to share costs and learning, and to explore pathways for commercialization.

Brands win by helping innovators develop and increase their chances of commercialization, through offtake agreements, pilot projects, and direct investment.

> **"Strategic investors such as brands can provide a lot of value for startups by qualifying technologies for financial investors, for example. It's part of our strategy at H&M CO:LAB to engage with startups at an early stage to help them develop by giving strategic advice and de-risk the project for other investors."**
>
> **Erik Karlsson**
> Investment Manager for Sustainable Fashion, H&M CO:LAB

Co-Development and Piloting. Brands and innovators mutually benefit from partnering to launch a prototype together. Brands can position themselves at the forefront of innovation and gain valuable insights from testing these technologies in their value chain. Innovators benefit from access to the brands' expertise and the ability to optimize and refine their technologies. Launching an innovation with a brand can provide a valuable branding and marketing halo effect for innovators, as it builds credibility with future customers and investors alike. The value of co-development, in fashion and all other industries, emerged in a BCG–Hello Tomorrow survey of 400 deep-tech startups, which found that the reasons these startups partnered with corporations were to gain market access (46%), to obtain technical knowledge and expertise (26%), and to gain access to business knowledge and expertise (19%).[40] Fashion brands are starting to realize the benefits of co-development and should follow examples set by leaders such as adidas, which partnered with 3D printing innovator Carbon and with textile innovator Evrnu. Through these collaborations, adidas was able to advance its position as an industry pioneer and test upcoming technologies such as Evrnu's NuCycl fiber.[41] Its startup partners benefited from the strength of the adidas brand and the opportunity to create a proof of concept. In another example, Stella McCartney collaborated with biomaterial fabric maker Bolt Threads to create a manmade spider silk dress and a mycelium-based alternative leather handbag. This collaboration furthered Stella McCartney's position as a leading player in sustainability and gave Bolt Threads a platform for greater visibility and opportunities to further develop its products.[42] To make these collaborations succeed, brands need to adapt to the pace of startups, by working more quickly and flexibly.

> **"When brands support startups, both parties win. Startups provide brands a competitive edge through innovation. Brands have the power to catalyze those innovations to scale."**
>
> **James Carnes**
> Vice President of Global Brand Strategy, adidas

Volume Commitments or Direct Investments. Brands can also become early adopters of new solutions and can take a stake in ventures. They can help their preferred innovators develop and increase their chances of commercialization through offtake agreements, volume commitments, or direct investment. For innovators, aside from the capital or future sales and expertise that a brand offers, this can lead to easier access to capital, as investors see a brand commitment as a strong, risk-lowering factor.

To date, a few large brands have driven direct investment through CVC funds. H&M, Patagonia, Bestseller, and adidas have actively invested through their VC arms, thereby unlocking investment from outside investors, a common practice in other industries.[43] For example, Patagonia's investment in Mango Materials—which produces biopolymers from waste—through its CVC fund Tin Shed Ventures sent a strong signal to other investors.[44] In 2019, H&M's investment and commitment helped Infinited Fiber Company raise a sizable consecutive funding round from various investors, including upstream investors such as RGE Group.[45]

Common in other industrial sectors, corporate guarantees offer another way for brands to support the financing of innovators. Corporate guarantees give innovators access to inexpensive debt in order to build plants or invest in heavy capital expenditures. This is an especially effective way to help innovators secure funding for large-scale projects in commercialization such as building a demonstration plant. For example, recycling startup PurFi has built a plant worth tens of millions of dollars for industrial textile applications in a partnership with the established company Concordia Textiles, which helped it secure the funding needed for capital expenditures, on top of a €5 million equity investment.[46]

> **"It's best when brands make investments directly. CVC investments have a strong influence on attracting additional investment. Currently, only a few brands are pioneering this, and if we could have more of this, it would make a big difference."**
>
> **Roy Hirsch**
> Head of Business Development, Sonovia

Supply Chain Partners: Increased Engagement and Ownership of Disruptive Technologies

The fashion industry is a fragmented network of many different stakeholders, starting upstream with chemical companies and material or fiber producers, followed by a complex supply chain of spinning facilities, fabric producers, and cut-make-trim manufacturers, and then the brands. To provide the support that disruptive solutions need in order to unlock their full potential, manufacturers and upstream operators must actively engage in developing, scaling, and investing in promising technologies. In other industries that have undergone similar transformations, upstream operators have served as strong drivers of innovation. For example, in food and agriculture, companies such as Cargill, DSM, Dow Chemical Company, and BASF have been actively engaging with and investing in innovators.[47] And in biotech and other sectors, advanced materials and chemical companies such as Eastman, Mitsubishi, and Sabic, as well as Dow and BASF, play a similar role. These same upstream operators also supply the fashion industry, and yet they have overlooked the investment opportunity it offers. As with the innovation support they provide in other industries, upstream operators can invest in fashion by sharing expertise, offering strategic partnerships, and providing access to essential equipment, facilities, and capital.

For example, upstream operators might fund innovators' growth in exchange for special access to the innovators' product, staff, distribution rights, ultimate sale, or some combination of those items.[48]

Two key points in the innovation development cycle offer opportunities for supply chain partners' involvement: partnership during the development-and-scaling stage, and financial investments and exit potential.

Partnership During the Development and Scaling Stage. Because supply chain partners understand the technology best, they can play a critical role in an innovation's development and commercialization. This may take the form of providing support during the R&D stage, piloting or testing new innovations in their labs, or establishing a development partnership. Manufacturers and upstream operators have access to relevant customers, salespeople, and marketing programming that innovators can tap into, if the product or service is compatible with what they already offer.[49] Also, in some cases, upstream operators may make equipment or underutilized production line capacity available to hard-tech innovators, reducing the innovators' capital and asset requirements. For example, Ecovative Design develops mycelium-based technology, including a leather substitute for the fashion industry. For mycelium production, Ecovative partners with existing regional mycelium manufacturers that have excess production capacity, thereby utilizing an existing global production network and limiting capital costs.

> **"Manufacturers are best equipped to support startups in the commercialization phase. In this phase, they have the opportunity to impact and test the scaling technologies and build long-term partnerships with innovators. This helps them perform feasibility checks not only from a technological point of view, but also from a commercial viability point of view."**
>
> **Umasankar Mahapatra**
> VP Innovation, Welspun Group

Financial Investments and Exit Potential. For manufacturers and upstream operators, both access to disruptive technologies and partnerships with promising innovators are very valuable. As innovation in fashion becomes a key success factor, successful supply chain partners must differentiate their offerings and engage in higher value-added activities. By investing in (and potentially acquiring or buying out) the solutions that innovators develop, they can bring to market the products that the industry needs in order to respond to and drive consumer demand. Funding at this point can act like VC, or it can be royalty based, with the partner receiving a piece of every product sale.[50] This is especially important as a way to accelerate the transformation in fashion: if an innovation has a strategic fit for a supply chain partner, that company might tolerate longer time horizons than external investors would, as it represents more than a standalone financial investment. For innovators, this is an opportunity to advance toward a typical exit: acquisition by a large player in the fashion value chain. For example, Brazilian pulp and paper company Fibria invested €5 million to acquire a minority share of Spinnova, the Finnish textile startup. The agreement included investments from both companies to create a pilot production line that, if able to reach commercialization successfully, would lead to a joint venture.

Innovators: Focused Use Cases and Practical Implementation Plans

Innovators have to step up, too. They must improve their approach to attracting customers and investors with stronger, more focused, efficiency-driven use cases; build teams with a balance of technical and business skills; and define more realistic and prudent implementation plans for commercializing their solutions.

Use Case and Value Proposition. Innovators are often caught up in the daily challenges of mastering the science or engineering of their solutions. This is essential, of course, but so are the actions needed to position their ventures to attract investors. Innovators have to approach customers and investors with executable use cases, clear value propositions, and more realistic plans for bringing their solutions to market. This is especially critical for

technologies that address multiple steps in the supply chain, which might involve separate facilities located in different markets or geographies. By clarifying their value proposition and implementation approach as early as possible, innovators will have a better chance of securing partnerships and pilot projects with brands and supply chain partners, and investors will be more likely to consider investing.

Efficient and Collaborative Use of Resources. Innovators should seek ways to achieve capital efficiency where possible. This is particularly important for hard-tech innovators, to offset their higher capital costs. Improved efficiency could take the form of renting factory space from supply chain operators instead of building a new facility, using unspecialized equipment wherever possible, and building with modular parts. For example, in clean energy, the development costs for solutions were high and required large amounts of capital investment even to develop and test prototypes. One solution to this challenge in the US has been to create common testing grounds that allow many innovators to share a ready-made testing space, splitting the costs and reducing the time involved in preparing for testing.[51] In the fashion industry, recycling innovators Tyton BioSciences and Infinited Fiber Company have partnered with Marubeni, RGE, and Fortum Oyj to collaborate on efficient use of resources, which is especially important given the high costs of recycling R&D and testing.

Investors: Mobilizing More Investment and New Types of Capital

There is ample opportunity for investors. As a relatively underfunded industry, fashion offers many opportunities for innovation journeys, and investors that develop the right expertise, relationships, and instruments for the fashion industry should expect to consolidate their advantage over latecomers.

> **It is a unique time in the fashion industry right now. With growing consumer demands for sustainability, regulatory shifts, and the emerging innovation landscape, it is forming a perfect storm for opportunity."**
>
> **Mike Jackson**
> Generate Capital

Mobilizing More Investors. Investors should seize the opportunity to equip themselves with broader industry expertise to support investments in this field. Specialized knowledge of the fashion industry will enable them to judge technology and market risks more accurately, and establish effective partnerships. Some investors have built strong partnerships with multiple fashion brands and manufacturers in order to exchange knowledge and benefit from their deep technical expertise. These partnerships help investors assess potential targets, and they provide a vehicle for more effective support for innovators. Investors can also play a crucial role in advising and connecting entrepreneurs to the industry or to other financiers, as they do in other industries. Support from early equity investors during the initial development stages can be critical to an innovator's success.

> **As a VC fund, we bring capital to the table that innovators need, but our foremost value-add is through the business development and professional expertise support we provide."**
>
> **Keith Gillard**
> General Partner, Pangaea Ventures

While the financial element that an equity investor brings to the table is valuable, the intangible support of network connections, coaching, credibility, and building an end-to-end network of investment from early stage to late stage is equally essential to accelerating innovation.

> **We sought out private equity investment primarily to bring additional expertise and support on board to catalyze the growth of the company."**
>
> **Enrique Silla**
> CEO, Jeanologia

Diversifying Investors' Profiles and Use of Securities Beyond Preferred Shares. Regardless of how many VC funds enter this space, they alone will not solve the financing needs of the fashion industry. For some ventures, especially hard-tech ones, generating fast growth and returns in the traditional time frame that VC investors require will remain a challenge. Moreover, their balance sheet structure, absence of top-line activity (sometimes for several years), and lack of credit history will prevent these companies from tapping into the traditional corporate finance market. It is crucial to bring in new and different players and types of capital. Three options are especially relevant:

- **Debt and Equity Tranches for Asset Investments.** Direct leasing and renting, combined with equity tranches, can support startups when they need to face investment in hard assets (property, plant, and equipment). Although innovators will struggle to secure full debt funding for these investments unless they have a track record, combining two or more tranches of equity and debt can help align the interests of different investors.
- **Blended Finance.** A combination of private capital and public and philanthropic capital is becoming more common, as institutions such as the European Innovation Council promote these public-private partnerships. Especially in the context of closing the investment gap to meet the SDGs, blended capital is often referred to as an important emerging tool.[52] A blend of private and public funding could help close the funding gap in fashion, especially for hard-tech investments. A hybrid structure can bridge differences related to risk and return expectations, enable large investment tickets, and ensure the provision of different expertise. For example, the Good Fashion Fund is one of the first private blended financing vehicles in the fashion sector that catalyzes private financing through a layer of philanthropic capital—provided, in this case, by the C&A foundation. The new fund provides impact lending tools to finance investments in supply chain innovations in India, Bangladesh, and Vietnam, as well as in other areas throughout Asia. The fund's blended structure combines risk-tolerant capital with private-sector investment that permits flexibility and tailored financing. Overall, philanthropic capital has a greater role to play. By increasing their appetite to support for-profit entities and taking a more strategic approach, foundations can de-risk and attract significant private investments, especially in the case of high-impact hard technologies.
- **Debt Financing.** Green lending incentives and more tailored approaches by banks to assessing risk can help move the needle and finance projects that currently do not qualify for funding. Banks are beginning to incorporate new criteria for analyzing opportunities to lend to innovators. Instead of relying exclusively on traditional metrics such as revenue and customer contracts, they take into consideration the presence of reputable early-stage investors in the capitalization table. This helps late-stage innovators bridge the commercialization gap and grow their business to the point where they can tap into more conventional debt financing. For their part, financial institutions benefit from building long-term relationships with potential clients early on.

A broader range of investors and lenders is needed to support innovation—VC alone will not be enough to finance the transformation.

Public Sector: Stronger Policy Frameworks and Mechanisms to Catalyze Private Investment

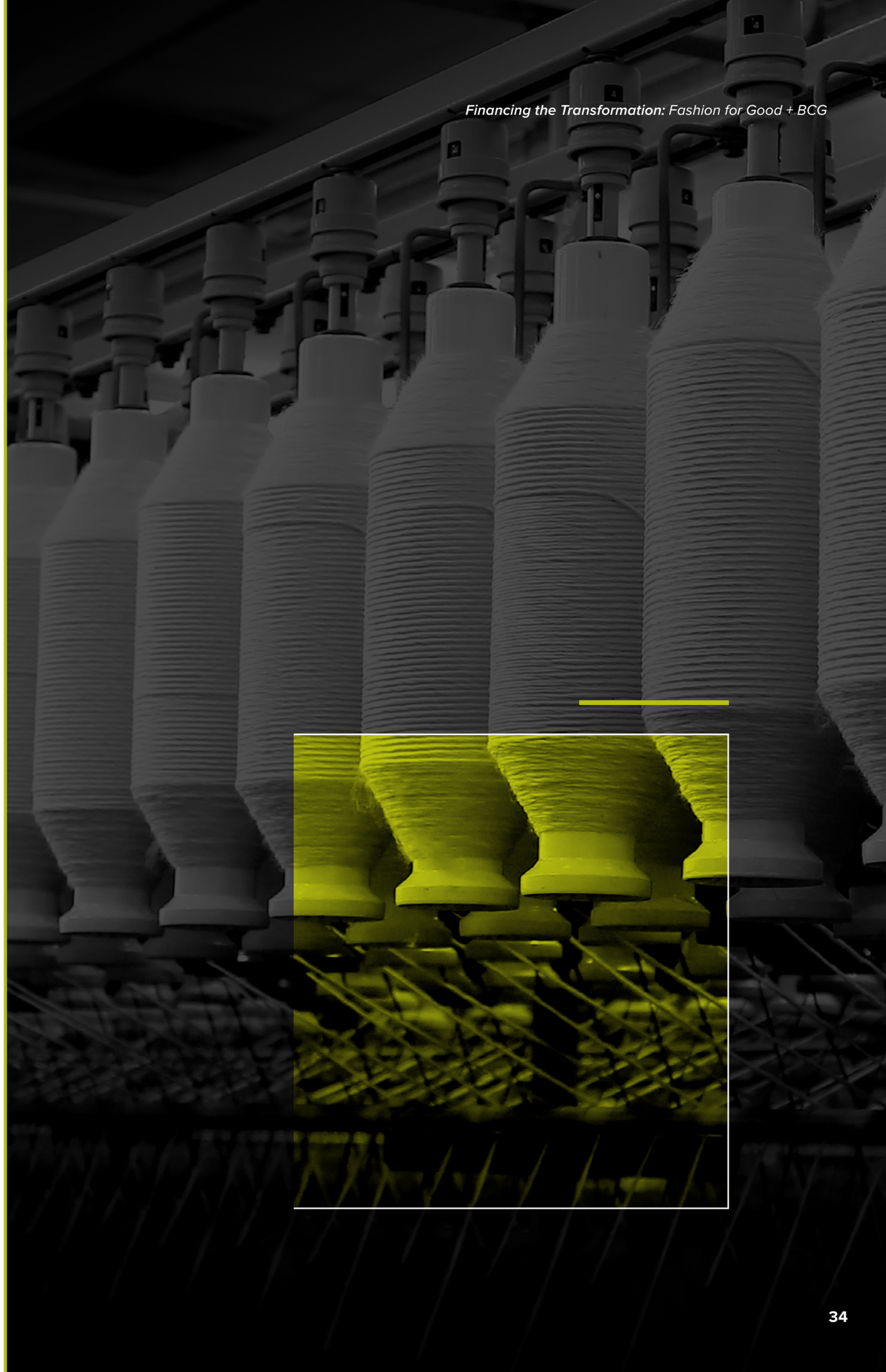
Regulatory bodies play a crucial role in the fashion industry's overall transformation toward sustainability. Establishing a policy framework consisting of economic incentives, policies, regulations, and standards is necessary to empower systemic change and create pressure for the fashion industry to accelerate the transformation.[53]

While this policy framework may not directly seek to foster innovation, many of the underlying actions have an indirect positive effect on innovation. For example, global policymakers and governments have introduced heavy regulations on plastic, with some regulators banning single-use plastic and others imposing severe restrictions on it. Since the first regulations took effect, investment in support of innovation and research into alternative or bio-based plastics has skyrocketed. For example, in the UK, the Department for Business, Innovation, and Skills has collaborated with the private sector to encourage R&D for biodegradable packaging to replace plastics. This project combines £60 million from the public sector with £149 million from the private sector.[54]

The public sector must enact policies to increase pressure on the fashion industry to act responsibly, and take direct action to catalyze private investment.

Beyond driving the right policies, regulations, and incentive schemes, the public sector has the power and responsibility to directly strengthen the development and acceleration of new disruptive solutions. In other industries, such as agriculture, food, health, and energy, the public sector has taken active measures to provide capital for the development and commercialization of innovative technologies and to catalyze private-sector investment. For example, in 2014, the European Union (EU) launched the approximately €80 billion Horizon 2020 framework program for funding research, technological development, and innovation. Mainly through grants, the EU supported promising ventures that would have struggled to find sufficient financing from private investors alone for the development and scaling of their technology. For many of these ventures, the EU's Horizon 2020 funding helped unlock further investment from private investors. On average, each €1 that Horizon 2020 invested generated €1.6 of private investment.[55] A recent study confirms the positive effect that public funding has on attracting subsequent private financing. Researchers from the economics departments of UC Berkeley and MIT found that public-sector R&D expenditures produce a "crowding-in" effect that increases private-sector spending in R&D, especially in projects with high fixed costs.[56] In addition to offering direct investments such as grants, the public sector increasingly partners with private or philanthropic investors to offer blended finance instruments. Therefore, the public sector can offer larger ticket sizes for ventures and de-risk larger investment rounds from other investors.

Strong public-sector initiatives are essential for the fashion industry to transition to sustainability and circularity. As we have elaborated throughout this report, achieving a step change requires a broad range of commercialized hard-tech solutions. For some of these innovations, relying entirely on private investment cannot be the only option. Increasing the availability of public or blended capital will provide these innovators with the investment ticket sizes and support they need. Also, creating regulations, policies, and incentives to require these technologies will generate more urgency and demand for them in the fashion industry.



THE IMPERATIVE
for Collaborative and Decisive Action

It is indisputable that the fashion industry must accelerate its transformation to sustainable, circular practices. Success depends heavily on the development of new, disruptive solutions that will future-proof the industry's business models. The growing innovation pipeline proves that such solutions can be found, but the pace of development is too slow, and the most significant innovations needed are not yet available at scale. Too many innovators still fall victim to the financing gap, in which they fail to receive the support they need from brands, investors, supply chain partners, philanthropy, and regulators.

Financing will flow into the fashion space if risk is manageable, returns are attractive, and impact is measurable.

Financing will flow into the fashion space if all actors involved build toward conditions that promote attractive returns and measurable impact with manageable risk. The six solutions outlined in this report provide an initial road map for the entire industry. Better orchestration and bolder actions from established fashion players, investors, and the public sector will pave the way to a thriving innovation ecosystem and a sustainable business model.

> **"In an industry where even the biggest players alone cannot achieve the scale of change needed, collaboration is essential. Actors that jointly take responsibility and risk to support disruptive solutions will lead the transformation and ultimately win."**
>
> **Paul Polman**
> Cofounder & Chair, Imagine

ENDNOTES

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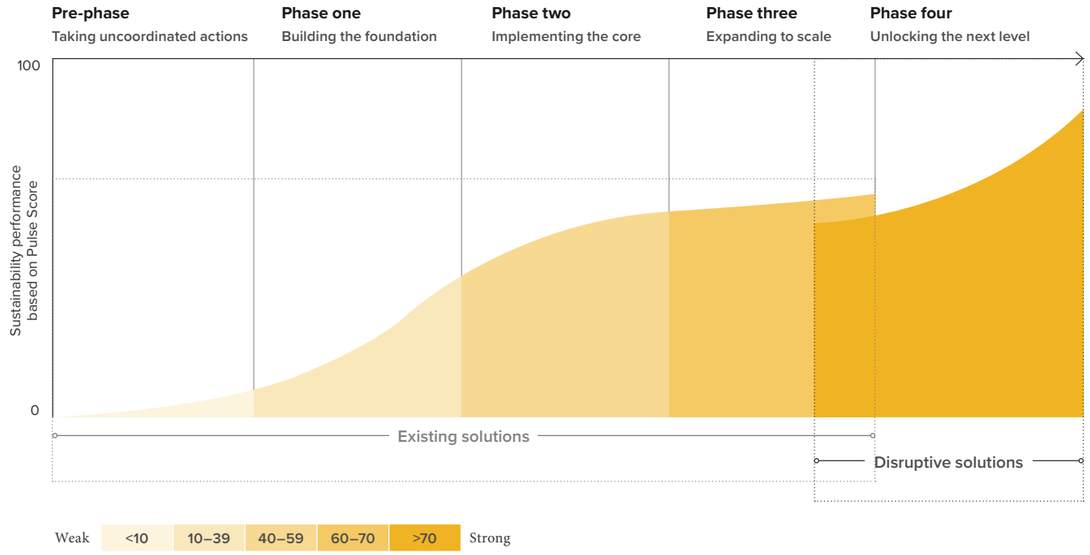
APPENDIX A

Pulse Curve: Trajectory of the Fashion Industry Transformation

The Pulse Curve is a tool developed by BCG and the Global Fashion Agenda (GFA) to illustrate the trajectory of the fashion industry's environmental and social progress. In early phases of the curve, the adoption of existing new solutions moves the industry forward; but at a certain point, the impact of these existing solutions levels off. Maintaining the momentum needed to continue ascending the Pulse Curve requires new technologies as well as solutions that disrupt traditional business models. Reaching the last phase of the Pulse Curve will lead to a step change that unlocks a sustainability transformation across the industry. (See Exhibit A.)

Exhibit A | *The Pulse Curve*

The Pulse Curve shows the trajectory of the industry's environmental and social advances along phases.



Source: Pulse of Fashion Industry.

APPENDIX B

The Five Goods

The Five Goods, defined by Fashion for Good and William McDonough, represent an aspirational model for the fashion industry to use in working toward a more sustainable and circular fashion industry, along five core impact areas. The Five Goods serve as a basis for charting the ambition for the industry's sustainability transformation, in addition to conducting research across multiple established frameworks such as the UN Sustainable Development Goals and Science Based Targets. Together, these sources outline essential actions to take and targets to meet by 2030. (See Exhibit B.)

Exhibit B | *Selected Actions for 2030*

Various actions and targets for sustainable fashion can be charted across the Five Goods framework.

Five Goods	Description	Selected actions and targets for 2030	Link to UN SDGs
 Good Materials[1]	**Using materials that are safe, healthy, and designed for recycling and reuse**	Transition to widespread use of recyclable, biodegradable, and reusable materials or materials with a lower environmental footprint (e.g., water and chemical use) through increasing the share of alternative materials and developing new materials	Life on land Responsible consumption and productions
 Good Economy[2]	**Setting up an economy that is growing, circular, shared, and beneficial to everyone**	Introduce circular business model elements (e.g., circular design and innovative and disruptive business models, including fashion as a service) and end-of-use solutions to ultimately eliminate waste	No poverty Decent work and economic growth Responsible consumption and production
 Good Energy[3]	**Using energy that is renewable and clean**	Set science-based targets for emissions reduction in line with keeping the global temperature increase below 2°C at a minimum or below 1.5°C for leading companies[6] Develop energy-efficient solutions and increase the percentage of renewable energy in use to meet the above science-based targets	Affordable and clean energy Responsible consumption and production
 Good Water[4]	**Conserving and generating water that is clean and available to all**	Increase water-use efficiency and reduce water pollution, such as through water stewardship[7]	Clean water and sanitation
 Good Lives[5]	**Ensuring living and working conditions that are just, safe, and dignified**	Promote safe and just working environments in accordance with regulatory standards, enabled through supply chain transparency solutions Collaborate across brands, suppliers, regulators, and other stakeholders to promote better wage systems	No poverty Good health and wellbeing Gender equality

Source: BCG and Fashion for Good analysis.

[1] Pulse of the Fashion Industry (2017, 2018); Ellen MacArthur Foundation (2017); Higg Index (2019); UN Fashion Alliance (2019); Linda Greer, "Remove Toxic Chemicals and Fabrics from Fashion's Supply Chain," The Business of Fashion, March 31, 2015 (retrieved on January 4, 2020, from https://www.businessoffashion.com/community/voices/discussions/can-fashion-industry-become-sustainable/remove-toxic-chemicals-fabrics-fashions-supply-chain).

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[6] Science Based Targets is a collaboration of CDP, the United Nations Global Compact (UNGC), World Resources Institute (WRI), the World Wide Fund for Nature (WWF), and the We Mean Business Coalition. This initiative champions science-based target setting as a powerful way to boost companies' competitive advantage in the transition to a low-carbon economy. Companies can use the framework and resources provided to set individual targets based on two temperature goal options: 1.5 degrees, and well below 2 degrees. For more information, see the Science Based Targets website at https://sciencebasedtargets.org/.

[7] There is some overlap between the goals "Good Water" and "Good Materials," such as through using materials with more water-efficient production methods.

APPENDIX C

The Innovation Landscape

Various innovations have emerged within each stage of the fashion value chain, in addition to some solutions that span multiple stages. (See Exhibit C.) While solutions such as resale and rental marketplaces are more commonly known, many other innovations are already in the pipeline, ready for investment and in demand by the industry. This innovation landscape draws from Fashion for Good's comprehensive database of more than 2,000 innovators, as well as from extensive interviews with brands, innovators, and investors on key technology needs.

Exhibit C | *Innovation Landscape Across Value Chain Stages*

Various innovations occur at each value chain stage, as well as across the value chain.

	Raw materials	Processing	Cut-make-trim	Retail and use	End of use
Textile	Biosynthetic (e.g., PLA, PHA)	Microbial dye/fixing	Additive manufacturing	Circular business model	Chemical recycling
Textile	Regenerated fibers (e.g., algae, chitin)	Plasma, ultrasonic, nano, foam, CO_2	Automation	Customization solutions	Automated sorting
Textile	Man-made cellulosics	Pretreatment (e.g., Enzymes, cationic)	Mass customization	Visualization solutions (e.g., virtual fitting)	Mechanical recycling
Textile	Natural fibres (e.g., wood, bast, agri waste)	Digital pricing, Laser finishing	Zero-waste manufacturing	Microfiber solutions	
Textile	Proteins (e.g., silk, wool, cashmere)	Plant-based dyes and pigments	Optimized yarn and fabric construction		
Leather	Lab-based leather	Alternative tanning, preservation			Recycled leather
Leather	Plant/fungi/fish "leather" alternatives				

Cross- and supply-chain innovations

Transparency and traceability	Wastewater treatment	Worker empowerment	Supply chain redesign	Warehousing, transport, and packaging

Source: Fashion for Good analysis.

Note: Spinning, knitting, and weaving are not listed as separate steps in the value chain. Although they are typically considered as separate steps, innovation in these areas is included in the other steps.

APPENDIX D

Sizing the Financing Opportunity

The calculation of the financing opportunity for sustainable innovations in fashion is based on various methods and factors. (See Exhibit D1.) The financing opportunity is triangulated across three top-down and bottom-up methods, leading to a base case where industry progress, regulatory pressures, and consumer trends follow the current trajectory and an accelerated case if the pace of change increases under higher pressures:

- **Top-Down Method 1.** Calculate the fashion industry's share of the global UN SDG investment needed to reach the 2030 goals.
- **Top-Down Method 2.** Benchmark against R&D spending to develop, scale, and adopt new and disruptive solutions used in industries that are further ahead in their sustainability transformations.
- **Bottom-Up Method.** Estimate the amount of financing today, and model the financing needs of innovators to reach the market by 2030.

The first top-down method calculates the fashion industry's share of the global UN SDG investment need to reach the 2030 goals. (See Exhibit D2.) It also accounts for the high environmental and social impact of the fashion value chain relative to its share of global GDP. Narrowing the financing need to the share related to development and scaling of new, disruptive innovation, this reaches a financing opportunity of $20 billion to $23 billion per year until 2030. This range is validated through the second top-down method, which benchmarks the fashion industry's level of R&D spending compared with other industries, and through the extensive bottom-up model, which quantifies the amount of financing today and predicts the financing needs of innovators to reach the market by 2030. The bottom-up analysis closely examines innovations throughout the value chain and at different maturity stages, covering the entire innovation landscape. The resulting detailed findings, according to value chain, technology type, and maturity stage, appear in Exhibits 3, 4, and 5 of the main report.

The base case, calculated at $20 billion to $23 billion, assumes that the growth trajectory of the fashion industry's market growth will continue at approximately 5% annually, that sustainability improvement will progress as shown in the Pulse of the Fashion Industry reports, and that financing, regulation, and consumer pressure will continue to grow at their current pace.

The accelerated case of $28 billion to $30 billion per year assumes more rapid innovation in response to growing regulatory and market pressures. In this scenario, solutions will have to scale faster and, therefore, more late-stage financing will be needed sooner, increasing the overall financing need. This scenario also calls for more impactful solutions to reach the market faster. Such solutions tend to be more complex, with higher individual financing needs, so bringing them to market faster presents a larger total opportunity.

For example, research has shown that more than 50% of the fashion industry's environmental footprint lies in the raw materials stage. However, due to the complexity of development and the natural funnel effect under which not all startups will ultimately reach the market, fully funding and introducing a portfolio of new raw materials at scale could require up to one-third of the $30 billion accelerated case. Similarly, in end of use, another high-impact area, a single recycling demonstration plant could require $20 million to $30 million to develop and build. Completion of a demonstration plant does not necessarily mean that the innovation will be successfully scaled up—alluding to the potential cost of developing a widespread industry recycling and collection system reaching up to 20% of the accelerated $30 billion case.

Exhibit D1 | *Sizing the Financing Opportunity Across Three Methods*

Top-down and bottom-up methods are applied to triangulate the financing opportunity.

1. Top-down: Calculating the fashion industry's share of the global UN SDG investment need to reach the 2030 goals	**Share of global investment need** The UN, International Finance Corporation, and World Bank have quantified the investment need to meet the Sustainable Development Goals (SDGs) at $5 trillion to $7 trillion per year until 2030, by analyzing data on capital expenditures needed for infrastructure, R&D, conservation of ecosystems, and more. This estimate serves as a starting point for calculating the fashion industry's share of this global transformation. Given that the UN SDG method takes a global view encompassing many sectors, we account for fashion's share of the global economy through its share of global GDP (2% to 2.5%), in addition to projections of approximately 5% growth annually and a greater than 60% increase in apparel consumption by 2030.[1] **Share of investment need by impact area** In addition, due to its high-impact value chain, the fashion industry plays a larger role in the global sustainability transformation than its GDP size alone might suggest. Accounting for both the fashion industry's share of the global economy and its environmental and social impacts, findings show that around 60% of the total financing opportunity in fashion is directed to the industry's top three high-impact areas: energy, water, and waste. **Energy.** Up to 25% of the financing need is for innovations in improving fashion's energy efficiency and reducing its carbon footprint. This does not include innovations that need to come from the energy sector itself, such as developing renewable sources. This analysis draws on research on the global energy investment gap from UN Policy Briefs in Support of the First SDG7 Review, the International Energy Agency (IEA), and the International Renewable Energy Agency (IRENA), in addition to research on the fashion value chain's impacts on global energy usage and emissions conducted by the UN Fashion Alliance, the French Ministry of Ecology, and the Pulse of the Fashion Industry reports. **Water.** About 15% of the financing need is for technologies to improve water efficiency and reduce water pollution. Calculations were based on research on the global water investment gap from the World Bank, and the industry's impacts on water usage and pollution from the Ellen MacArthur Foundation, the French Ministry of Ecology, and the Pulse of the Fashion Industry reports. **Waste.** About 20% of the financing need is for innovations in reducing waste through recycling, reuse, biodegradable solutions, and so on. Calculations were based on research on the global waste and recycling investment gap from the Climate Bonds Standard, and fashion's share of the waste problem from the Pulse of the Fashion Industry reports and the US Environmental Protection Agency. **Share of investment for scaling innovation to market readiness** The overall share of financing toward development and scaling of innovation (as opposed to implementation of existing solutions) varies across industries. In fashion, around 15% of total financing is estimated to be needed for innovations, calculated from analyses of: • United Nations research on financial flows to address climate change and sustainability goals[2] • Benchmarking against historical investments in the clean energy sector[3] • Benchmarking against historical investments in the automotive sector[4]
2. Top-down: Benchmarking against R&D spending in industries that are further along in their sustainability transformations	Benchmarking R&D spending as a percentage of sales against industries that are further ahead in their sustainability transformations provides an indication of the amount of additional capital needed to accelerate innovation in fashion to a similar level. R&D spending from the fashion industry is in addition to financing from other sources such as VC, grant funding, and growth capital to support and scale innovation. Currently, the fashion industry spends less than 1% of sales on R&D, which is among the lowest percentages in a study of 16 major industries.[5] In contrast, automotive and technology are among the leading industries in terms of R&D spending as a percentage of sales. For example, the automotive industry saw an increase of nearly 60% over four years in R&D spending as a percentage of sales. R&D data draws from multiple sources: • Refinitiv ESG database • NYU Stern Damadoran database • Organization for Economic Co-Operation and Development R&D statistics • BCG industry R&D database Only a portion of financing goes toward disruptive innovation, as opposed to incremental improvement. This amount varies by industry, as discussed previously; in this methodology, around 15% of total financing is estimated to be needed for disruptive innovations.
3. Bottom-up: Modeling the amount of financing today and the remaining financing needs of innovators to reach the market by 2030.	The bottom-up model of financing needs across the innovation pipeline provides a detailed view of the financing opportunity, leveraging Fashion for Good's proprietary database of over 2,000 innovators. The model leverages historical investment data for different technologies across value chain stages to calculate the total financing opportunity, including funding need per innovator by technology area and stage of maturity, current funding per innovator, success rates of startups through each stage of maturity, and adjustments for some areas of innovation that are not within the primary focus areas of Fashion for Good. For example, an individual hard-tech innovator could require about $5 million to close the technology gap, about $25 million to advance through the commercialization gap, and about $50 million to grow to an established company with broad market reach.

[1] Based on data from Euromonitor (2018), Oxford Economics (2018), Pulse of the Fashion Industry (2017), and Fashion for Good (2018).

[2] See UN World Investment report (2014) and UN Investment and Financial Flows to Address Climate Change (2007) for more information.

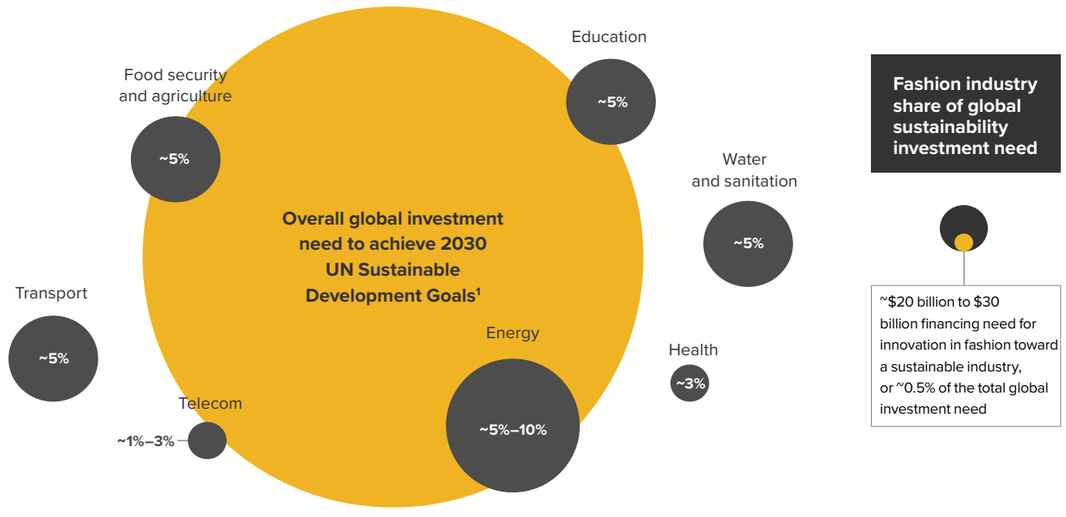
[3] Based on analysis of Refinitiv ESG database, NYU Stern Damodoran R&D dataset, and Bloomberg & MIT Energy Initiative clean energy sector investment data.

[4] Based on analysis of Refinitiv ESG database, NYU Stern Damodoran R&D dataset, and Wood Mackenzie Power & Renewables data on electric vehicles investment.

[5] BCG R&D Intensity Benchmark (2019).

Exhibit D2 | *The Size of the Fashion Financing Opportunity Relative to the Global UN SDG Transformation*

The $20 billion to 30 billion opportunity in fashion is shown in comparison with global SDG investment need.



Source: UN World Investment Report 2014.

[1] Goals set forth by the UN as "a shared blueprint for peace and prosperity for people and the planet, now and into the future." Selected sectors are for comparison and are not exhaustive.

AUTHORS

Katrin Ley
Managing Director
Fashion for Good

Rogier van Mazijk
Investment Manager
Fashion for Good

Sebastian Boger
Managing Director and Partner
Boston Consulting Group

Drake Watten
Managing Director and Partner
Boston Consulting Group

Catharina Martinez Pardo
Principal
Boston Consulting Group

Connie Zuo
Consultant
Boston Consulting Group

GET IN TOUCH

FASHION FOR GOOD
Rokin 102
1012 KZ Amsterdam
Netherlands

www.fashionforgood.com

Katrin Ley
Katrin.Ley@fashionforgood.com

Rogier van Mazijk
Rogier.Vanmazijk@fashionforgood.com

BOSTON CONSULTING GROUP
One Beacon Street
Boston, MA 02108
USA

www.bcg.com

Sebastian Boger
Boger.Sebastian@bcg.com

Catharina Martinez-Pardo
Martinezpardo.Catharina@bcg.com

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