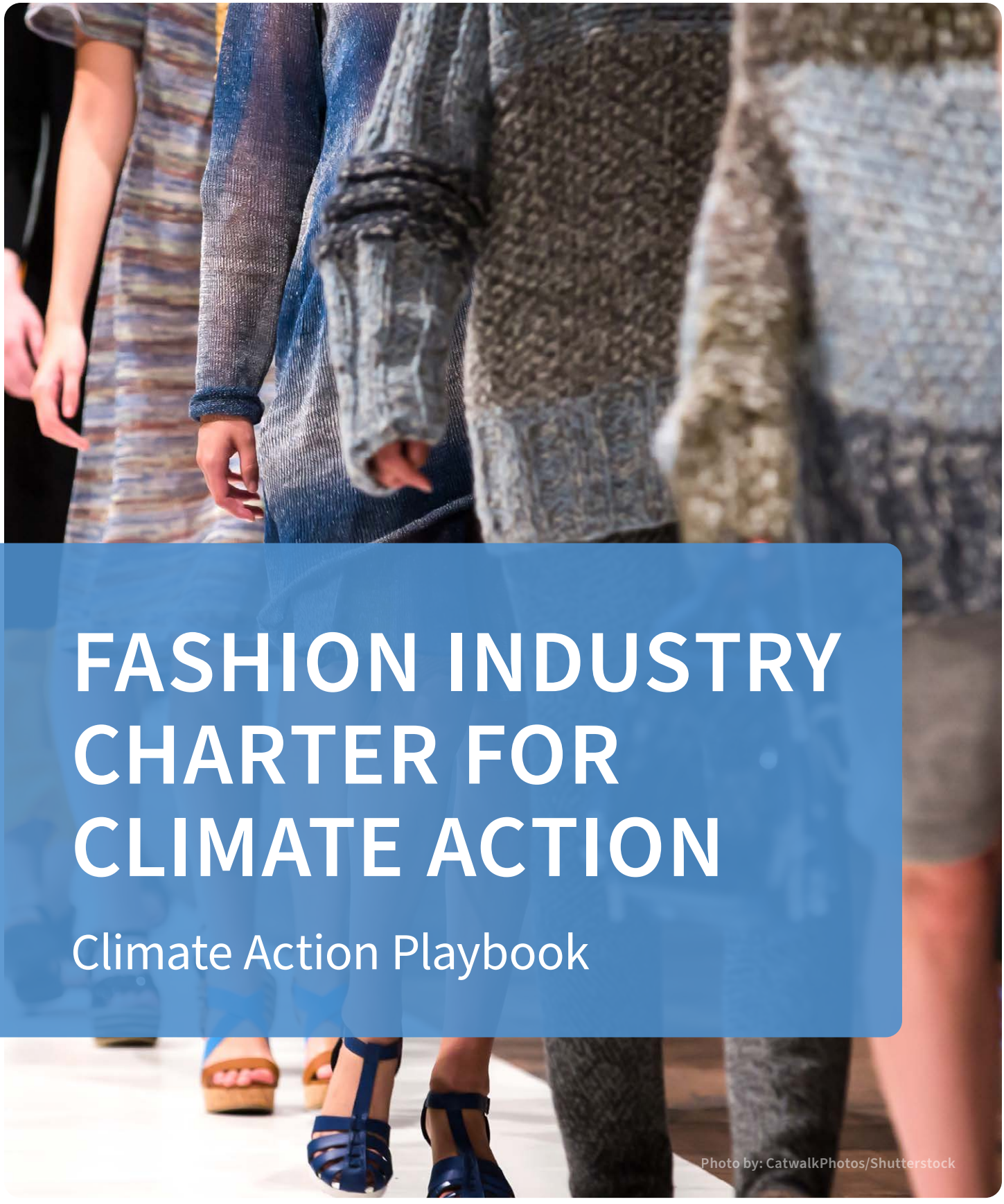

FASHION INDUSTRY CHARTER FOR CLIMATE ACTION

Climate Action Playbook

Photo by: CatwalkPhotos/Shutterstock

Global Climate Action
United Nations Climate Change

Partnership for Sustainable Textiles

ON BEHALF OF

Federal Ministry
for Economic Cooperation
and Development

Implemented by

giz Deutsche Gesellschaft
für Internationale
Zusammenarbeit (GIZ) GmbH

In this publication, “UN Climate Change” refers to the secretariat to the United Nations Framework Convention on Climate Change (UNFCCC or Convention), the Kyoto Protocol and the Paris Agreement, and their bodies, institutional arrangements and organs.

Photo by: Guy Bowden

FOREWORD

Science tells us that to keep the planet safe, we must significantly reduce CO_2 emissions within the next decade to meet our 1.5°C climate goal. Together we must work towards this goal—to drastically reduce emissions and adapt to climate change—so as to escape the worst impacts of climate change. The timeline to do this is very short, and the goals are incredibly tough to meet, but that is our challenge.

In 2018, the Fashion Industry Charter for Climate Action, was launched in response to that challenge. With a growing list of signatory companies and organizations, as well as clear commitments and plans, the Charter has the ingredients to be a success.

In the second year of the initiative, Charter members have a clear vision of where they want to go. Through several dedicated working groups, they are joining hands to develop consistent approaches to climate action, spotlight solutions and best practices, and build pathways to net-zero carbon emissions by 2050. We are as yet only in the early parts of this journey, but the first steps have already been taken. Sharing knowledge and building capacity is key to climate ambition, as we transition to implementation of the Paris Agreement.

I am pleased to see the first version of the Playbook for Climate Action developed by the industry, for the industry. The Playbook is intended to be a living document that will help fashion stakeholders to identify what actions to take and which initiatives and programmes could support them. I encourage you to read it and provide feedback on how the next version could be strengthened, so that it becomes a go-to tool in your decarbonization journey.

Fashion can play an important role in inspiring other sectors and society at large to lead the way towards a healthy and prosperous planet for all. That is our dream too! We look forward to the next edition of the Playbook that will incorporate practical steps and recommendations in making that dream a reality.

Niclas Svenningsen
Head of Global Climate Action
UN Climate Change

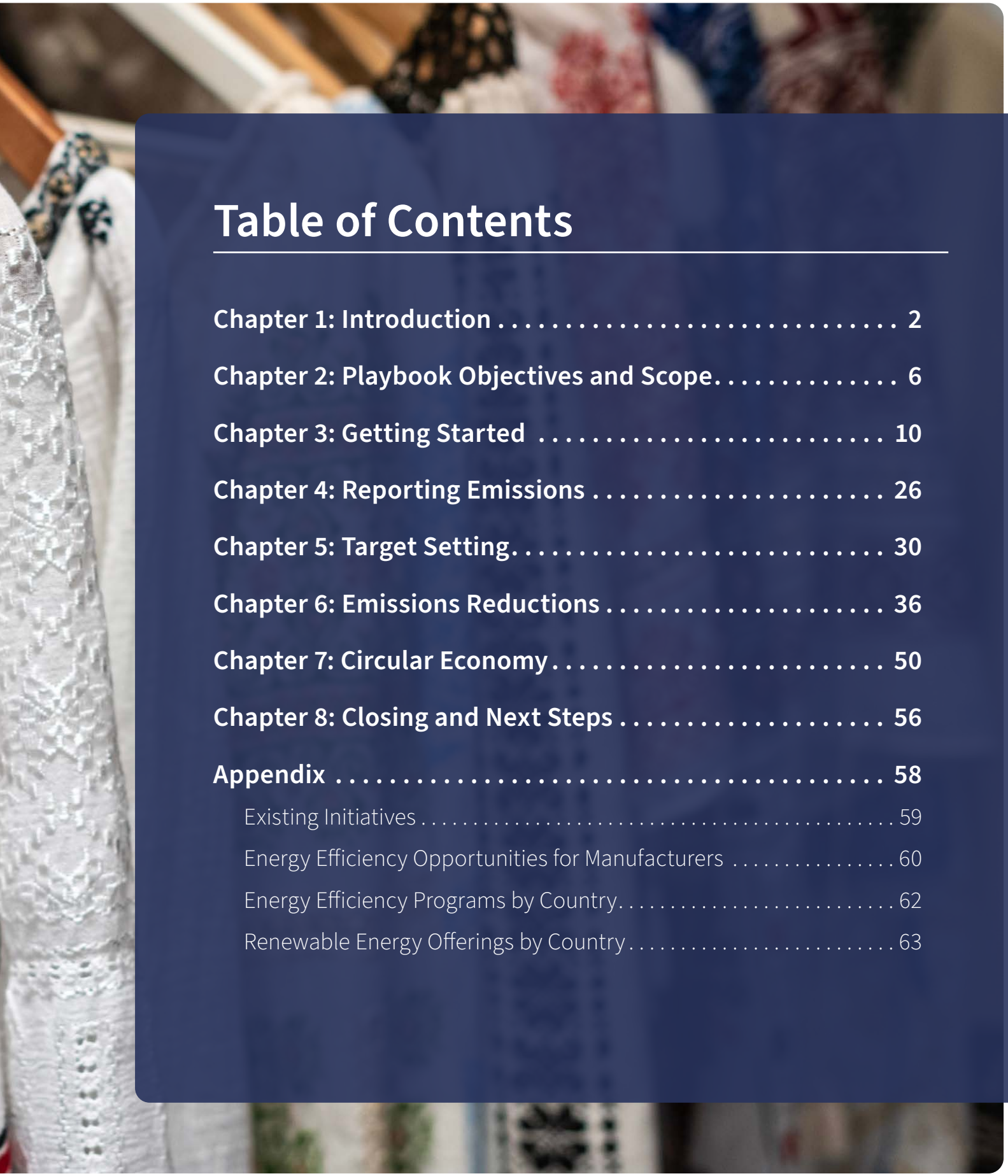

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Photo by: Catalin Apostol

CHAPTER 1
Introduction

Photo by: Dan Romero

Under the 2015 Paris Agreement, nearly 200 nations committed to limit global temperature increase to well below 2 degrees Celsius (°C) and strive to limit the increase to 1.5°C above pre-industrial levels. In 2018, the Intergovernmental Panel on Climate Change (IPCC) released a report that provides strong evidence that limiting warming below 1.5°C will significantly reduce climate impacts including drought, sea level rise, flooding, and extreme heat. This level of ambition will require significant reductions in greenhouse gas (GHG) emissions across the economy: 45% by 2030 from 2010 levels and net zero by 2050.

The fashion sector is a significant source of GHG emissions, and faces growing risks from increasing emissions and the resulting changes in climate, which we outline below.

Given the urgency and scale of the climate challenge, in 2018, UN Climate Change convened companies from across the fashion value chain - raw material producers, textile producers, apparel manufacturers, and brands - as well as other organizations to align on a holistic set of commitments on climate action - the Fashion Industry Charter for Climate Action (Charter) - including reducing emissions to net zero by 2050. These signatories see a clear business imperative for acting on climate change given the risks and opportunities it presents for the sector, for example:

RISKS

- Water scarcity and security (for cotton production, textile mills, and more)
- Physical and business continuity risk for facilities and infrastructure from more frequent and severe climate events (e.g. storms, flooding, extended periods of excessive heat)
- Access to and price volatility of raw materials such as cotton
- Regulatory risk (e.g. limits placed on air emissions, carbon taxes)
- Access to labor given climate change-driven demographic shifts
- Changes in consumer demand due to shifting weather patterns
- Reputational risk from stakeholder campaigns and pressure

OPPORTUNITIES

- Cost savings from reducing energy consumption and reducing waste
- Access to more reliable and less volatile energy sources
- Drive new innovation in low-carbon materials, products, services, and business models
- Brand and reputational benefits with stakeholders including investors, employees, consumers, policy makers, NGOs, and more

While the Charter is focused on climate change, its signatories see the imperative for addressing the broader set of UN Sustainable Development Goals.

DEFINING NET ZERO

Reaching net-zero emissions for a company means achieving a state in which the activities within the value-chain of a company result in no net impact on the climate from greenhouse gas emissions. This is achieved by reducing value-chain greenhouse gas emissions, in line with 1.5°C pathways, and by balancing the impact of any remaining greenhouse gas emissions with an appropriate amount of carbon removals.

Source: Science Based Targets Initiative Discussion **Paper**


Photo by: Jake Gard

ILLUSTRATIONS OF CLIMATE-RELATED RISKS

According to the **International Labor Organization**, increasing heat stress will reduce manufacturing hours in Bangladesh (the 3rd largest apparel exporting nation) by nearly 5% by 2030.

According to **Aqueduct**™, several key countries in the fashion supply chain (e.g. India, Pakistan) face high water stress - presenting risks for raw materials such as cotton and water intensive processes such as dyeing and finishing.

In September 2019, Extinction Rebellion **protested** the fashion industry's contribution to climate change and other environmental impacts during London Fashion Week. Extinction Rebellion has also started a **campaign** to enlist individuals to pledge to not buy any new clothing for one year.

ILLUSTRATIONS OF CLIMATE-RELATED OPPORTUNITIES

According to the **Apparel Impact Institute**, more than 30 textile mills completed the Clean By Design program in October 2019, realizing over 10% energy savings overall, with the top 5 energy-saving mills reducing energy by over 30%.

The International Finance Corporation's Partnership for Cleaner Textile (**PaCT**) program reduced energy consumption in apparel factories by 2.5 million MWh per year in the first five years of its existence.

CDP works with over 700 institutional investors with assets of roughly US$90 trillion to motivate companies to disclose their impacts on the environment and take action to reduce them.

MISSION OF THE CHARTER

The mission of the Charter is to drive the fashion industry to net-zero greenhouse gas emissions no later than 2050 in line with keeping global warming below 1.5°C.

Signatories to the Charter commit to:

1. Support the goals of the Paris Agreement in limiting global temperature rise to well below two degrees Celsius above pre-industrial levels
2. Commit to 30 percent aggregate GHG emission reductions in scope 1, 2 and 3 of the Greenhouse Gas Protocol Corporate Standard by 2030 against a baseline of no earlier than 2015
3. Commit to analyzing and setting a decarbonization pathway for the fashion industry drawing on methodologies from the Science-Based Targets initiative
4. Quantify, track and publicly report our GHG emissions, consistent with standards and best practices of measurement and transparency
5. Partner with experts, businesses, investors, environmental advocates and other stakeholders to develop and implement a decarbonization strategy for the fashion industry, including by developing a work programme and tools necessary to achieve the GHG emission reduction targets
6. Commit to prioritizing materials with low-climate impact without affecting negatively other sustainability aspects
7. Commit to continuously pursue energy efficiency measures and renewable energy in our value chain
8. As soon as possible and latest by 2025, commit to not installing new coal-fired boilers or other sources of coal-fired heat and power generation, on sites within Tier one and Tier two
9. Support global transition to low-carbon transport by giving preference to low-carbon logistics
10. Support the movement towards circular business models and acknowledge the positive impact this will have towards reducing GHG emissions within the fashion sector
11. Establish a closer dialogue with consumers to increase awareness about the GHG emissions caused in the use and end-of-life phases of products, building towards changed consumer behaviors that reduce environmental impacts and extend the useful life of products
12. Partner with the finance community and policymakers to catalyse scalable solutions for a low-carbon economy throughout the sector
13. Together with other stakeholders, develop a strategy including targets and plans to advocate for the development of policies and laws to empower climate action in the fashion industry, especially in supply chains
14. Establish a dialogue with governments in key countries to enable renewable energy, energy efficiency and the necessary infrastructure for a systemic change beyond the fashion industry
15. Communicate a shared vision and understanding through the development of a common strategy and messaging, including by championing climate action within the fashion industry through an enhanced and trust-building dialogue with relevant stakeholders
16. Support the UN Climate Change secretariat in its efforts to manage the tracking and recognition of progress of the commitments outlined in the Charter

Signatories to the Charter see the business and moral case for leading on climate change, and have created this Playbook to help the sector join together and take action. Charter signatories have agreed to share learnings and support those who are starting out on their climate journeys.

CHAPTER 2

Playbook Objectives and Scope

Photo by: BCFC/Shutterstock

Charter signatories have committed to a number of actions on climate change, including a 30% aggregate reduction in scope 1, 2, and 3 GHG emissions by 2030. Signatories not yet measuring GHG emissions will need to do so to deliver on their 30% commitment. Signatories have also clarified that the overall goal of the Charter is to ensure that the sector has net zero GHG emissions by 2050, in line with a 1.5°C climate scenario. Through the working groups, the charter will also provide guidance to signatories on shared reporting, an industry roadmap, and recommendations on setting targets beyond the interim 30% target.

While many Charter signatories have internal expertise and resources to assess and reduce their carbon footprints, there are many more within the industry - especially small and medium sized brands and suppliers - that may have less experience with carbon accounting and planning carbon reduction strategies. This may be due to a number of factors including:

- Unfamiliarity with climate change and the risks and opportunities it poses for their companies and the industry
- Insufficient resources and expertise to address climate change
- An unclear business case for action (e.g. customers have not yet demanded action)
- A real or perceived inability to effect change, for example because a company is small relative to its customers or suppliers

THE CHARTER HAS CREATED A NUMBER OF *WORKING GROUPS* TO LEAD WORK IN KEY AREAS INCLUDING:

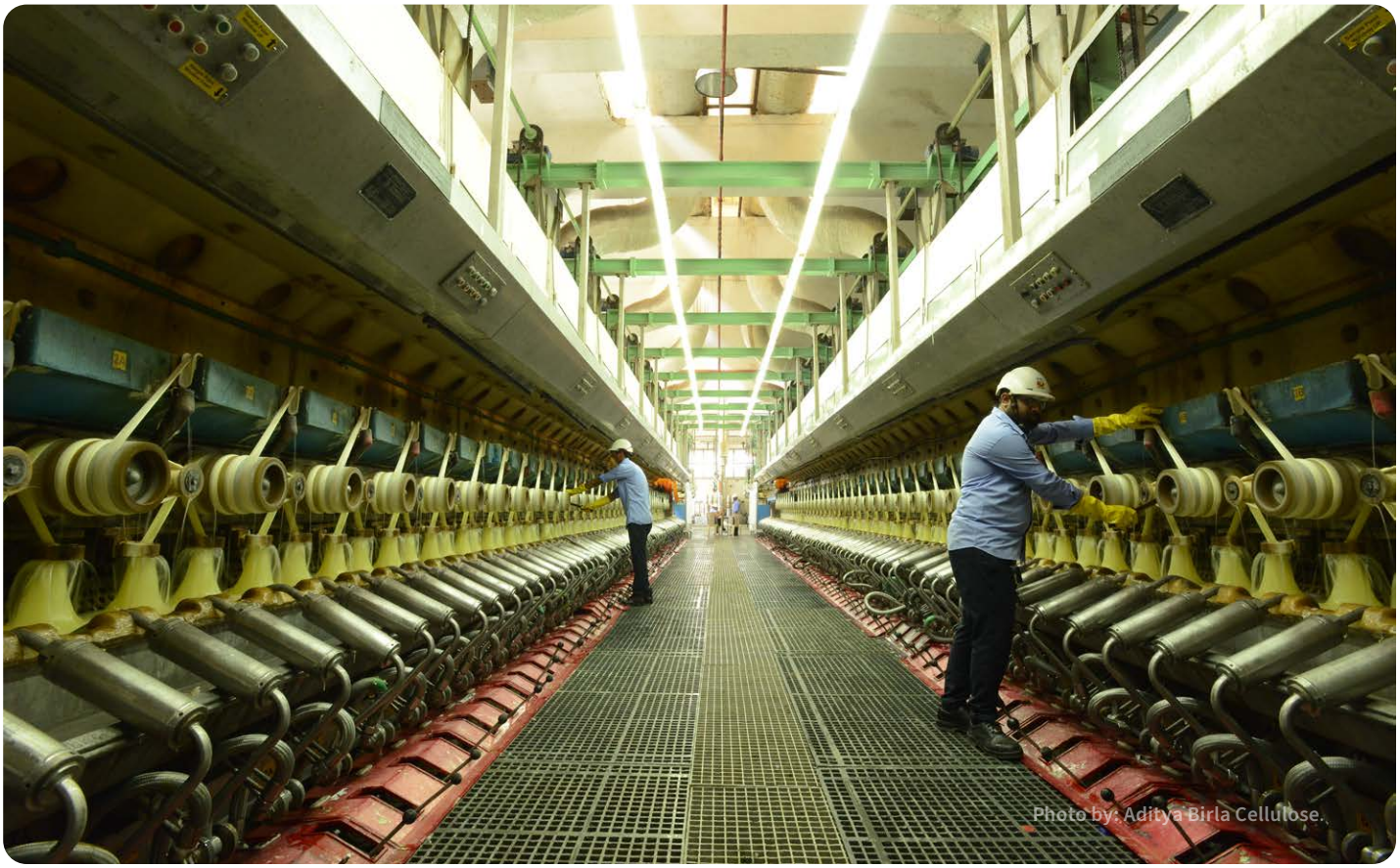
- **Decarbonization pathway**
- **Raw materials**
- **Manufacturing / energy**
- **Policy engagement**
- **Financial tools**
- **Promoting broader climate action**
- **Logistics**
- **Brand / retailer owned or operated emissions**

Several of these working groups are also working on addressing data and measurement gaps in the fashion industry, for example the raw materials and manufacturing working groups. The results of these workstreams will help fill in the gaps and challenges for the industry in measuring GHGs and setting targets.

This Playbook is primarily intended for these less experienced fashion companies that have not yet taken action on climate change, but want to join the sector to deliver net zero emissions by 2050. For these companies, the Playbook is intended to increase their level of understanding of climate change and provide a roadmap to guide their actions. In addition to providing basic

To illustrate the scale of the fashion industry and the complexity of apparel value chains, individual brands and retailers can have hundreds of suppliers, for example:

- **As of April 2020, PUMA had 123 core tier 1 and 2 suppliers and hundreds more non-core suppliers around the world.**
- **As of March 2019, Levi Strauss & Co sourced from hundreds of factories and dozens of mills globally.**

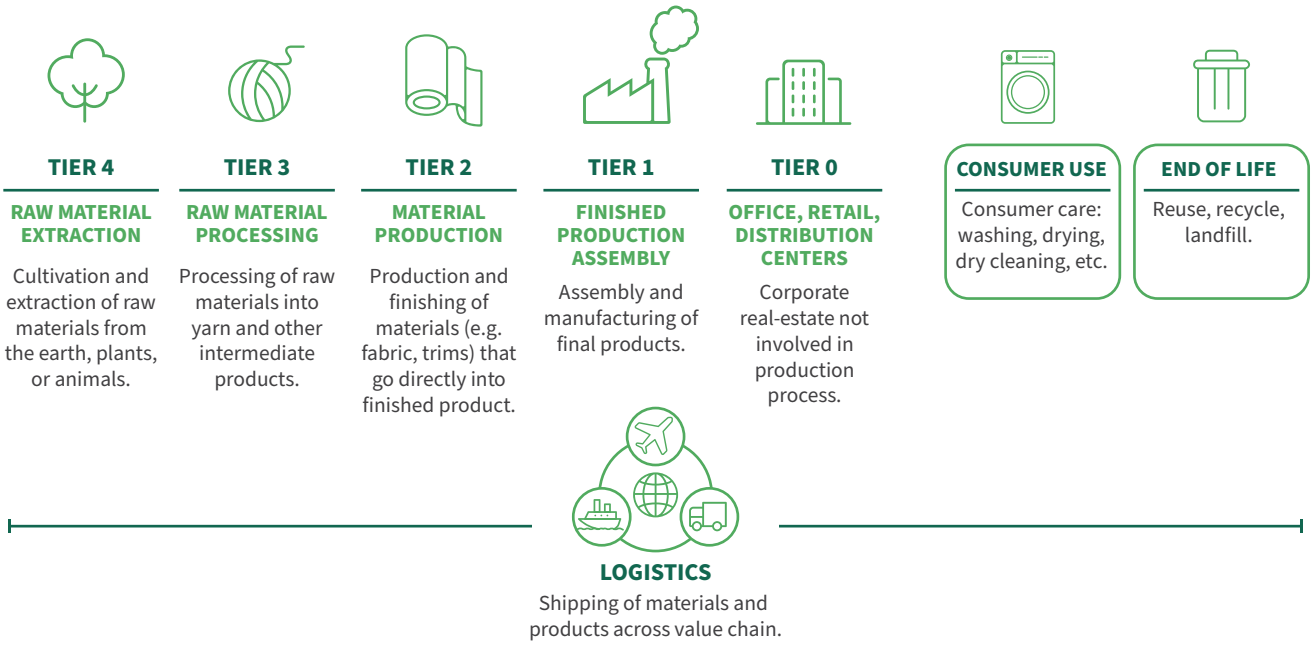


instructions, the Playbook also includes links to additional resources to help companies develop a GHG emissions inventory and reduction targets, build a strategy to achieve the targets, and identify partner organizations to help in the process.

The Playbook will also be valuable for larger and / or more experienced companies - including those with approved science-based targets (SBTs) - as they need to bring their suppliers along on the journey.

The Playbook is intended for companies across the value chain that are primarily involved in the fashion sector - brands, retailers, manufacturers, material suppliers, and more - as setting and achieving ambitious targets will take action from thousands of companies across the value chain. See figure 1 for a high-level depiction of the fashion value chain, and note that this may differ for companies based on their circumstances. The Playbook is not meant for companies for which fashion is a minor portion of their business, for example chemical manufacturers.

FIGURE 1 | Apparel and Footwear Value Chain



Source: Sadowski, M., C. Yan, and N. Aden. 2019. Apparel and Footwear Sector Science-Based Targets Guidance. Washington, DC: World Resources Institute.

For more information on the Charter, including the commitments and up-to-date signatories, see the Charter **website**.

CHAPTER 3

Getting Started

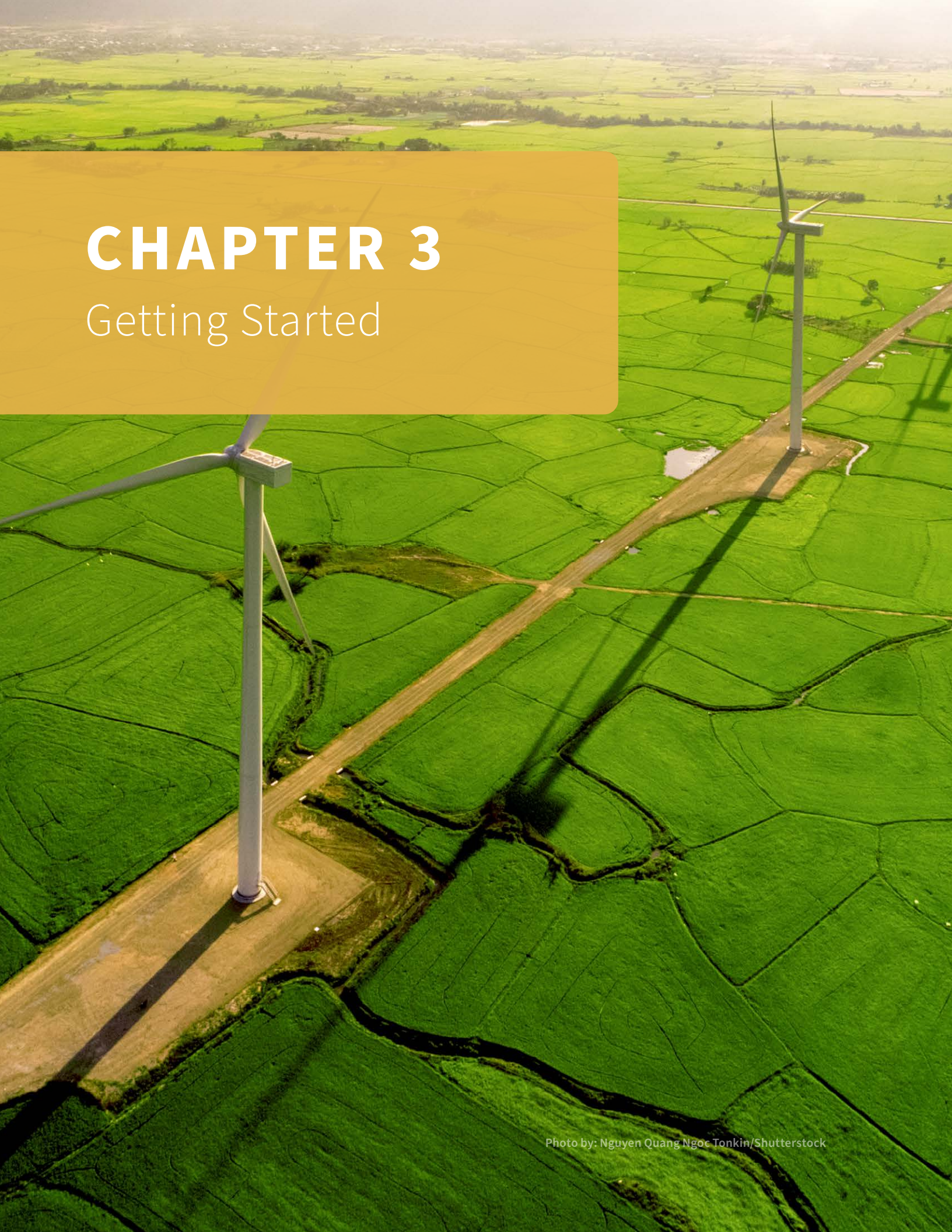


Photo by: Nguyen Quang Ngoc Tonkin/Shutterstock

UNDERSTANDING GHG EMISSIONS

Greenhouse gases are gases in the atmosphere that absorb and emit radiation at specific wavelengths within the spectrum of thermal infrared radiation emitted by the Earth's surface, the atmosphere itself, and by clouds. This results in the greenhouse effect. There are seven major GHG gases caused by human activity, but the most relevant ones for most fashion companies are carbon dioxide (CO_2)— produced by the burning of fossil fuels such as coal and oil - and methane (CH_4)—which may be emitted in the use of natural gas for fuel and is also released in the leather supply chain (i.e. from cattle).

The full list of GHG gases, and their relative global warming potentials (i.e. gasses differ on their heat trapping capacity), can be found on the GHG Protocol website. As CO_2 is the most common gas, emissions are usually expressed as a carbon dioxide equivalent value (CO_2e) to describe the total release of GHG emissions.

In general, corporate GHG emissions come from the following sources:

- **Stationary combustion**: Fuel burned in on-site stationary sources such as boilers in textile mills or electric power plants
- **Mobile combustion**: Fuel burned during transportation (e.g. truck, ocean, air, rail)
- **Process emissions:** Physical or chemical processes that release emissions (e.g. volatile organic compounds from applying adhesives in footwear manufacturing)
- **Fugitive emissions:** Intentional and unintentional releases, for example HFC and PFC leakage from air conditioning in stores and offices and methane emissions from cows in the leather value chain (from belching due to enteric fermentation).

DEFINING THE SCOPE OF EMISSIONS

Before a company can define its scope of emissions, it must first decide how to set the boundaries of its reporting scope:

Under the **equity share approach**, a company accounts for emissions from operations according to its share of equity in a facility, office space, or other operation. For example, if a company owned 100% of a factory, then it would be accountable for 100% of the emissions. If it held 50% ownership - for example as part of a joint venture - then it would be accountable for 50% of the emissions.

Under the **control approach**, a company accounts for 100% of the emissions from operations over which it has control. Control can be defined in either financial or operational terms. Operational control is the most common approach used by companies to draw GHG inventory boundaries.

A fuller description of how to set organizational boundaries can be found in the GHG Protocol Corporate Standard.

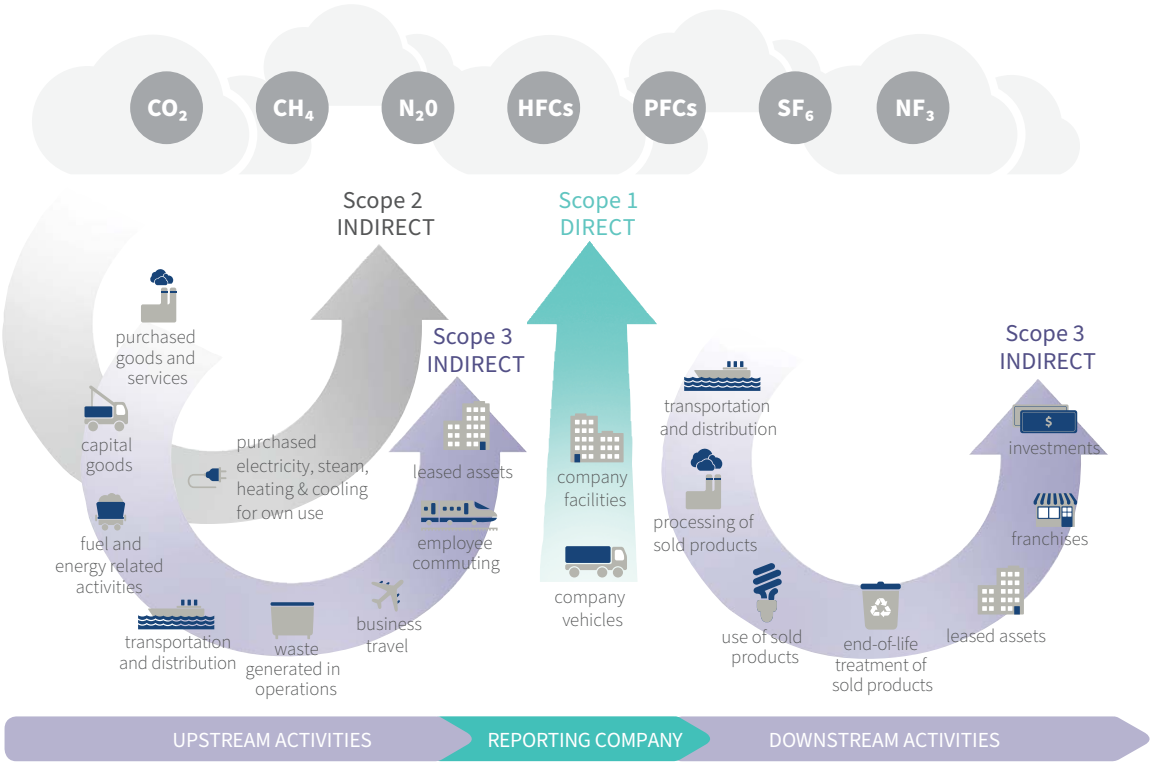
For all companies, GHG emissions are grouped into three categories:

- **Scope 1:** Direct GHG emissions that are emitted from sources owned and controlled by a company.
- **Scope 2:** GHG emissions from the generation of electricity, heat and steam purchased by a company.
- **Scope 3:** "Indirect" emissions from a company's value chain activities.

The GHG Protocol Corporate Value Chain (Scope 3) Standard categorizes scope 3 emissions into 15 categories, as illustrated in Figure 2.

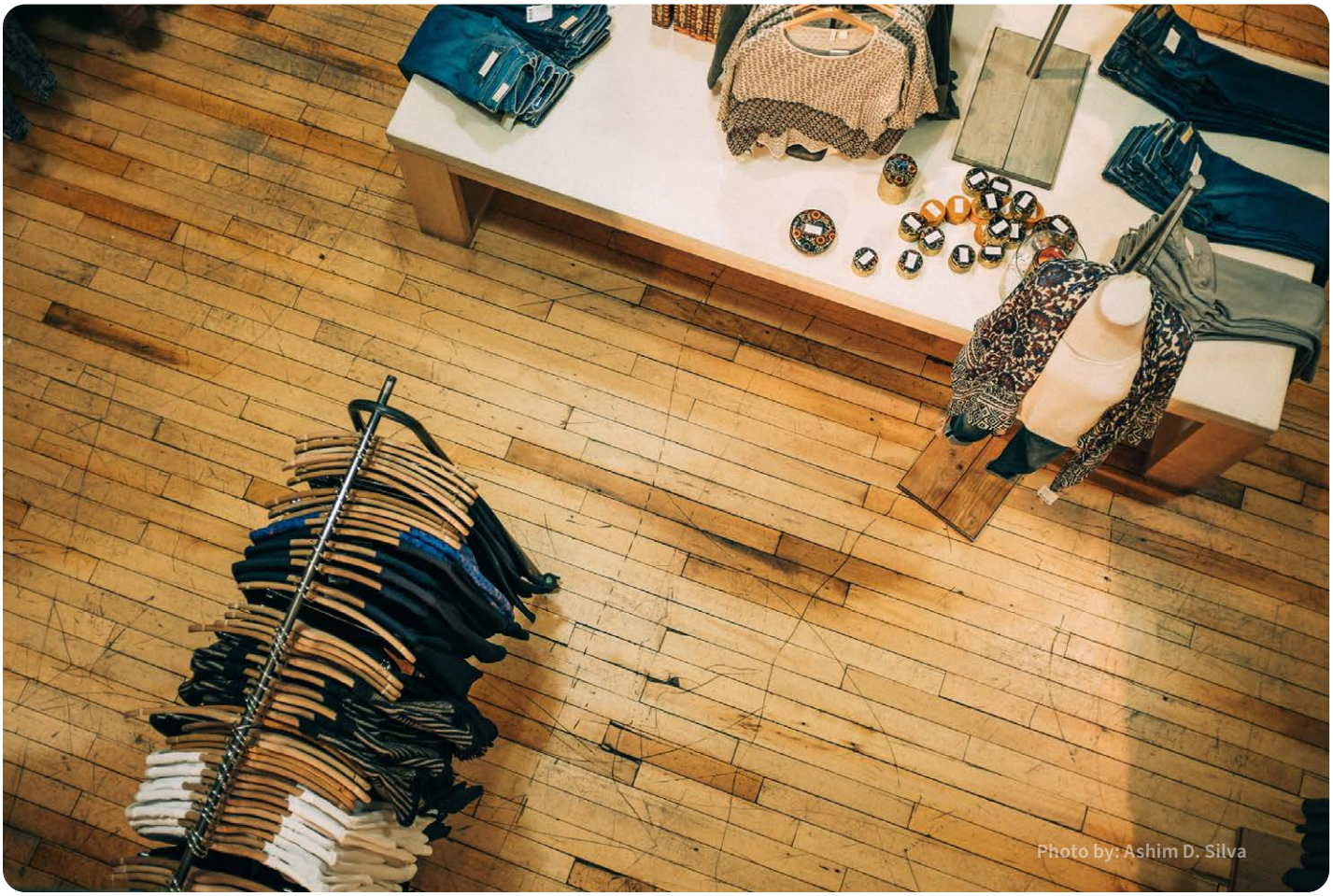
Tip: For fashion companies just starting to measure their GHG emissions, we recommend focusing on CO_2 as this will likely be the vast majority of emissions.

FIGURE 2 | GHG Protocol Corporate Standard Scopes of Emissions



Source: Greenhouse Gas Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard.

> Tip: If you are a small and medium size company, as a first minimum step, start reporting energy-related CO_2 emissions from the use of fuels and electricity. Other types of emissions such as methane or PFCs can be added at a later stage.



The relative magnitude of emissions in each of the three scopes will differ based on where a company sits in the fashion value chain. For example, for a brand or retailer, scope 1 and 2 emissions are typically small, while scope 3, particularly in Purchased Goods and Services, tends to be the majority of emissions. For a finished goods manufacturer or textile mill, scope 1 and 2 will likely be more significant.

In general, the Purchased Goods and Services emissions (scope 3) for a brand are the scope 1 and 2 emissions of suppliers. Thus, brands and suppliers need to collaborate to measure and reduce these emissions (more on this in section 6).

A number of companies and organizations have developed estimates of the breakdown of fashion sector emissions across scopes 1, 2, and 3. We include several of these estimates below, and advise the reader that the distribution of emissions will vary for individual companies based on a number of factors (e.g. type of products, nature of supply chain, countries of origin).

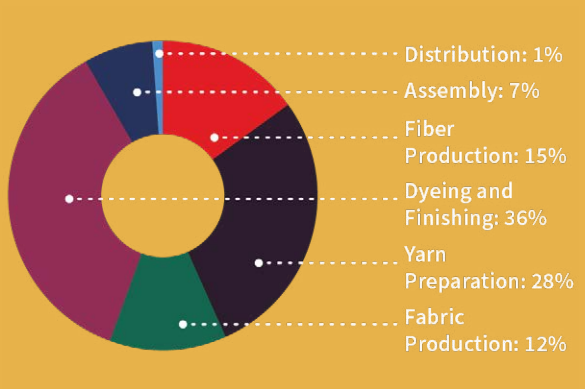
Company GHG inventories should extend for 12 month periods (calendar or fiscal year), and ideally companies should track emissions on a monthly or quarterly basis. Companies may find tools such as the US EPA Inventory Management Plan helpful in developing a consistent and robust approach to measuring emissions.

GHG EMISSIONS ACROSS THE FASHION VALUE CHAIN

Quantis found that over 90% of the emissions for apparel come from four activities: dyeing and finishing, fabric preparation, yarn preparation, and fiber production.

Source: Measuring Fashion: Insights from the Environmental Impact of the Global Apparel and Footwear Industries Study.

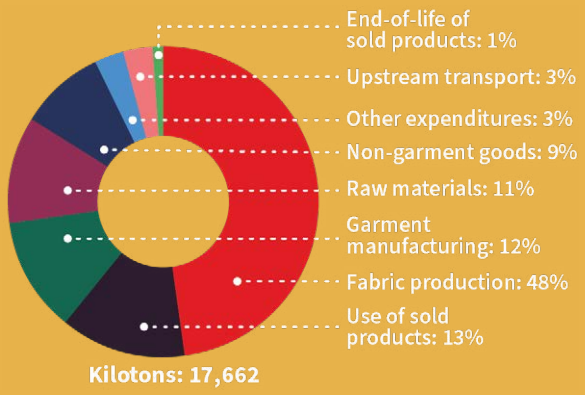
FIGURE B1 | GHG Emissions across the fashion value chain



In its 2019 sustainability report, H&M reported scope 1 and 2 emissions to be 61,462 tons (0.4% of total), and scope 3 emissions to be 17,622,000 tons (99.6% of total). Within scope 3, raw materials, fabric production, and garment manufacturing represented 71% of emissions.

Source: H&M Group Sustainability Report 2019.

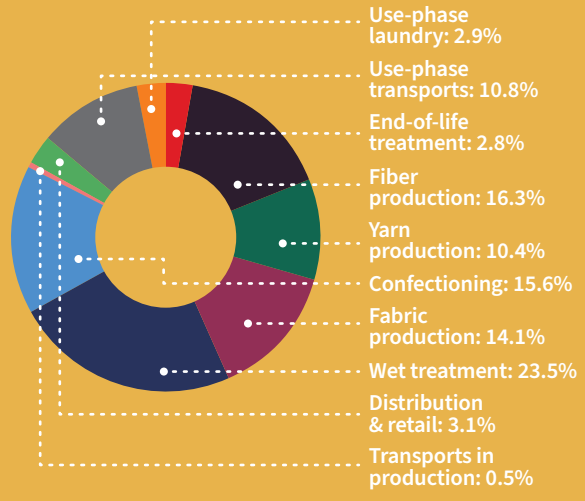
FIGURE B2 | H&M Scope 3 CO_2e emissions



In a study of Swedish clothing consumption funded by Mistra Future Fashion, researchers found that nearly 80% of life cycle emissions lie in fiber, yarn, and fabric production, wet processing, and garment manufacturing

Source: Gustav Sandin, Sandra Roos & Björn Spak (RISE) Bahareh Zamani & Greg Peters (Chalmers University of Technology). 2019. Environmental assessment of Swedish clothing consumption.

FIGURE B3 | Climate impact of Swedish clothing consumption, contribution of life-cycle phases



CHOOSING A GHG ACCOUNTING METHODOLOGY

The Corporate Accounting and Reporting Standard (Corporate Standard) from the GHG Protocol is the accounting foundation for most corporate GHG reporting programs in the world. In 2016, 92% of Fortune 500 companies responding to CDP used the GHG Protocol directly or indirectly. The Corporate Standard provides guidance for companies to prepare GHG emissions inventories. It covers accounting and reporting of the seven GHGs mentioned above, and it was updated in 2015 with Scope 2 Guidance which addresses emissions from purchased electricity, steam, heat, and cooling.

The Corporate Value Chain (Scope 3) Standard provides guidance for developing a value chain GHG inventory (i.e. the 15 scope 3 categories).

Tip: For scope 1 and 2 emissions, start by identifying a responsible person or team for data collection and GHG inventory calculation. Once you identify the sites to be included, send a questionnaire (e.g. Excel) to each site asking for the relevant activity data (e.g. quantity of fuel used for heating). To reduce errors, the person responsible for calculating the GHG inventory should use activity data to calculate GHG emissions for all facilities.

MEASURING SCOPE 1 EMISSIONS

As mentioned above, scope 1 GHG emissions are those emitted on-site from sources that are owned or operated by a company, typically on-site fuel combustion for a manufacturing processes or back-up power generators, fuel use for vehicle fleets owned or leased by a company, and fugitive refrigerants from air-conditioning and refrigeration. The Corporate Standard provides direction on setting operational boundaries for scope 1 emissions.

» ***Scope 1 emissions for a fashion brand might include:***

- **Natural gas or other direct fuels used for heating stores, offices, or warehouses that are owned or operated directly**
- **Fuel used for owned or operated vehicles**
- **Diesel used in backup generators**
- **Refrigerant leakage (if relevant)**

» ***Scope 1 emissions for a manufacturer might include:***

- **Natural gas or other fuels used for heating stores, offices, or warehouses that are owned or operated directly**
- **Natural gas, coal, oil, or biofuels used for generators, heat-intensive processes, or boilers**
- **Fugitive process emissions**
- **Fuel used for owned or operated vehicles**
- **Refrigerant leakage**

» ***Tools and data sources to measure these impacts:***

- **Information on the size of office, retail, and warehouse space (in square meters or square feet)**
- **Actual fuel use data or purchase records (invoices) for office, retail, warehouses, and factories**
- **Actual fuel use data or purchase records from vehicle fleet managers or users**
- **Actual refrigerant losses data or modelled estimates**
- **Emissions factors**

Most companies calculate scope 1 emissions by multiplying the volume of fuel used in a given activity by the relevant GHG emissions factor for the fuel type. For example:

If a company used five tons of coal to run a boiler for one month, the emissions for that month would be: 5 tons of coal x 2.602 tons of CO_2 per ton of coal consumed = 13.01 tons CO_2.

Similarly, if 100 liters of gasoline were used in a vehicle fleet for a month, the emissions would be: 100 liters of gasoline x 0.00878 tons of CO_2 per liter = 0.878 tons CO_2.

Note: the emission factors in the examples above are sourced from the US EPA. Conversion factors recommended by the UN Climate Change and created by the IPCC can be found here. Note that the emissions factors may be in different units than the user data (gallons versus liters), and thus the user may need to convert data.

Based on the experience of Charter signatories, there are a number of measurement challenges for scope 1 emissions (possible solutions are included in italics):

- Data availability, for example when a company cannot easily obtain refrigerant purchases for air conditioning from leased office or retail space. *In such cases, it is fine to start with estimations or extrapolations based on the sites for which data is available.*
- Data accuracy: assumptions and estimates may be needed due to lack of data availability. *Use data you have in hand and extrapolate or estimate for other sites.*
- Managing and updating data, including challenges around timing of measurements when gathering data and missing key inputs if bills/estimates/usage figures are not yet available. *In this case, you can use data from the prior year and extrapolate for any missing months.*
- Comparability of data over several years when affected by weather conditions or seasonal demand patterns. *Companies may use a rolling average of three annual inventories when fluctuations are significant year to year. They should also report the annual inventory with an explanation for any significant variations.*

- Accuracy of conversion factors. *Use globally accepted conversion factors such as the ones linked in this Playbook.*
- Tracking and measuring the use of refrigerants in air conditioners. *Can be estimated if purchase data is unavailable.*

Robust measurement, tracking, and reporting of scope 1 emissions requires establishing management systems and tools. For example, some companies use web-based data collection tools to track emissions, while others use spreadsheet-based tools. Such tools can be simple and inexpensive—for example using Excel to gather data and calculate emissions—and companies may have existing business tools that can be used for emissions tracking.

Regardless of the tool used, companies should take management approaches that support accurate and timely data collection and analysis. For example having a designated person for compiling activity data and calculating emissions across scope 1 sources and rolling them up to the company level, and another person (or mechanism) for verifying the information.

MEASURING SCOPE 2 EMISSIONS

Regardless of where a fashion company sits in the value chain, scope 2 emissions are the emissions generated by purchased electricity, heat, steam, and cooling - typically from a utility. As mentioned above, the relative magnitude of scope 2 emissions will differ based on where a company lies in the value chain, for example scope 2 emissions are relatively small for a brand compared with scope 3, but for an apparel cut and sew facility (tier 1) or yarn spinning facility (tier 3), scope 2 emissions can be the majority.

The vast majority of scope 2 emissions for brands and retailers are typically from purchased electricity. Purchased steam or cooling may be more applicable to manufacturers.

As with scope 1, quantifying scope 2 emissions requires a company to know the amount of purchased electricity, heat, steam, and cooling and then apply relevant GHG emissions factors from the electricity grid where each facility is located. Companies can access electricity,

heat, steam, and cooling consumption data from their utilities via invoices. Companies can access country-level emissions electricity factors from the IEA and regional emissions factors from sources such as eGRID (US) and DEFRA (UK). Companies should apply grid emissions factors to their inventories when the factors are released. So, if grid emissions factors come out in 2018 and reflect the grid in 2016, they should be applied to the 2016 inventory and the two years after that in order for the inventory to reflect the most accurate reflection of emissions in a given year.

To illustrate, if a facility based in California (USA) purchases 100 MWh of electricity each month, the emissions would be: 100 MWh x 225.2 kg CO_2e per MWh = 22,520 kg CO_2e (emissions factor with conversion from lbs to kg from eGrid). Note that this example is for one facility in one location, and thus a company would need to aggregate all facilities and make similar calculations to derive a company-wide footprint.

This calculation is based on the so-called location-based approach - in brief it takes the average emissions from the electricity grid. If a company purchases renewable energy (e.g. unbundled Renewable Energy Certificates, Power Purchase Agreements), then it would also develop an inventory based on the market-based approach (i.e. factoring in the specific renewable energy sources). The GHG Protocol Scope 2 Guidance has more information on these two approaches.

» ***Scope 2 emissions for a fashion brand might include:***

- **Electricity for heating, lighting, or cooling in retail, offices, or warehouses owned or operated directly by the company**
- **District heating or cooling used in owned or operated facilities**
- **Purchased and consumed steam**

» ***Scope 2 emissions for a manufacturer might include:***

- **Grid electricity for heating, lighting or cooling in retail, offices, or warehouses**
- **Grid electricity used for manufacturing processes**
- **District heating or cooling**
- **Purchased and consumed steam**

» ***Data sources for Scope 2 data may include:***

- **Actual or estimated meter readings or invoices from electricity providers**
- **Actual or estimated usage or invoices from steam providers**
- **Renewable energy contractual agreements, energy attribute certificates, etc.**
- **Emissions factors**

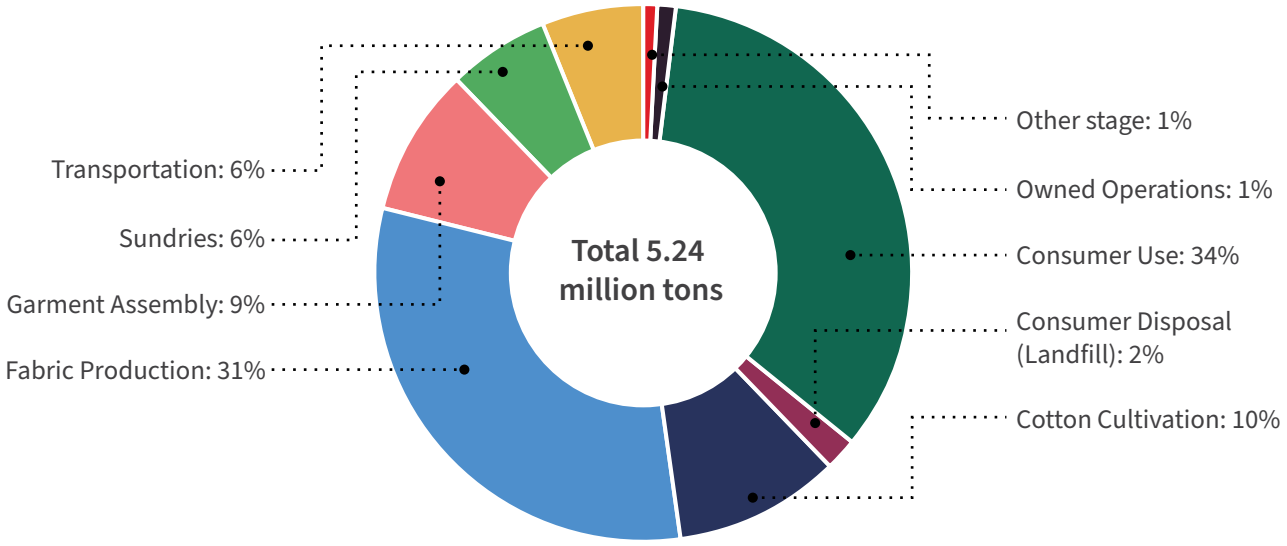
MEASURING SCOPE 3 EMISSIONS

As with scope 1 and 2 emissions, the importance and magnitude of scope 3 emissions will differ depending on where a company sits in the value chain. For example, scope 3 emissions for brands and retailers tends to be the majority of emissions (due to Purchased Goods and Services), while scope 3 tends to be smaller for upstream suppliers to brands and retailers. See figure 3 for an illustration of this with one brand and retailer, Levi Strauss & Co. A. (in this example, scope 3 is virtually all of their emissions - “owned operations” is the only scope 1 or 2 category).

There are 15 categories of scope 3 emissions, which are listed below with illustrations of how these emissions might be relevant for fashion companies across the value chain. We have also included the average percentages that each category represents of total scope 1, 2, and 3 emissions for the 20 companies that have approved SBTs (as of March 2020) through the SBTi. These percentages may be a useful guide for companies that are just beginning the GHG inventory process. Note that the percentages are primarily based on the targets of brands and retailers as they comprise nearly all of the approved targets to date.

For a full overview of these categories and how to approach scope 3 emissions measurement and target setting, see the GHG Protocol Scope 3 Standard.

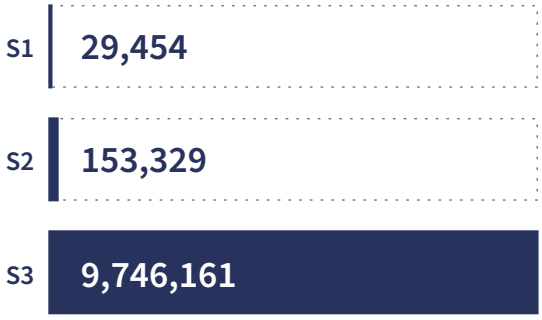
FIGURE 3 | Levi Strauss & Co Full Value Chain GHG Emissions (million tons CO_2e)



Source: Levi Strauss & Co. 2018. Climate Action Strategy 2025.

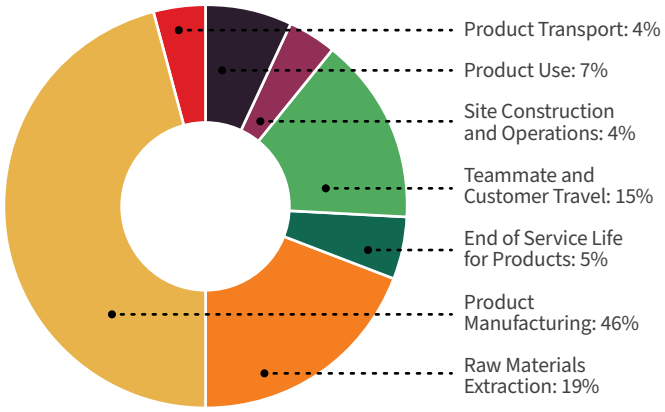
FIGURE 4 | Decathlon GHG Footprint, 2018

Decathlon Breakdown of Emissions by Scope (tons CO_2e, market-based method)



SCOPE 1: Direct emissions. SCOPE 2: Indirect emissions from energetical consumptions. SCOPE 3: Other indirect emissions (supply, transport, use, end-of-life, etc.).

Decathlon Breakdown of Emissions by Activity



Source: 2018 Sustainability Report.


Photo by: Hector J. Rivas

TABLE 1 | Scope 3 Emission Categories with Examples

CATEGORY NAME	DESCRIPTION	ILLUSTRATIVE ACTIVITIES FOR FASHION	% OF COMPANY EMISSIONS (APPROVED SBTS)[1]
1. Purchased goods and services	Extraction, production, and transportation of goods and services purchased by a company	For brands and retailers, this includes all of the emissions "embedded" in finished products, from raw materials through processing to final assembly (i.e. tiers 1 to 4). See below for guidance for manufacturers on PG&S.	78.5%
2. Capital goods	Extraction, production, and transportation of capital goods	The impact of producing and transporting a newly purchased boiler.	1.3%
3. Fuel and energy-related activities (not included in scope 1 or 2)	Extraction, production, and transportation of fuels and energy purchased or acquired by the reporting company in the reporting year, which have not been included in scope 1 or scope 2	Refining of gasoline used in third party vehicles for garment distribution purchased by a manufacturer.	0.8%
4. Upstream transportation and distribution	Transportation and distribution of products purchased by the reporting company in the reporting year between a company's tier 1 suppliers and its own operations (in vehicles and facilities not owned or controlled by the reporting company) Transportation and distribution services purchased by the reporting company in the reporting year, including inbound logistics, outboundlogistics (e.g., of sold products), and transportation and distribution between a company's own facilities (in vehicles and facilities not owned or controlled by the reporting company)	Third-party transportation services for fabric purchased by a garment producer. Note that some tools like the Higg Material Sustainability Index (MSI) may include transportation emissions for select segments of the value chain.	5.1%

TABLE 1 | Scope 3 Emission Categories with Examples (Cont.)

CATEGORY NAME	DESCRIPTION	ILLUSTRATIVE ACTIVITIES FOR FASHION	% OF COMPANY EMISSIONS (APPROVED SBTS)[1]
5. Waste generated in operations	Disposal and treatment of waste from the reporting company's operation.	Incineration or landfilling of scrap yarn, fabric, samples, and unsold product.	0.5%
6. Business travel	Transportation of employees for business-related activities (in vehicles not owned or operated by the reporting company).	Air travel for business-related meetings.	0.6%
7. Employee commuting	Transportation of employees from home to work (in vehicles not owned or operated by the reporting company).	Employee commuting (e.g. automobile, public transportation).	1.2%
8. Upstream leased assets	Operation of assets leased by the reporting company (lessee).	Leased retail space that was not included in a company's scope 1 and 2 inventory. This may occur if a company draws its inventory boundary via the financial control approach.	0%
9. Downstream transportation and distribution	Transportation and distribution of products sold by the reporting company in the reporting year between the reporting company's operations and the end consumer (if not paid for by the reporting company), including retail and storage (in vehicles and facilities not owned or controlled by the reporting company).	Transportation of fabrics to a cut and sew facility; shipping of products to retail outlets or to customers who purchased products online.	1.6%
10. Processing of sold products	Emissions of processing intermediate products by downstream companies.	For a company that focuses on wool spinning, the emissions from further processing of knitting and/or weaving by another company.	0%
11. Use of sold products	End use of goods and services sold by the company.	For fashion companies, customer care for products (e.g. washing and drying) is considered indirect use, as compared to direct use which would be the emissions from the operation of an automobile. The SBTi recommends but does not require that emissions from indirect use are included in GHG inventories and targets. See the Guidance for a full discussion of this topic.	Omitted
12. End-of-life treatment of sold products	Waste disposal and treatment of products.	Incineration or landfilling of sold clothing.	1.9%
13. Downstream leased assets	Emissions of assets owned by the company but leased to another entity.		0%
14. Franchises	Emissions of franchises.	Scope 1 and 2 emissions from franchisees, whom the franchisor grant licenses to sell or distribute garments in return for payments.	0.5%
15. Investments	Emissions associated with investments.	Equity investments in a joint venture.	1.2%

Note: [1] WRI calculations.

Source: Greenhouse Gas Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard.

Based on a survey on the scope 3 categories covered in their inventories, Charter signatories are generally aligned with categories noted as most relevant above, for example nearly all include Purchased Goods and Services. While every company should assess the relevance of the 15 scope categories, the survey responses may provide direction on the most relevant categories.

For an initial approximation of scope 3 emissions, companies can use the free Scope 3 evaluator from the GHG Protocol and Quantis. While not designed for collecting and managing actual GHG data, the tool can give companies an initial estimate of their scope 3 emissions and the magnitude of these emissions compared to scope 1 and 2. Based on the results, companies can then collect higher quality data for their largest emissions sources.

> Tip: Many companies will be able to cover over 80% of their scope 3 footprint with three categories: purchased goods and services, upstream logistics, and downstream logistics.


Photo by: Wonderlane

Many companies hire technical consultants to help develop GHG inventories and establish targets. Charter signatories named the following organizations as potential service and/or tool providers:

- Accenture
- Act Renewable
- Anthesis
- APPLUS
- Carbon Trust
- Carnstone
- CEMAsys
- Climate Partner
- Deloitte
- Enablon (Scope 1 and 2)
- Engie Insight
- Navigant
- Point 380 (Scope 1&2)
- PwC
- PRé
- Quantis
- Schneider-Electric
- Shift Advantage
- Smart Freight Centre
- South Pole
- Systain
- Thinkstep (Sphera Solutions)
- ConnectorPro tool from Semtrio Sustainability Consulting
- WSP Group

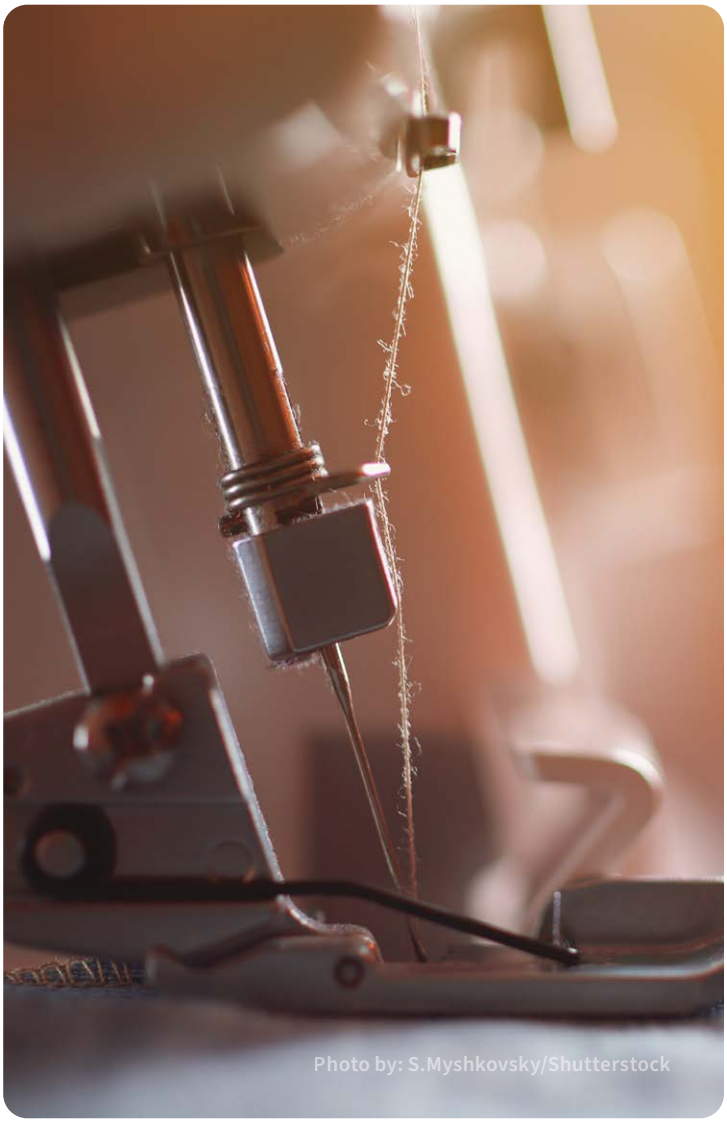


Photo by: S.Myshkovsky/Shutterstock

As demonstrated above, Purchased Goods and Services is generally the largest category of emissions for most fashion companies, and it can be complicated to calculate. There are four ways to calculate emissions for Purchased Goods and Services:

- **Supplier-specific:** Collect product-level data from goods across the value chain (i.e. from raw material extraction to finished product).
- **Hybrid:** Combination of supplier-specific activity data (e.g. emissions from running a coal-fired boiler in a textile mill) and average data (e.g. LCA data) to fill the gap.
- **Average data:** Estimate emissions by collecting data on the mass or other relevant units of goods or services purchased and multiplying by the relevant secondary emission factors (from sources such as the Higg MSI or Quantis WALDB).
- **Spend-based:** Estimate emissions by collecting data on the economic value of goods and services purchased and multiplying it by relevant secondary emission factors.

The best method may vary for each company based on a number of factors including data availability and the degree of transparency the company has into its supply chain and manufacturing processes. Ideally, a company would have primary data for every upstream phase of

> Tip: Given the complexity of measuring emissions from Purchased Goods and Services, the **SBT Apparel Guidance** includes a separate chapter on the subject. This chapter includes methods for gathering data as well as data sources. It also includes an explanation of how companies can use the Higg Index, specifically the Facilities Environmental Module and MSI, to set baselines and targets.

Tip: Thousands of apparel and footwear suppliers have entered their energy data into the Higg **FEM**. If you are a brand or retailer, ask your key suppliers if their data is already covered in the FEM. If not, consider enrolling them in the Higg FEM and ask the SAC for access to your suppliers' GHG emissions data.

If you are a manufacturer, entering data into the FEM should help you reduce the number of customer inquiries for such data

the product (from farm to spinning to mill to cut and sew), and then just add up the emissions. However, this is generally not possible given the complexity and reach of the industry (e.g. most brands do not know their tier 3 and 4 suppliers), and thus companies use secondary data in their calculations - for example industry-specific LCA databases and tools (e.g. Higg MSI, WALDB). To calculate these emissions, companies will need to identify the volume of each material used in their products, and then apply emissions factors.

With secondary (LCA-based) data, challenges for textiles still exist, as data points may be limited. The Raw Materials Working Group of the Charter is working to address these issues, and plan to carry out a gap analysis of current resources and collaborate with Charter signatories and third-party data holders to explore whether a more complete GHG database can be made available through relevant channels and tools for use by all industry stakeholders.

As a starting point, fashion brands and retailers can ask their direct suppliers (Tier 1) to report their GHG emissions, for example via the Higg Facilities Environmental Module (FEM) or via the CDP supply chain module. Suppliers can attribute the share of emissions to a specific brand by making a link to the volume of products produced. For example:

- If a footwear factory produces 1 million pairs of shoes per year and emits 8 million kg of CO_2 emissions, one pair of shoes emits on average 8 kg of CO_2e.
- A brand sourcing 200,000 pairs of shoes would then be responsible for 1,600,000 kg of CO_2e from that supplier.

This tier 1 data can then be supplemented by emissions from the usage of materials such as cotton, polyester, or leather. For example:

- If a brand uses 1 million kg of cotton per year, and the average emissions of producing 1 kg of cotton is 2 kg CO_2e, then the emissions from cotton production would be 2 million kg of CO_2e.

While companies often use global averages for emissions factors for simplicity and / or a lack of visibility into the precise origin for materials, emissions factors tend to vary by country. For example, cotton grown in the US has a different emissions factor than cotton grown in India.

CHAPTER 4

Reporting Emissions

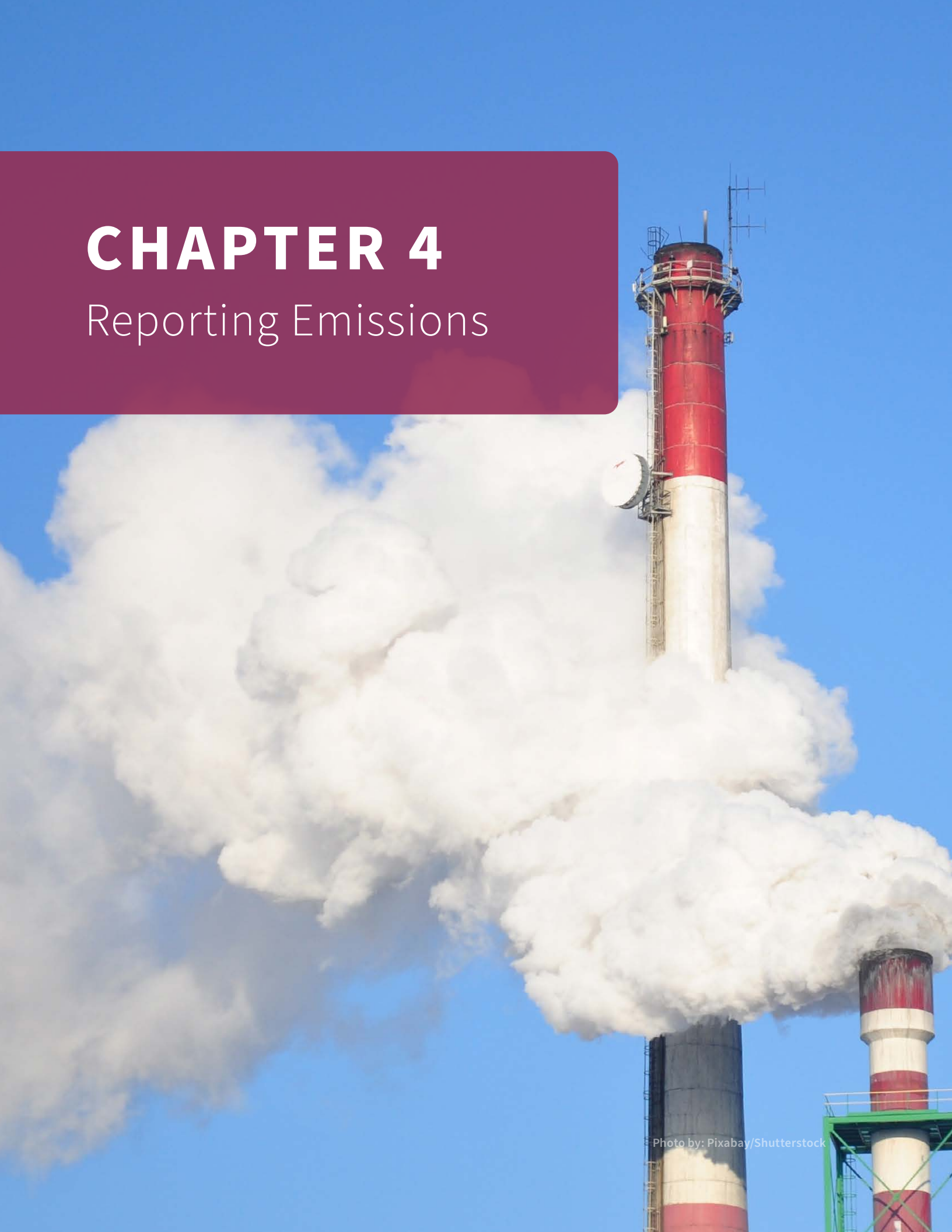


Photo by: Pixabay/Shutterstock

REPORTING GHG EMISSIONS

Signatories to the Charter have committed to publicly report their GHG emissions, consistent with best practices of measurement and reporting. A task team of Charter signatories assessed all available reporting options for credibility and suitability and (with approval from Working Group 1 and the Charter Steering Committee) selected CDP as the reporting platform for the Charter. CDP, formerly known as the Carbon Disclosure Project, is a global, investor-led coalition on greenhouse gas and other types of environmental disclosure

Signatories can either enter the CDP Reporting Platform via an investor request (fees may apply) or customer request, or via the Fashion Charter Platform (free of charge). Companies can fill in the entire CDP questionnaire, or if they are new to reporting, can answer the priority questions identified by the task team. In particular, companies will need to include data on their scope 1, 2, and 3 GHG emissions baselines, their GHG reduction targets including their Charter commitments, and progress made on GHG emission reductions. Signatories are encouraged to share their data publicly from the first year of reporting in 2020, and the Charter will also share the overall data and progress of signatories on an annual basis.

Companies with targets approved by the Science Based Targets initiative (SBTi) must also publicly report their GHG inventory and progress against published targets on an annual basis. The requirement for public disclosure is grounded in the belief that transparency allows for greater stakeholder accountability for companies to deliver on their commitments. Aligned Charter reporting also allows UN Climate Change to assess whether the collective efforts of the signatories are on pace to meet the 2030 and 2050 targets.

Photo by: Tembela Bohle/Pexels

For companies not currently signed up to the Charter, there are a number of options for sharing GHG emissions, targets, and progress data. Some of these options include:

- Corporate sustainability reports or websites (ideally data shared in these formats should also be audited/ validated by a credible 3rd party)
- CDP
- UN Global Compact
- Global Reporting Initiative (Reporting Standard)
- Industry-specific mechanisms such as the SAC Higg tools (note that the FEM will be able to support public sharing of data but the brand and retail module is not yet shared externally)

There are other entities such as Bloomberg and S&P (for the Dow Jones Sustainability Index), but such data is typically not freely available to the public.

EXAMPLES OF PUBLIC GHG REPORTING

Gap, Inc publishes energy and GHG emissions data for Scopes 1, 2, and 3 on its website

Lenzing includes energy and GHG emissions data in its annual sustainability report

Photo by: Waldemar Brandt/Pexels

ASSURANCE

Some fashion companies elect to have their climate change targets and reported information assured by an external party. Such assurance can increase the confidence that a company and its stakeholders have in the data, and also improve the quality of the data by evaluating and improving data collection systems and controls. Providers of such assurance vary, from large, global accounting firms such as KPMG and PwC, to firms such as Bureau Veritas and Intertek.

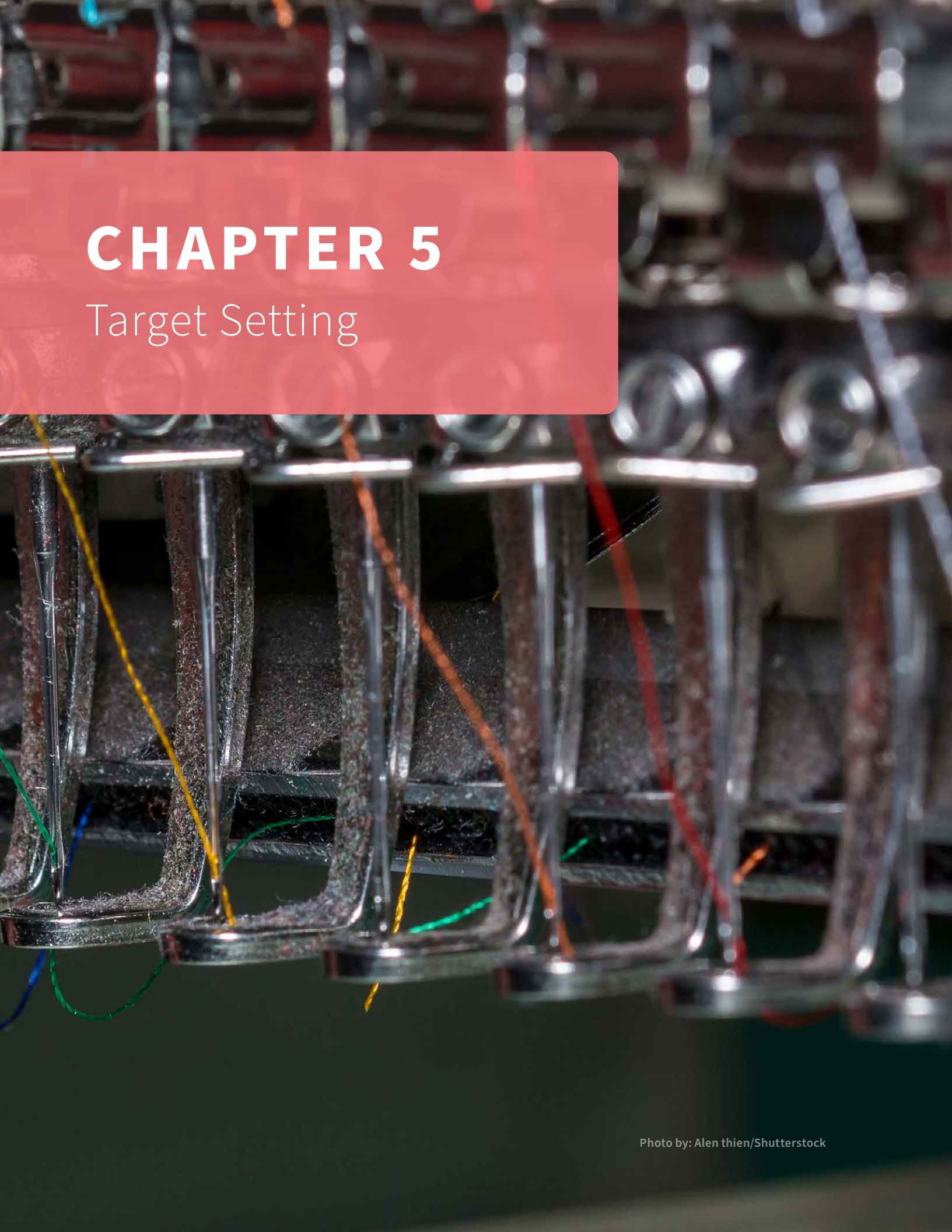
See Chapter 10 in the GHG Protocol Scope 3 Standard for detailed information on assurance.

EXAMPLES OF ASSURANCE OF ENERGY AND GHG INFORMATION

For its FY2019 Impact Report, NIKE, Inc. obtained external assurance on select reported metrics including Scope 1 and 2 energy consumption and emissions, and Scope 3 commercial air travel emissions.

Burberry obtained limited assurance over select sustainability information for fiscal year 2018/19, including for Scope 1 and 2 GHG emissions.

PUMA has obtained assurance on its sustainability disclosure, including climate change and energy information, since 2015.



CHAPTER 5

Target Setting

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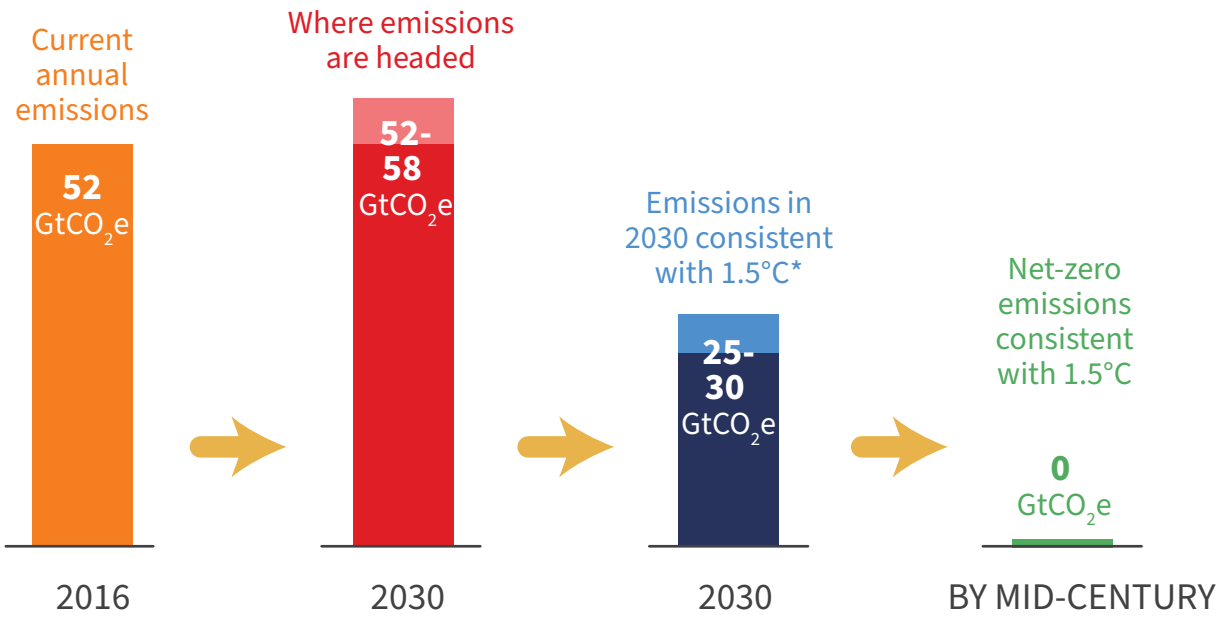
THE SCIENTIFIC BASIS FOR CLIMATE CHANGE TARGETS

As stated above, limiting global temperature increase to 1.5°C will significantly reduce the most harmful impacts of climate change including drought, sea level rise, flooding, and extreme heat. This will require substantial reductions in GHG emissions: 45% by 2030 and net zero by 2050.

To put this into perspective, global GHG emissions were roughly 52 gigatons (Gt) CO_2e in 2016, and are projected to be 52 to 58 Gt CO_2e by 2030. Annual emissions need to be roughly half that (25 to 30 Gt CO_2e per year) by 2030, and net zero by 2050, to limit warming to 1.5˚C. If emissions continue to increase, then the 1.5˚C target will be missed and the necessary reduction to get back to a 1.5˚C pathway will increase as well.

Despite the efforts of governments and other actors, anthropogenic GHG emissions continue to increase. Under current trajectories, global mean temperatures are projected to increase by 2.2°C to 4.4°C by the end of this century.

FIGURE 5 | The World Is Not on Track to Limit Temperature Rise to 1.5˚C



Source: WRI, 2018.

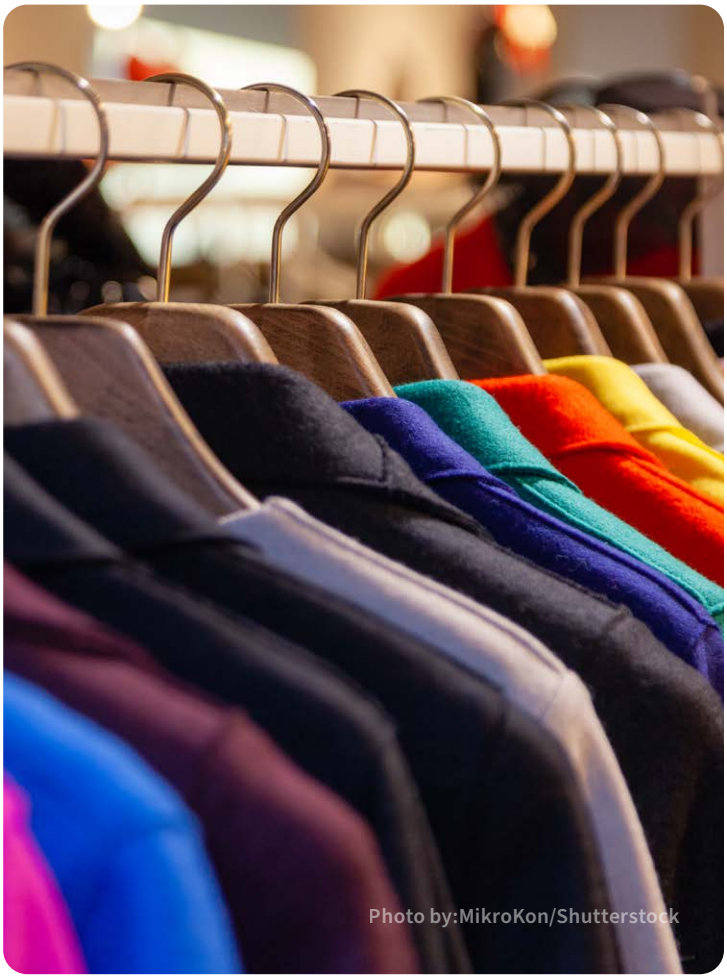


Photo by:MikroKon/Shutterstock

TARGETS UNDER THE CHARTER

Signatories to the Charter have committed to 30% aggregate GHG emission reductions in scope 1, 2, and 3 emissions, as defined by the GHG Protocol Corporate Standard, by 2030 against a base year of no earlier than 2015. This interim target will be aligned with the 1.5 °C scenario going forward. The Charter will update this target as the working groups mature.

Working Group 1 of the Charter will continue working on recommendations for target setting, and will also be working collaboratively to understand what a fashion-specific pathway for decarbonisation would look like. This pathway would help companies to understand what their targets would need to look like in order to align with a 1.5°C decarbonisation scenario, and should make SBTs even more accessible.

> Tip: If you want to align your targets with the interim target of the Charter, we recommend setting a minimum target of 30% absolute reduction of CO_2 emissions until 2030 for all 3 scopes. If you would like to also claim that your target is science based and aligned with 1.5°C, we recommend you go a step further and set a target based on a 4.2% absolute annual reduction of emissions. For example a 42% reduction by 2030 from a 2020 base year (10 x 4.2% per year).

TARGETS UNDER THE SCIENCE BASED TARGETS INITIATIVE

Targets adopted by companies to reduce GHG emissions are considered "science-based" if they are in line with what the latest climate science says is necessary to meet the goals of the Paris Agreement, i.e. limiting global warming to well-below 2°C above pre-industrial levels and pursue efforts to limit warming to 1.5°C.

For scope 1 and 2 emissions, companies can express their targets in several ways:

- **Absolute contraction:** Reduce absolute emissions by the same percentage to keep global temperature increase within well below 2°C (minimum 2.5% annual linear reduction) or 1.5°C (minimum 4.2% annual linear reduction).
- **Physical intensity:** Reduce emissions intensity per physical production (e.g. per pair of shoes), which, when translated to absolute emissions reduction terms, is in line with absolute contraction.
- **Economic intensity:** Reduce emissions intensity per economic value with a unit that is representative of a company's portfolio (e.g., revenue or value added), which, when translated to absolute emissions reduction terms, is in line with absolute contraction.

For the SBTi, if scope 3 emissions are at least 40% of total scope 1, 2, and 3 emissions (which they are for most brands and retailers), then a scope 3 target is required. The target must cover 2/3 of total scope 3 emissions, and companies must be explicit about what is included and not.

Companies can view the SBTi scope 3 requirements here.

A NOTE ON TARGET BASE YEARS

For Charter signatories, it is strongly recommended that a baseline year of no earlier than 2015 is used in order to ensure that the measurement of GHG emissions is aligned with the initial 30% reduction target. We also recommend this for companies considering signing the Charter as it will maximize the value of the advisory support coming from the Charter as well as keep the door open to signing the Charter or reporting with Charter members at a future date. If companies have already created a baseline that differs from 2015 for their GHG emissions data, and they are Charter signatories, please get in touch with UN Climate Change or with Working Group 1 to discuss the latest suggestions for alignment with Charter goals.

The SBTi recommends choosing the most recent year for which data are available as the target base-year.

COMPARING TARGET REQUIREMENTS FOR THE CHARTER AND SBTI

For comparison, we present below the target requirements for the Charter and SBTi (assuming a 2018 baseline year).

FASHION CHARTER

Scope 1, 2, and 3: 30% in aggregate by 2030 (2.5% per year); net zero by 2050

Note that the 30% is an interim target

SBTI WELL BELOW 2°C

Scope 1 and 2: 30% by 2030 (2.5% per year)

SBTI 1.5°C

Scope 1 and 2: 50.4% by 2030 (12 years x 4.2% per year)

The SBTi requires targets to be a minimum of 5 years and maximum of 15 years from the date they are submitted to SBTi, and does not have an official 2050 target threshold. However, as the SBTi is based on the latest climate science, the 5 to 15 year targets are along the pathway to deliver net zero by 2050.

The SBTi has multiple approaches to the scope 3 portion of company targets:

- **Absolute-based approach:** Reduce absolute emissions in line with keeping global temperature increase below 2°C (minimum annual linear reduction 1.23%)
- **Physical Intensity:** Reduce emissions intensity per physical production OR set targets that do not result in absolute emissions growth and lead to linear annual intensity improvements equivalent to a minimum 2% linear annual reduction
- **Economic-based approach:** Reduce emissions intensity per unit of value added by at least 7% year-on-year
- **Supplier Engagement:** Commit to having a percentage of suppliers with their own SBTs within five years from the date the company's target is submitted.

EXAMPLES OF SCOPE 3 TARGETS

H&M: Reduce absolute scope 3 GHG emissions from purchased raw materials, fabric and garment 59% per piece by 2030 from a 2017 base-year. (physical intensity)

Kering: Reduce scope 3 emissions from purchased goods and services 40% per unit of value added by 2025 from a 2015 base year. (economic intensity)

Lenzing AG: Reduce scope 1, 2 and 3 (purchased goods and services, upstream and downstream transport, and fuels and energy related activities) GHG emissions 50% per ton of fiber and pulp sold by 2030 from a 2017 base year. (physical intensity)

Target Corporation: Reduce absolute scope 1 and 2 emissions and scope 3 GHG emissions from retail purchased goods and services 30% by 2030 from a 2017 base-year. Target also commits that 80% of its suppliers by spend covering all purchased goods and services will set science-based scope 1 and scope 2 targets by 2023. (absolute + supplier engagement)

VF Corporation: Reduce absolute scope 3 GHG emissions from purchased goods and services and upstream transportation 30% by 2030 from a 2017 base year. (absolute)

See the Science Based Targets Initiative **website** for more targets.

Photo by: Waldemar Brandt

CHAPTER 6

Emissions Reductions

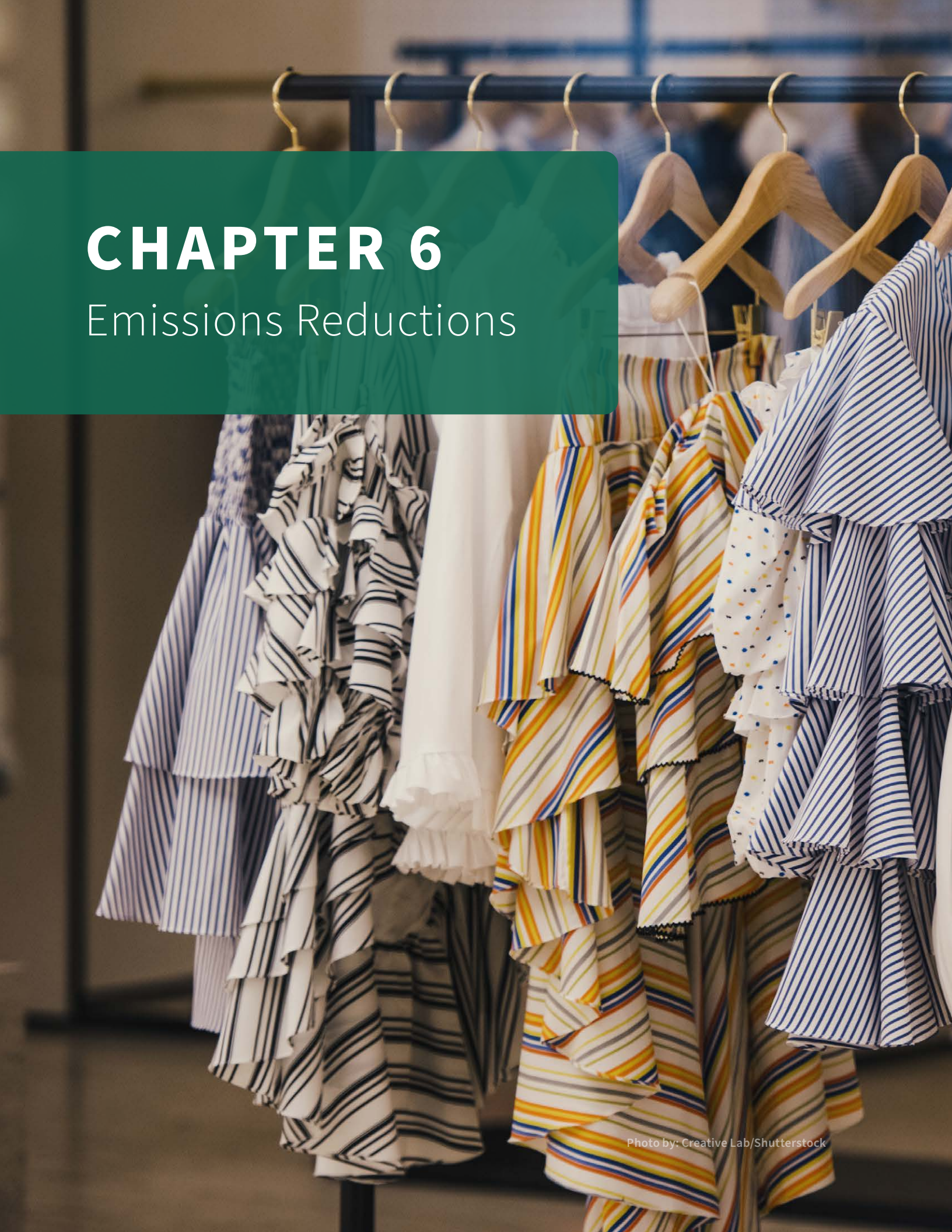


Photo by: Creative Lab/Shutterstock

To avoid repetition, we take the vantage point of a brand or retailer in this chapter to describe emissions reduction opportunities for scopes 1, 2, and 3. Under the scope 3 section below, we identify key opportunities for reducing a brand or retailer's scope 3 emissions, which are typically the scope 1 and 2 emissions of upstream manufacturers and suppliers.

REDUCING SCOPE 1 EMISSIONS

As a reminder, scope 1 emissions are direct GHG emissions that occur from sources that are owned or controlled by a company, for example, emissions from combustion in owned or controlled boilers, furnaces, and vehicles. Scope 1 emissions will differ based on where a company lies in the value chain, for example:

- For a brand or retailer, scope 1 might include emissions from fossil-fuel based heating and cooling equipment in offices and retail locations, as well as emissions from company-owned vehicles.
- For a finished goods manufacturer or textile mill, scope 1 might include those emissions plus emissions from thermal energy needed to run manufacturing equipment (e.g. coal- fired boilers in a mill). We address the latter in the scope 3 section below.

We present below a number of ways that companies can reduce scope 1 emissions.

Company Facilities (Non-Manufacturing)

For office buildings, retail spaces, distribution centers, and other non-manufacturing facilities, companies can take a number of steps to improve energy efficiency and reduce emissions:

- Conducting an energy audit to determine the uses of energy in a facility
- Establish and implementation of a sub-metering plan
- Installing energy efficient heating, ventilation, and air conditioning (HVAC) equipment, and regularly maintaining such equipment
- Improving the insulation of the building
- Making use of natural lighting (for heat and light) and controlling direct sun with shades and other means
- Using cogeneration systems (generating heat and electricity at the same time)
- Switching to low or no carbon fuels (in general, biomass is better than natural gas, which is better than oil, and in turn coal, in terms of emissions)
- Ensuring the minimum and maximum temperature is reasonable (e.g. 18 to 22°C)
- Keeping boiler temperature at reasonable level
- Ensuring that HVAC systems are automatically switched off when windows are open
- Turning off or reducing heating and cooling during non-working hours
- Certifying facilities to LEED, BREEAM, or similar green building standards

EXAMPLES OF SCOPE 1 REDUCTION EFFORTS

Target Corporation has certified over 1,500 stores as ENERGY STAR and has replaced more than 1,000 rooftop HVAC units resulting in estimated annual savings of 12M kWh.

Roughly 38 of Inditex's flagship stores are LEED or BREEAM certified.

ENERGY EFFICIENCY RESOURCES

There are a variety of resources that companies can use to better understand and manage their energy programs. For example:

- **US Energy Star: Energy Strategies for Buildings and Plants**
- **American Council for an Energy-Efficient Economy: Portal for Commercial Buildings**
- **European Commission: Hub on Energy Efficiency**
- **LEED rating system**
- **BREEAM In Use Standard (and others)**

Company Vehicles

In general, companies can reduce vehicle-related GHG emissions by reducing the miles traveled by employees for business purposes, and shifting away from gasoline-based automobiles. For companies that provide vehicles to employees for regular business use (e.g. a leased car for commuting to and from the office), they might encourage and incentivize forms of transportation other than single-occupancy vehicles, for example public transportation, car pooling, and cycling.

If companies own a fleet of vehicles, or provide them to employees for business use, they can promote and incentivize more gasoline-efficient and alternative technologies such as hybrid, electric, and hydrogen engines. If companies shift to electric vehicles, they should consider installing onsite renewable energy to charge the vehicles, or purchasing renewable electricity (scope 2) to power the vehicles.

REDUCING SCOPE 2 EMISSIONS

As described above, scope 2 emissions are those from purchased energy, which is primarily electricity, but may include steam or hot water for central heating systems. Electricity is used in company offices, distribution centers, and retail environments, as well as in factories to power equipment such as sewing machines.

Energy Efficiency

Similar to scope 1 emissions, companies should start by implementing energy efficiency measures, as this will reduce operating costs. For example:

- Conducting an energy audit and identifying key uses of electricity
- Installing and using energy efficient HVAC systems, computers, screens, machines, servers, etc. and regularly maintaining them
- Managing natural light (for heating and cooling)
- Limiting room temperature to a minimum and maximum level (for example 18 to 22°C)
- Turning off lights and unused equipment during non-use hours
- Switching to more energy efficient lights (e.g. LED)
- Switching off air-conditioning systems during non-working hours

See the scope 1 section above for resources on energy efficiency.

> Tip: To start, we recommend you focus on eliminating the most carbon intensive and polluting fuels (coal, oil) in your own sites and set gradually reduced emission caps for your car fleet.

Onsite Renewable Energy

Along with reducing electricity consumption via the above efficiency measures, a company might consider installing renewable energy (e.g. solar photovoltaics or wind) on its property, assuming there is space. For most companies, such onsite renewable energy will not be sufficient to cover the full electricity needs of the location, but it can address a portion and serve as a visible signal to employees and other stakeholders.

In recent years, the cost of generating electricity via solar PV has dropped significantly, and it is often cost competitive with grid offerings (including fossil-fuel based power). The economics of solar PV and onsite wind depends on several aspects, for example:

- The amount and intensity of sunlight (or wind resource)
- The availability of feed-in tariffs into local electricity grids (i.e. local utilities will pay a company for excess renewable electricity)
- The rate of electricity consumption at a site (the more consistent and predictable, the better)

The World Bank has developed global maps for solar and wind power potential that can be a useful starting point to determine if solar or wind are viable.

Photo by: Azamat Imanaliev/Shutterstock

EXAMPLES OF SCOPE 2 OPPORTUNITIES

According to the International Renewable Energy Agency (IRENA), the cost of solar photovoltaic panels has fallen by around 80% since the end of 2009, while wind turbine prices have fallen by 30 to 40%. In many parts of the world, solar and wind are cost competitive with conventional forms of electricity (e.g. coal, natural gas).

In 2010, PUMA installed a 200 kWh solar PV system at its headquarters. This had a payback period of approximately 10 years, and the system will generate a profit for the next 15 years of its anticipated lifetime.

> Tip: The **Renewable Energy Buyers Alliance** (REBA) and the **RE-Source** are two multi-stakeholder collaborations which aim to help corporations buy renewable energy. You may find their resources useful in navigating renewable energy procurement.

Offsite Renewable Energy

For many companies, onsite renewable energy is not a complete or viable solution, for example:

- Onsite solar or wind cannot meet 100% of a company's electricity needs because there isn't enough property or there are certain limitations (e.g. cannot site a turbine on the property, rooftops cannot support solar PV)
- A company doesn't own the space that it wants to power with renewables (e.g. tenant / landlord scenario)
- The cost of onsite renewables is prohibitive

For these reasons, a number of fashion companies have switched to renewable or green electricity tariffs. Green electricity tariffs are offered in a number of countries with liberalized electricity markets, for example Austria, Germany, Italy, Spain, the UK, and the US.

A number of fashion companies also access renewable energy through purchase power agreements (PPAs), which are legal contracts between buyers and sellers (e.g. electricity generators) that allow buyers to gain access to green electricity. For buyers (fashion companies in this case), PPAs can allow them to meet renewable energy and climate change targets, and have greater certainty in long-term electricity costs since the pricing terms for the off-take of electricity are locked into the contract. Signing a PPA generally enables new renewable energy projects to be developed, and so this allows buyers to demonstrate sustainability leadership.

EXAMPLES OF PURCHASE POWER AGREEMENTS

In 2019, Gap Inc signed a 90 MW PPA with Enel Green Power North America. The wind project, sited in North Dakota (USA), will enable Gap to meet its 2020 goal to reduce absolute Scope 1 and 2 GHG emissions for owned and operated facilities by 50% compared to 2015.

Over the last three years, Nike has signed three PPAs with Iberdrola, totaling over 200 MW. The latest is a PPA for Nike facilities in Europe for 40 MW from wind power in northern Spain. The other deals are with Avangrid Renewables (subsidiary of Iberdrola) for 100 MW of wind power from Texas and 69 MW from wind in Oregon and Washington.

Renewable Energy Certificates

Renewable Energy Certificates (RECs) are another form in which companies can tie their energy consumption to the generation of renewable energy. RECS are generated by renewable energy power plants, such as wind turbines, hydro-electric turbines, or larger scale solar PV parks. RECs allow companies to access renewable electricity where renewable electricity tariffs are not offered. Note that RECs must be generated and purchased from the same grid in which the consumption takes place - typically within the country of electricity consumption or a country with a grid connection to the country of consumption.

See the appendix for information on renewable energy in select countries.

EXAMPLES OF RENEWABLE ENERGY CERTIFICATES

In 2020 PUMA purchased RECs to cover 74% of its 2019 electricity consumption globally.

ALDO has reduced its energy consumption and GHG emissions through energy efficiency and other measures such as reducing business travel. To offset the remainder of its non-avoidable emissions, ALDO purchases RECs from wind farms located in regions where its corporate stores are located and invests in high-quality carbon credits that support low-impact, small hydroelectric projects in its top sourcing countries.

REDUCING SCOPE 3 EMISSIONS

As mentioned above, scope 3 emissions are the vast majority of total emissions for brands and retailers, and these emissions are the scope 1 and 2 emissions for suppliers (finished goods manufacturers, textile mills, yarn spinners, etc.).

Manufacturing

For manufacturers, emissions can generally be reduced by increasing energy efficiency and shifting to renewable sources of energy (there are typically little to no process-related emissions). The emissions profile of a facility and the reduction opportunities will depend on how much of the total energy comes from electricity (e.g. for powering sewing machines) versus thermal energy (e.g. for heating water for dyeing). In general, addressing the electricity portion of total energy in a facility may be easier to address than thermal energy, as companies can install renewable electricity or purchase it via PPAs or other instruments. However, companies may have opportunities to shift from coal to gas or biomass for thermal heat, or use combined heat and power generation (co-generation).

The breakdown of total energy varies by the type of product (apparel versus footwear, different types of apparel). According to adidas' *Environmental Good Practice Guide & Toolkit*, the thermal energy portion of total energy in a tier 1 apparel manufacturer (cut and sew) with a fossil fuel central boiler could be at least 40%, leaving the remaining 60% from electricity. The main drivers of electricity consumption in such facilities are sewing (24%), air compressors (20%), and ironing (12%).

> Tip: As a first step, we recommend you switch to renewable electricity tariffs in countries where these are available and purchase RECs for a proportion of those countries where renewable electricity tariffs are not offered.

EXAMPLES OF MANUFACTURING ENERGY EFFICIENCY

New Balance works closely with its factory partners to reduce energy, GHG emissions, and costs. Third party energy audits, like those offered through IFC's Vietnam Improvement Program, can provide much needed expertise to the factory and are often an essential step in identifying key energy saving opportunities. Two of New Balance's largest Tier 1 footwear suppliers in Vietnam worked with IFC to conduct detailed engineering assessments that uncovered an average of 15 saving opportunities at each site, with savings ranging from 14-31% of their annual energy consumption. One such opportunity was improving the insulation on hot oil pipes in an outsole production workshop, which resulted in fuel savings of over 300 tons per year and an economic payback of less than one year.

For tier 2 apparel facilities, according to adidas, thermal processes can be up to 90% of total energy consumption, with the balance coming from electricity. Of the thermal portion, roughly 60% is used in dyeing, 30% in stenter machines, and 11% in shrinking.

The energy used in tier 1 footwear facilities is primarily electricity for most entities. Just over a third of electricity is used in assembly machinery (e.g. cutting, sewing), 25% for outsole production, 12% for compressors, and 10% for stockfitting.

The adidas *Environmental Good Practice Guide & Toolkit* includes a comprehensive list of ways in which tier 1 and 2 facilities can reduce energy consumption and GHG emissions, along with business benefits, electricity savings (in percentage terms), and payback period for investments. The savings opportunities are listed in Table 2 (see the document for more detail):

The PUMA SAVE Program, which was carried out at 40 suppliers in four Asian countries between 2013 and 2015, came to similar recommendations and resulted in annual savings of 40,000 tons of CO_2 emissions, which was approximately the total amount of scope 1 and 2 emissions of PUMA at that time. SAVE Guidelines and other materials are available on request at sustain@puma.com.

For more detailed information about specific opportunities to reduce energy consumption and GHG emissions, please see the appendix.

> Tip: We recommend you identify your largest suppliers globally covering a significant percentage of your sales volume. You can then enroll these suppliers into energy efficiency programs offered by the World Bank (IFC) and/or other experienced service providers. For a list of programs in the most relevant sourcing countries, please refer to the Appendix.

TABLE 2 | Opportunities for tier 1 and 2 facilities to reduce energy consumption and GHG emissions

General operations	• Turning off machines at the end of the day and when not in use • Setting up automatic turn-off systems for optimizing HVAC systems • Adjusting shifts to maximize utilization of the production line
Lighting efficiency	• Replacing compact fluorescent lamps with LED lamps • Optimizing on / off time for lights (including turning off when not in use) • Installing additional light switches for better zonal control • Eliminating double layer lights • Lower the lighting fixture height level • Use of daylight (installation of skylights)
Maintenance	• Introduce regular steam trap and leakage check and repair program • Introduce total productive maintenance program (link) • Introduce regular Thermal Imaging Checks Program
Air compressor	• Lower inlet air temperature into air compressors by diverting hot exhaust air outside • Optimize the compressed air distribution piping system • Introduce regular compressed air leakage check program
Boiler / thermal	• Install steam trap on condensate pipe to limit flow of steam for ironing process • Proper insulation for thermal systems (piping, valves and flanges) • Install economizer for heat recovery of exhaust air • Optimization of air-fuel ratio for boiler or oil heater • Reuse condensate and cooling water • Heat recovery from hot wastewater
HVAC	• Install temperature/humidity control for optimizing HVAC system
Motors and drives	• Install Variable Speed Drive (VSD) for cooling tower fan to lower fan speed • Install VSD and modulating valve for air handling unit (AHU) • Install VSD for chiller water pumps • Install VSD for condenser water pumps • Install VSD for air compressors • Replace induction motor with servo motor for sewing machines • Replace hydraulic motor with servo motor for cutting machines
Power quality	• Install capacitor bank for power factor correction
Process equipment	• Stenter exhaust heat recovery for air preheating • Dryer control enhancement
Additional common opportunities	• Replace manual cutting machines with automatic cutting machines • Low liquor ratio dyeing machines • Replace manual compression molding machines with by automatic injection molding for single color soles. • Replace manual buffing machines with automatic machines for flat soles.

Source: Environmental Good Practice Guide & Toolkit and other sources.

Mill Improvement Programs

Clean by Design, created by the Natural Resources Defense Council and now a program of the Apparel Impact Institute, is a turnkey green supply chain program which improves the energy, water, and chemicals usage in textile mills. Clean by Design has identified 10 best practices for reducing environmental impacts and operating costs at mills:

1. Metering & Data Management
2. Condensate Recovery
3. Cooling Water Reuse
4. Process Water Reuse
5. Heat Recovery from Wastewater
6. Improve Boiler Efficiency
7. Steam System Operation
8. Improve Insulation
9. Heat Recovery from Hot Exhaust Air
10. Optimizing Compressed Air System

Led by the International Finance Corporation (IFC), the PaCT program (Partnership for Clean Textile) is a collaboration amongst brands, textile factories, and others to improve the environmental performance of textile mills. In addition to identifying best practices for reducing impacts, PaCT also aims to address regulatory gaps and facilitate investments in resource efficient technologies.

Raw Materials

The Raw Materials Working Group of the Charter is developing a roadmap for reducing the GHG emissions related to raw material extraction and processing, which for some companies can be the most carbon-intensive part of the fashion value chain. The roadmap will cover

EXAMPLES OF MANUFACTURING ENERGY EFFICIENCY

As part of its energy and GHG emissions reduction program across its supply chain, Nike has engaged its footwear finished good factories to either eliminate or optimize centralized boiler systems. In FY18, more than 90% of these factories successfully improved their boiler systems, creating an average energy saving of between 15 to 20% for factories in Asia. As part of the initiative, in FY18 the last footwear finished goods factory successfully converted its coal-fired boiler system to use sustainably-sourced, renewable biomass – marking the end of coal use in any of Nike's footwear focus factories.

Over a three-year period, adidas implemented over 300 energy efficiency measures with its global strategic suppliers - reducing energy intensity by 23% and overall energy use by 9.5 billion MJ of energy.

To support its corporate long-term GHG emissions targets and to improve, Indorama Petrochem in Rayong, Thailand, switched from furnace oil and natural gas to biomass for its heaters. The newly-designed heater can be fed with a variety of biomass materials including wood chips, wood pellets, and palm kernel shells. With cleaner fuel consumption, GHG emissions were reduced by more than 50% from 2016 to 2017.

Through working with the IFC's Partnership for Cleaner Textile (PaCT), DBL Group in Bangladesh has reduced water consumption by 17% and its use of dyes and chemicals by 12% for dyeing one kilogram of fabric. These reductions also result in lower energy use and GHG emissions.

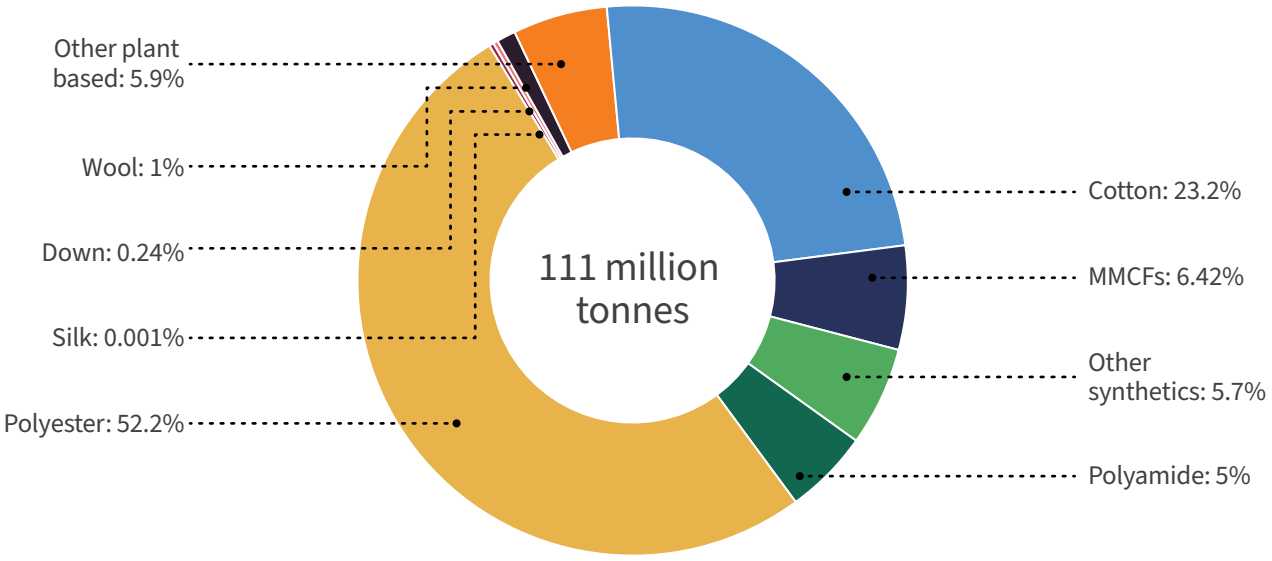
the most used and highest impact materials used in the fashion industry to allow signatories to identify the necessary actions to reduce GHG emissions in line with a 1.5°C pathway. The roadmap will provide guidance on ways to reduce the GHG impact of a single fiber type, for example using recycled polyester instead of virgin polyester, and climate beneficial farming methods for cotton. It will also provide guidance on how to consider these reduction opportunities in conjunction with other sustainability attributes, including circularity.

The Phase I focus materials are cotton, polyester, and viscose. According to the Textile Exchange's Preferred Fiber & Materials Market Report 2019, cotton, polyester and man-made cellulosic fibers (MMCF) made up over 80% of the global fiber market in 2018. Materials for future consideration will likely include wool, leather, nylon, polyurethane, and silk.

For the purpose of this roadmap, the Working Group has defined the scope of raw materials to include extraction or cultivation of a raw material through to a pre-spinning (or the equivalent) state. For example, for cotton this includes farming through ginning, and for virgin polyester this includes oil and natural gas extraction to fiber creation.

All raw materials come with a carbon footprint and we acknowledge that raw materials have significant environmental impacts. Estimates on raw materials range from 15% to 50% of a fashion companies' GHG emissions (the percentage will vary based on the types of materials used).

FIGURE 6 | Global Fiber Production in 2019



Source: Preferred Fiber & Materials Market Report 2020.

Photo by: Surene Palvie/Pexels

Measuring the footprint of raw materials is complicated. The contributing factors that should be included are all of the processes used to grow or manufacture raw materials as well as the location in which this happens. One of the most used methodologies to measure impacts is Life Cycle Assessment (LCA). While LCAs can provide credible and industry-recognized results, they have their own challenges. LCAs are often either calculated using industry averages that are not accurately applicable to specific regions or in a manner that means that they cannot be used easily for comparison.

In evaluating the comparability of different LCAs, the following factors should be considered:

- Scope of assessment and function of the products should be the same
- Inclusions and exclusions of the processes should be consistent across all the products
- Time period of data collection should match for the products; when the LCA was produced can also influence the outcome
- Modeling assumptions should be consistent across all the products
- Consistent databases/data sources and LCA software should be used for modeling all the products

To manage these challenges, the Raw Materials Working Group has engaged experts in the field of LCA development and research, and is collaborating with industry organizations who have pertinent tools and information. The table below outlines the criteria currently being used by LCA experts to review existing LCA research and reports on cotton, polyester and manmade cellulosics and retreive climate data to provide informed conclusions and guidance to the industry on sourcing raw materials.

ACCOUNTING FOR PURCHASED GOODS AND SERVICES: MANUFACTURERS

For submitting targets to the SBTi, companies must conduct a scope 3 inventory and include a scope 3 target if scope 3 emissions are 40% or more of total emissions. In the apparel and footwear industry, it is common for manufacturers to have little to no influence or control over the materials that go into their customers' products. Brands typically make decisions on product attributes (e.g. materials, finishes, source country) and instruct manufacturers and suppliers on where to purchase these inputs. Per the SBT guidance, manufacturers should start with a high-level screening of purchased goods and services, recognizing there will be double counting with brands (an inherent factor in scope 3 accounting). Ideally, brands and manufacturers collaborate to reduce these "shared" emissions.

TABLE 3 | Raw Materials Working Group Review Scope

REVIEW CRITERIA	COTTON	POLYESTER (PET)	MANMADE CELLULOSE FIBERS (MMCF)
Raw material Sub-Type/Sources	• Conventional • Organic • CmiA cotton • Better Cotton • Recycled Cotton • Regenerative Cotton	• Virgin PET • Chemically recycled PET • Mechanically recycled PET • Biobased PET	• Viscose • Modal • Acetate • Lyocell
Geographic regions under consideration*	India, China, USA, Pakistan, Turkey, Australia, Brazil, Tanzania, etc.	China, USA, Japan, Taiwan, India, Europe	China, India, Austria, Sweden, USA, Indonesia
System boundary/Scope	Cradle-to-gin gate	Cradle-to-gate (filament yarn)	Cradle-to-fiber gate (staple fibers)
Climate Impact Results reported	Kilogram CO2e per metric ton of ginned cotton fiber	Kilogram CO_2e per metric ton of polyester filament yarn	Kilogram CO_2e per metric ton of MMCF staple fiber
Key processes driving climate impacts	• Fertilizer production • Field emissions • Machinery use • Ginning • Irrigation • Transport	• Oil extraction & processing • Precursor production • Polymerization • Melt Extrusion/Spinning • Waste collection and processing • Depolymerization • Crop farming (for bio-based PET)	• Pulpwood harvest • Dissolving pulp production • MMCF production • Recycling process (only applicable to recycled pulp production)
Factors influencing variability in climate impacts across various geographic regions	• Yield • Tillage practices • Harvest practices (hand-picked versus mechanical) • Water requirements: Irrigation versus rainfed • Irrigation systems • Seed inputs (GMO versus non-GMO) • Crop residue management • Soil health improvement: crop rotation, intercropping • Fertilizer inputs • Pesticide inputs • Land transformation/field clearing practices • Soil carbon fluxes	• Feedstock type: pre/post-consumer textiles, bottles, ocean waste, petrochemicals (DMT, TPA, EG), corn, sugarcane, etc. • Production technology • Feedstock conversion efficiency • Fiber/Filament grade • Waste collection region/ transport	• Feedstock for dissolving pulp (hardwood, softwood, eucalyptus, bamboo, etc.) • Tree species • Region of pulpwood harvest • Pulping technology (sulfite, Kraft, etc.) • Wood sourcing certifications • Bleaching technology (ECF, TCF) • MMCF spin bath composition • Sulfur recovery technology • Chemical consumption and production • Soil carbon fluxes
Calculation Methodology	IPCC 2007, IPCC 2013 (GWP20), IPCC 2013 (GWP100), CML, Recipe, ILCD, etc.		
Primary and Secondary Data	Proportion of primary and secondary data used for modeling and data sources used for filling data gaps		
Data collection period	Review data collection period of primary data for each process and fiber type		

TABLE 3 | Raw Materials Working Group Review Scope (continued)

REVIEW CRITERIA	COTTON	POLYESTER (PET)	MANMADE CELLULOSE FIBERS (MMCF)
LCA software	SimaPro, Gabi, openLCA, Milca, RangeLCA, etc.		
LCA databases used for modeling	Ecoinvent, GaBi, IDEMAT, USLCI, Plastics Europe, etc.		
Key modeling assumptions	• Allocation of impacts to fiber versus seed during ginning process • Emission factors used for modeling field emissions at cotton farms • Modeling of compost/manure production • Modeling soil carbon fluxes	• Allocation of burden of recycling process • Allocation of by-products • Credits for biogenic carbon stored in bio-based PET	• Allocation of by-products at pulp and fiber mills • Credits for biogenic carbon stored in pulp and by-products sold • Modeling soil carbon fluxes
Exclusions	Identify key processes and factors excluded from the model		
Limitations	Note limitation of models and data sources applied in the studies		

Note: *Inclusion of these regions is subject to data availability.

As an example for cotton fiber, LCA experts have conducted an extensive literature review of over 40 studies and reports quantyifying climate impacts of cotton fibers, representing the top seven cotton producing countries.

A meta analysis of these studies found that LCAs in use today are, in general:

1. Modeled with farming data which is predominantly over 10 years old. Climate conditions change over time and changes in temperature and rainfall could effect cotton yields (as illustrated in the figure above), change in pest levels, irrigation requirements, soil conditions, etc.
2. Not directly comparable due to differences in
    a. Time period of data collection
    b. Application of inconsistent calculation methodologies
    c. Use of different LCA software
    d. Use of different data sources and LCA databases to model cotton farming
    e. Use of inconsistent methodology to model field emissions
    f. Modeling choices for organic fertilizer production (compost, manure), attribution of impacts to fiber during ginning, assigning credits for carbon storage in cotton, soil carbon fluxes, etc.
3. Not effectively capturing the variability of impacts (especially field-related emissions) due to differences in geographical locations, climatic conditions, soil conditions, and diversity of farming practices. In some cases, global averages are reported for cotton fiber production and this can obscure the true impact of cotton farming, which is highly variable by geographic location.
4. Exclude soil carbon balances from change in land management

The working group has laid out the following plan:

- Polyester, cotton, and MMCFs were determined to be the first group of fibers to be analyzed
- Gather available LCAs and underlying data available for measuring targeted fibers' carbon footprints, with a focus on looking at regional data to be able to provide guidance on impact a regional level
- Collaborate with industry organizations and experts to identify information gaps and requirements to scientific based information
- Develop a roadmap to provide the industry with guidance on low-carbon materials
- Publish the recommendations for industry-wide use

The Raw Materials Working Group has identified existing datasets and tools to identify the below materials as low-carbon while acknowledging there is additional work to do.

The Raw Materials Working Group also recognises that recycled materials in general have a lower carbon foot-print than virgin materials at the raw materials phase (tier 4). For example, according to the Higg MSI*:

- Compared with fossil-fuel based polyester, mechanically-recycled polyester has a more than 70% lower GHG footprint; chemically-recycled (BHET) polyester is roughly 35% lower
- Compared with conventional cotton, recycled cotton has a 70% lower GHG footprint

Lastly, as noted in the apparel sector guidance from the SBTi, companies can reduce emissions in raw materials in several other ways:

- Material efficiency: Reduce the amount of material in a given product, for example, fewer grams of cotton per t-shirt
- Material substitution: Replace a material with a lower GHG alternative (e.g., virgin polyester with rPoly from bottles or textiles). This is a focus of the Raw Materials Working Group)
- Sourcing changes: Shift materials sourcing from higher carbon sources to lower ones (e.g., polyester made with renewable energy, leather sourced from lower-impact ranches)
- Supply chain investments: Seek discrete reduction opportunities, for example, footwear brands or leather suppliers might commit to reducing GHGs on a specific cattle ranch (insetting)

Freight Transportation and Logistics

According to the International Transport Forum, freight transportation contributes to 8% of global CO_2 emissions. Demand for freight is expected to triple between 2015 and 2050, causing CO_2 emissions to more than double.

The Logistics Working Group of the Fashion Charter has the following goals for fashion companies:

- Create full visibility of the GHG footprint across the logistics supply chain including own and subcontracted operations
- Include logistics GHG emissions (from own and subcontracted operations) in company SBTs
- Integrate logistics GHG emission into business processes, plans, and organizational structures
- Incentivize action by service providers to reduce GHG emissions through procurement and collaboration
- Support the use of low-emission vehicles and vessels for own and service provider fleets

The Logistics Working Group of the Charter has provided broad guidance to fashion companies on getting started on low-carbon logistics. Companies can act in three ways:

- Report emissions and set reduction targets
- Implement solutions as buyers or suppliers of freight services that reduce emissions
- Collaborate and advocate for sector-wide uptake and supportive policy

Note: * Based on Higg MSI data as of May 2020. Percentage reductions pertain to raw material phase

REPORT EMISSIONS AND SET REDUCTION TARGETS

Companies can calculate and report their logistics emissions using the GLEC Framework, developed by Smart Freight Centre with the Global Logistics Emissions Council (GLEC). It is the only globally recognized methodology, consistent with the GHG Protocol, recommended by CDP and now a main input to a new ISO standard on logistics emissions accounting. There are several green freight programs that help companies collect direct data from suppliers in an harmonized format, for example, SmartWay in the US for land freight, Clean Cargo for marine shipping, and the Sustainable Air Freight Alliance for air freight.

Freight transportation and logistics is an important part of Scope 3 emissions for most companies. Companies can set GHG reduction targets by leveraging the SBTi methodologies and guidance, for example the Transport SBT guidance.

IMPLEMENT SOLUTIONS

Companies should consider all types of solutions to reduce logistics emissions. Smart Freight Centre has provided an overview of five solution types for moving towards zero emissions for logistics based on Professor Alan McKinnon's book Decarbonizing Logistics (see figure 7). These cover freight demand, transport modes, fleet and assets utilization, fleets and assets efficiency, and the carbon content of energy sources. The solutions that companies can implement or influence depend on whether they are buyers and/or suppliers of freight services. The European logistics platform ALICE released a roadmap that gives more details on these solutions and which could be implemented immediately and which can be considered in the medium or long term.

COLLABORATE AND ADVOCATE

The limited pace and scale of change is the biggest threat to achieving the Paris Agreement, and the logistics sector

FIGURE 7 | Solutions for Zero Emissions Freight

Freight Demand Growth is Managed

- Supply chain restructuring
- Localization and nearshoring
- Decentralization of production and stockholding
- 3D printing
- Dematerialization
- Consumer behavior

The Best Transport Modes are Used and Combined

- Increased use of rail
- Increased use of short sea shipping and inland waterways
- Modular road transport
- Cargo bikes
- Multi-modal optimization
- Synchromodality

Assets are Shared and Used to the Max

- Load optimization
- Load consolidation and asset sharing
- Reduce empty moves
- Modular packaging and boxes
- Open transport networks and warehouses
- Increase storage density and energy efficiency

Fleets are Energy Efficient

- Cleaner and efficient technologies
- Efficient vehicles and vessels
- High capacity vehicles / duo trailers
- Driving behavior
- Fleet operation
- Fleet maintenance

Fleets Use Low Emissions Energy Source

- Electric hybrids
- Biofuels
- Hydrogen
- CNG / bio-LNG
- Cleaner diesel
- Fuel management

Source: Smart Freight Centre based on A. McKinnon "Decarbonizing Logistics" (2018) and incorporated in the ALICE Roadmap towards Zero Emissions Logistics 2050. (SFC and BSR input to the Charter, October 2019).

is no exception. As transport is a cross-sector issue, apparel and fashion brands should join forces with buyers of logistics services beyond the industry and collaborate with their shared suppliers. Companies can join green freight programs and initiatives, influence sectoral and sustainability initiatives, and advocate for supportive policy. An overview of relevant initiatives is available here.

As fashion companies mostly outsource their logistics services, a main way to leverage action by suppliers is through procurement processes. BSR and members of Clean Cargo and the Sustainable Air Freight Alliance developed the Sustainable Freight Procurement Framework to help companies evaluate, benchmark, and improve their freight procurement practices. As a complementary effort, Smart Freight Centre and the World Business Council for Sustainable Development (WBCSD) released the Smart Freight Procurement (SFP) Guidelines with practical actions, building on company experiences and best practice to highlight how these can contribute to GHG emission reductions. Building on the SFP Guidelines, SFC developed the SFP Questionnaire, which is a decision tool to be used in freight tender processes.

Climate Neutral Now

Any business or organization can contribute to limiting temperature rise beyond their own reduction efforts aligned with science. UN Climate Change, through its Climate Neutral Now initiative, invites organizations to:

1. Measure (quantify) the company/organization's climate footprint
2. Reduce that footprint as much as possible and in line with their commitments, and
3. Contribute to achieving further emission reductions by supporting projects in developing countries which reduce emissions and bring other sustainable development benefits, by using United Nations-certified carbon credits.

CASE STUDY: H&M AND MAERSK ECO DELIVERY

In support of its ambition to become climate positive by 2040, H&M is working with Maersk to reduce its logistics carbon footprint. The program - Maersk ECO Delivery - ensures that sustainable biofuel from sources such as waste cooking oil is used to power select vessels. The solution is developed based on the requirements of the Roundtable on Sustainable Biomaterials standard and is third-party verified.

"Partnerships are of the essence when exploring sustainable solutions for the future, and no company can do it alone. Our cooperation with Maersk enables us to pool our resources and reduce our respective carbon footprints much more efficiently. The service has the potential to make a substantial part of our supply chain carbon-neutral."

-- Mats Samuelsson, Senior Vice President, Global Logistics at H&M Group.

Tip: Select logistics service providers which are engaged in environmental initiatives (like those mentioned in this document). Include CO_2 reporting into your agreements with service providers and request regular updates on their emission reductions. In addition, try to minimize airfreight, as this is not only very carbon intensive but also quite expensive.

CHAPTER 7

Circular Economy

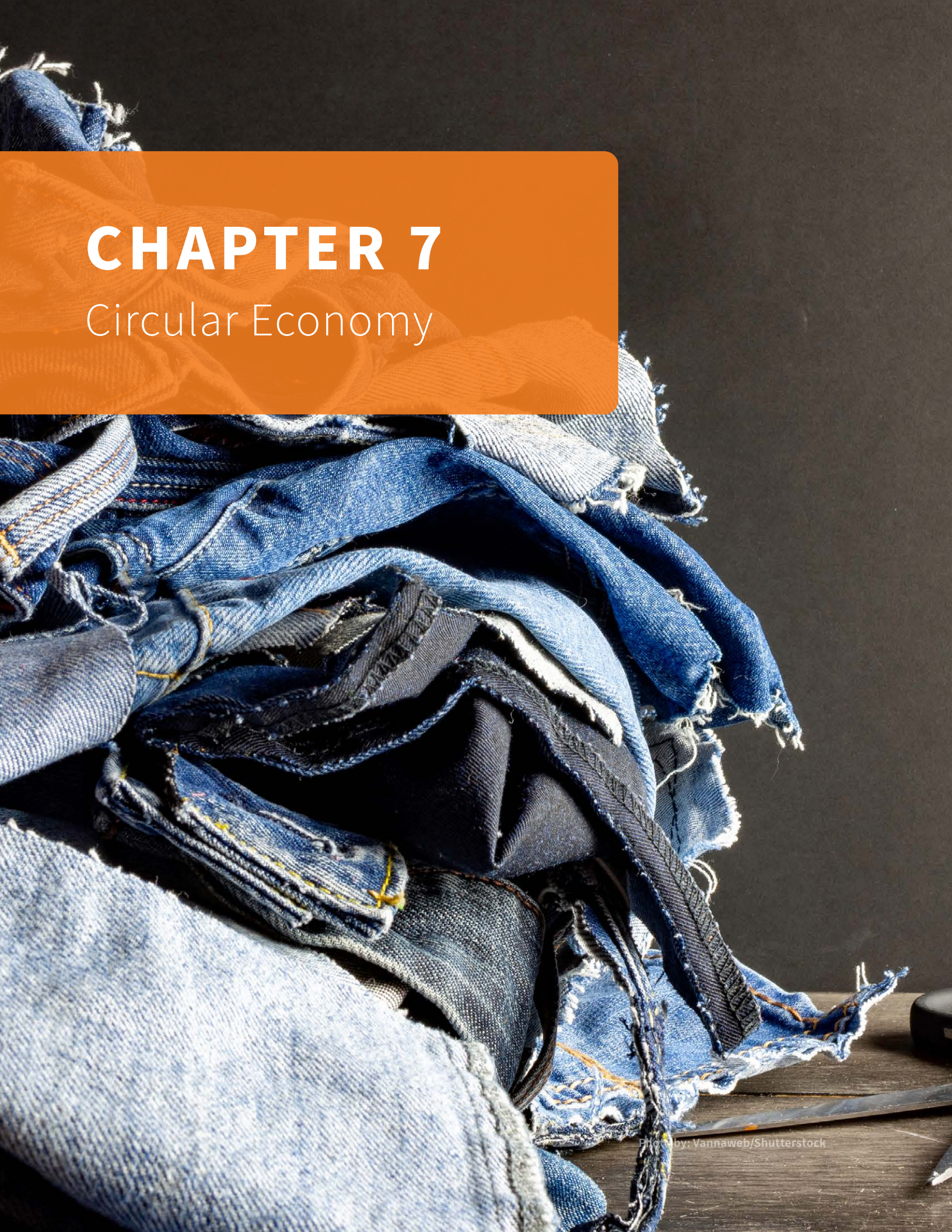


Photo by: Vannaweb/Shutterstock

OVERVIEW OF CIRCULAR ECONOMY

In recent years, the concept of the circular economy has received a great deal of attention in the fashion industry. The topic is not a new one, having its origins in frameworks and concepts such as industrial ecology, design for environment, cradle to cradle, biomimicry, and more. An early and oft-cited example of the circular economy is the Kalundborg eco-industrial park in Denmark, a collaboration amongst public entities and companies in which the waste of one entity is the raw material for another.

The Ellen MacArthur Foundation (EMF) has synthesized and amplified the frameworks and concepts mentioned above under the concept of circular economy. According to EMF:

The circular economy is restorative and regenerative by design. Relying on system-wide innovation, it aims to redefine products and services to design waste out, while minimizing negative impacts. Underpinned by a transition to renewable energy sources, the circular model builds economic, natural and social capital.

Put simply, the circular economy aims to:

1. Keep resources in life for longer
2. Maximize their value
3. Recover and reutilize products and materials

The circular economy has economic, environmental, and social benefits. For the purposes of this playbook, the focus is on the environmental side - specifically GHG emissions.

CIRCULAR ECONOMY IN THE FASHION SECTOR

The circular economy is grounded in a full life cycle and systems view. For fashion companies, the circular economy is relevant from a number of perspectives:

- **Material selection:** Companies can select materials and other product inputs (e.g. chemistry) that have a lower carbon footprint. For example, according to the HIGG MSI of the SAC, recycled polyester has a lower footprint than virgin polyester, and recycled wool has a lower footprint than conventional wool. A number of organizations are also working on regenerative agricultural practices for materials such as cotton and leather - efforts which have potential to lessen the environmental impact of such materials.

TIMBERLAND AND REGENERATIVE LEATHER PRACTICES

In 2019, Timberland (part of VF Corporation) announced a partnership with Other Half Processing to build a responsible leather supply chain from ranches that employ regenerative practices. Such practices, which entail managing cattle in a way that mimics the natural movement of herd animals, have the potential to build soil health, reduce carbon emissions, enhance biodiversity, improve water cycling, and improve farmer and rancher livelihoods.

ELLEN MACARTHUR FOUNDATION JEANS REDESIGN GUIDE

In its Jeans Redesign Guidelines, EMF provides a set of minimum requirements for jeans on durability, material health, recyclability, and traceability to ensure that jeans last longer, can be easily recycled, and are good for the environment and garment workers. The criteria for recyclability call for a minimum of 98% cellulose fibers (by weight), the minimization or removal of metal rivets, and easy disassembly for other components.

WORN AGAIN TECHNOLOGIES AND TEXTILE RECYCLING

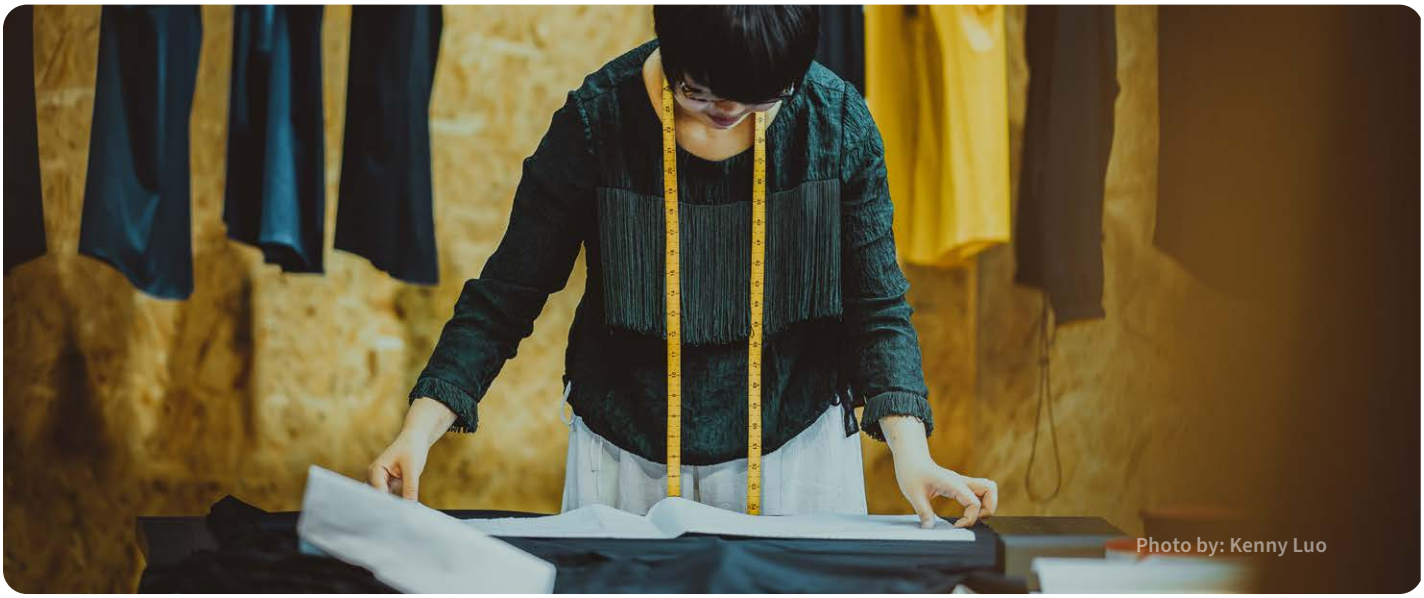
Worn Again Technologies is developing a polymer recycling technology which is able to separate, decontaminate, and extract polyester and cellulose (from cotton) from non-rewearable textiles to be reintroduced into production supply chains as new, virgin equivalent raw materials. The industrialized process will enable the industry to divert end-of-use textiles from landfill and incineration while simultaneously replacing polyester made from oil by-products and cellulose from trees with circular inputs, thereby providing an opportunity for significant GHG emissions in the raw materials value chain tier.

- **Design:** In selecting the materials and other inputs that go into a product, designers have the ability to select safer and more sustainable inputs and optimize the life cycle impacts of the product. Such optimization includes considering a product's life span and what happens when a consumer is finished with it. For example, in general, the more materials and components a product has, the less likely it is to be recycled.
- **Manufacturing methods:** Companies can reduce the GHG footprint of products through changes in how products are manufactured, for example through low impact coloration methods (e.g. dope dyeing versus piece dyeing, waterless dyeing).
- **Material and product reuse and recycling:** Currently, many apparel and footwear factories reuse or recycle scrap material - for example scrap can be downcycled for use in other sectors (e.g. automotive cushioning) or recycled for use in the apparel sector (e.g. Far Eastern New Century TOPGREEN rTEX). There is a well established secondhand market in which donated apparel and footwear is exported for reuse.
- **Alternative business models:** Over the last several years, there has been a proliferation of new business models including rental, subscription, and repair that hold promise for reducing GHG emissions and other environmental impacts (though many of such models are still in their early days).

ILLUSTRATIONS OF NEW BUSINESS MODELS

The RealReal is a consignment platform through which customers can buy and sell a range of fashion and accessory products, thus extending the lives of such products. The RealReal developed a calculator to evaluate the environmental benefits of its resale model - which is discussed in more detail below.

Banana Republic's (Gap Inc) Style Passport is a rental subscription service that allows members to rent and return items for a flat monthly fee.



GHG IMPLICATIONS OF THE CIRCULAR ECONOMY

A number of researchers have looked at different aspects of the circular economy in the fashion sector and the implications for GHG emissions. We present below several examples.

Extending Product Life

A number of authors have proposed that extending the useful life of an apparel or footwear item reduces its life cycle carbon footprint. For example, research from Mistra Future Fashion found that doubling the lifespan of a garment (from 30 to 60 uses) reduced its GHG footprint by roughly half - in their assessment is the most effective way to reduce the footprint. Similarly, the Ellen Macarthur Foundation found that doubling the average number of times a garment is worn would reduce GHG emissions by 44%.

Intuitively, these findings make sense: making products more durable so that consumers buy fewer of them could reduce environmental impacts. However, these studies are dependent on actual consumer behavior, and a so-called "displacement rate." If a pair of footwear lasts twice as long due to better materials and construction, does this mean that a consumer does not buy a second pair (or a third, and so on)? Estimating the displacement rate is a theoretical exercise, though most researchers seem to believe that the rate is less than one. That is, wearing an item does not mean that a consumer does not purchase one new item - on average it is some figure less than one.

Similar logic applies to UK WRAP's calculation of the GHG benefits of apparel reused in the UK as well as exported overseas for reuse - a portion of the emissions from producing a new garment is displaced.

SYMPATEX: RECYCLED AND CIRCULAR MATERIALS

By using polyester instead of polyurethane- or PTFE-based materials in its membranes, Sympatex has been able to reduce the GHG footprint of jacket materials by 30%. The selection of polyester also increases the likelihood that the material can be recycled at end of life.

Alternative Business Models

In recent years, a variety of companies have established business models that differ from the traditional revenue model - for example repair, rental, and subscription. Several of these companies have estimated the GHG implications of their models. For example The RealReal uses a displacement rate of 30% to evaluate the GHG impact of consignment on its platform (i.e. every item purchased offsets the production of one-third of a new item). Other companies such as ThredUP (consignment) and The Renewal Workshop (refurbishment) have made similar calculations.

As mentioned above, it intuitively makes sense that these business models will result in a lower impact, however this is dependent on consumers buying fewer apparel items overall - which is very difficult to validate. But, over time and as these models mature and become more compelling to consumers, they could result in a lower footprint for certain consumer segments (e.g. city residents with less wardrobe space for apparel).

EXAMPLES OF CIRCULAR BUSINESS MODELS

In the adidas Infinity Play program, UK consumers can trade in used adidas apparel and footwear for credit for new products. The worn gear is then cleaned and resold.

VF Corporation has a company goal to "lead the large-scale commercialization of circular business models through brand-led recommerce and rental initiatives." Thus far, circular initiatives include a renewed product line in partnership with The Renewal Workshop, a rental pilot with The North Face and camping gear, and a rental pilot with Kipling luggage.

In 2019, H&M's COS brand partnered with the Renewal Workshop to launch the Restored Collection - restored pieces that have been sourced from COS own supply-chain or returned by customers. It plans to measure and communicate the GHG and water benefits of the program. COS is also developing a resale platform.

Recycled and Other Sustainable Materials

Based on data from the MSI and Kering's EP&L, there are lower carbon alternatives in a range of materials types (see the Chapter 6 section on Raw Materials for recycled versions of polyester). Depending on the functional requirements of the product, companies may also substitute other materials, for example synthetic or plant-based leather for leather.

Also note that recycling of scrap occurs within the apparel and footwear supply chain, for example textile mills may collect textile scrap and incorporate it into new fabrics. To the extent that such recycling displaces virgin material, the emissions associated from producing the virgin may be displaced.

EXAMPLES OF CLOSED LOOP MANUFACTURING PROCESSES

Italian denim manufacturer Candiani recycles 100% of its cotton production waste from fiber, yarn, and fabric. A portion of this goes into certified recycled fabric.

Footwear component manufacturer Milspeed has a closed loop process by which it recycles component waste back into new materials.

CLOSING THE LOOP ON PRODUCTS AND MATERIALS

In 2019, adidas launched the first two versions of its 100% recyclable shoes - the FUTURE.CRAFT LOOP. While adidas is still testing various aspects of the shoes, including the degree to which materials from used shoes can go back into new shoes (closed loop), the shoes hold promise for reducing GHG emissions in a scenario in which virgin material is displaced by recycled.

PUMA's partnership with First Mile is a program in which waste PET bottles are collected in Taiwan and recycled into materials for PUMA apparel and footwear products. According to a number of studies and data sets, rPET has a lower carbon footprint than virgin PET.

CHAPTER 8
Closing and Next Steps

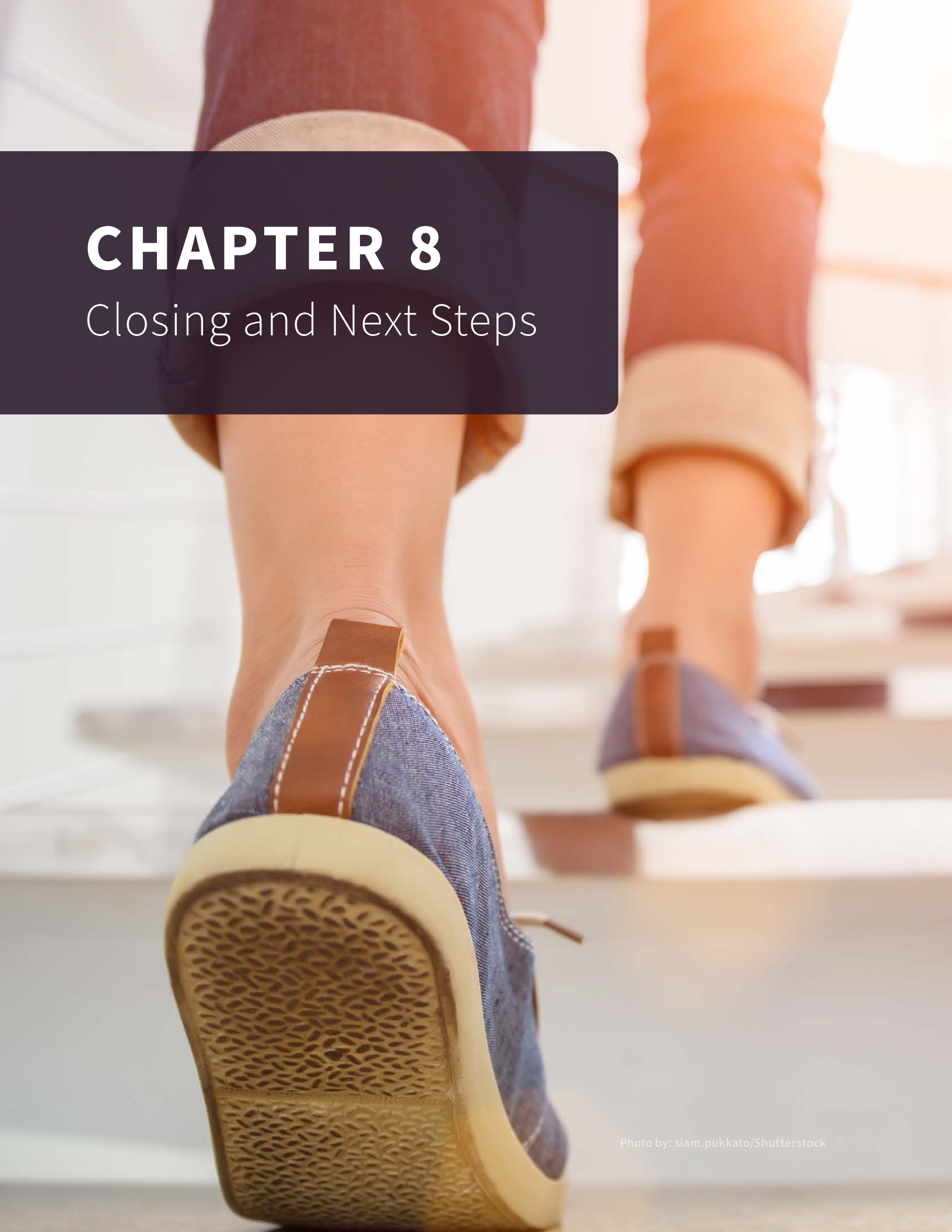


Photo by: siam.pukkato/Shutterstock

As we launch this first version of the Climate Action Playbook, our signatories as well as the wider fashion industry are severely affected by the COVID-19 crisis. Most manufacturers, brands, and retailers are experiencing significant financial consequences of the disruption to normal business models and supply chains.

While we are confident that the fashion industry will recover from this historic crisis, this experience serves as a further indication of the fragile nature of our business models with respect to unexpected external challenges. We did not foresee this pandemic, but we know that an equally or even more devastating crisis may occur if we do not act quickly to limit global warming below 1.5˚C.

As such, the Steering Committee of the Charter has endorsed a Mission Statement which clearly references the Charter's support for a 1.5˚C pathway, even though we are still working on the interim target of 30% reduction of GHG emissions until 2030. We can already foresee that 30% will not be enough to hit the 1.5˚C and are in the process of updating our target accordingly.

With that in mind, the Fashion Charter calls upon all signatories as well as the wider fashion industry stakeholders to set their own ambitious GHG reduction targets and, more importantly, **start introducing reduction measures now**. There are many good practice examples listed in this Playbook on how to reduce carbon emissions, both at a company's own operations as well as along the value chain.

We hope that by distributing this Playbook to a wider community beyond the Charter signatories, we will help catalyze the change needed to accelerate the reduction of GHG emissions in line with the targets of the Paris Agreement. We also recommend that Fashion Charter signatories will start inspiring consumers to reduce their carbon footprint during the consumer use phase.

The Fashion Charter signatories intend to keep this Playbook a living document, with updates as the Fashion Industry moves along its path towards Climate Action. We welcome our readers to share their good practice examples or comment on this Playbook by emailing; ClimateDialogues@unfccc.int.


Photo by: Markus Winkler

APPENDIX

Photo by: Greg Ortega

EXISTING INITIATIVES

Fashion companies interested in better understanding and reducing their GHG footprints can join and/or benefit from a variety of climate-related multi-stakeholder initiatives, some of which are referenced above. We include below a non-exhaustive list of such initiatives and organizations, and welcome input on other relevant efforts.

Apparel Impact Institute: A collaboration of brands, manufacturers, and industry stakeholders which have joined hands to select, fund, and scale high-impact projects that dramatically improve the sustainability outcomes of the apparel and footwear industry. Aii is currently managing the MILL/impact initiative program, of which Clean by Design (see below) is a part.

CDP: A global non-profit that manages a disclosure platform for companies, cities, and other entities on environmental issues including climate change. CDP requests information on climate risks and low carbon opportunities from the world's largest companies on behalf of over 500 institutional investor signatories with a combined US$106 trillion in assets. CDP's Supply Chain program enables companies to engage with their suppliers on climate change.

Clean by Design (Apparel Impact Institute): A collaboration among major apparel retailers and brands that leverages their buying power to clean up factories in their supply chains. Through the program, CbD promotes a 10-step process designed to reduce the hottest spot of the industry's environmental impact: dyeing and finishing. CbD encourages factories to adopt these best practices to save water, fuel, and electricity.

Clean Energy Investment Accelerator: A public-private partnership jointly led by Allotrope Partners, World Resources Institute, and the US National Renewable Energy Laboratory that aims to unlock clean energy investment across commercial and industrial sectors in select countries. The CEIA helps companies meet their clean energy targets and supports countries to meet their climate and development goals.

Gold Standard: A standard and certification body that quantifies and certifies the impacts of climate and development projects. Gold Standard is currently convening a group of apparel companies to assess its value chain intervention guidance for the fashion sector.

International Finance Corporation: In partnership with global brands, supplier factories, industry associations, and governments, the IFC works with factories seeking to adopt state-of-the-art practices and technologies to reduce water, energy, and chemical use in the garment and textile industry. These practices help factories become more competitive by lowering operating costs, increasing their productivity, and reducing their impact on the environment. For example, Puma offers lower-cost financing for suppliers that perform better on its supplier rating scheme.

Making Zero Impact Fashionable: This two-year project spearheaded by WWF and HSBC was launched in 2018 to promote and educate the industry and the public on fashion sustainability. The purpose of this project is to create novel ideas and solutions to address climate-related challenges in the fashion industry. It also provides tools and training to help businesses assess and reduce climate impacts from the textile and apparel supply chain.

Partnership for Cleaner Textile (PaCT): A multi-stakeholder collaboration that aims to drive long-term competitiveness and environmental sustainability of textile wet processing by addressing water, energy, and chemical use. Led by the IFC, partners include Solidaridad, the Embassy of the Kingdom of the Netherlands, 13 global apparel brands, two technology suppliers, textile factories, and the Bangladesh Garment Manufacturers and Exporters Association.

Race to the Top: A multistakeholder initiative that aims to reshape Vietnam's apparel and footwear sector by promoting and enabling embedded sustainable (financial, social, and environmental) manufacturing practices. Race to the Top aims to leverage existing programs from other

organizations (e.g. Clean by Design for mill optimization). It also aims to engage policymakers in Vietnam to address policy barriers to a more sustainable industry.

Renewable Energy Buyers Alliance: A membership association for large-scale energy buyers seeking to procure renewable energy across the US. The membership of over 200 includes stakeholders from across the commercial and industrial sector, non-profit organizations, as well as energy providers and service providers.

Sustainable Apparel Coalition: An industry-wide group of more than 250 leading apparel, footwear, and textile, brands, retailers, suppliers, service providers, trade associations, nonprofits, NGOs, and academic institutions working to reduce the environmental and social impacts of products around the world. Through multi-stakeholder engagement, the SAC seeks to lead the industry toward a shared vision of sustainability built upon a common approach for measuring and evaluating apparel, footwear and textile product sustainability performance delivered by the Higg Index that spotlights priorities for action and opportunities for technological innovation.

Textile Exchange: A global nonprofit that creates leaders in the sustainable fiber and materials industry. The organization develops, manages, and promotes a suite of leading industry standards as well as collects and publishes vital industry data and insights that enable brands and retailers to measure, manage, and track their use of preferred fiber and materials.

We Mean Business: A global nonprofit coalition working with the world's most influential businesses to act on climate change, We Mean Business works to increase business leadership to drive policy ambition and facilitate the transition to a low-carbon economy. As of April 2020, over 1,200 companies have made nearly 1,900 commitments in areas including science-based targets, climate smart agriculture, and carbon pricing.


Photo by: Annie Spratt

ENERGY EFFICENCY OPPORTUNITIES FOR MANUFACTURERS

TABLE A1 | Energy Efficiency Opportunities for Manufacturers

OPPORTUNITY	ENERGY SAVING DESCRIPTION	DETAILS	BENEFITS	PAYBACK	TECHNOLOGY AVAILABLE
1	Turn off machines at the end of the day and when not in use	1. Train officers and employees to enhance awareness on energy savings and improve management practices. 2. Conduct regular checks and manually turn off machines when not in use. 3. Install timers on machinery and/or HVAC system to automatically turn off during lunch time and after work hours.	Electricity and cost savings Increased equipment lifespan Increased employee productivity	0-3 months	High
2	Replace fluorescent lamps with LED lamps	1. Install a closed-loop piping system and provide a two-way flow to any point in the compressed air distribution piping system (i.e. centralized system). 2. Design the length of compressed air pipes based on pressure drop in the network and inlet air pressure (Compressed air distribution, Atlas). 3. Note that this opportunity pertains to the distribution piping system only.	Increased lightbulb lifespan (LEDs last for three times longer than CFLs) and more precise electronic control; LEDs are mercury-free, resulting in a safer work environment and no fees for disposal	15-30 months	High
3	Introduce regular steam trap and leakage check/repair program	1. Estimate compressed air leakage rate and associated loss of energy and costs. 2. Prepare an inspection map and regular inspection plan including but not limited to threaded connection points, rubber hose connections, valves, regulators and seals. 3. Use a combination of sensory and ultrasonic checks to detect compressed air leaks. Train workers to identify air leakage noise.	Steam and cost savings, and prevent operation-wide disruptions	0-3 months	High
4	Introduce regular compressed air leakage check program	Same as above	Energy and cost savings	Immediate	High

TABLE A1 | Energy Efficiency Opportunities for Manufacturers (Cont.)

OPPORTUNITY	ENERGY SAVING DESCRIPTION	DETAILS	BENEFITS	PAYBACK	TECHNOLOGY AVAILABLE
5	Insulate thermal systems (piping, valves and flanges)	1. Use a thermal camera to identify points of surface heat loss on the steam / thermal oil distribution lines. 2. Select and install high-quality insulation materials (insulation box or jacket) for steam / thermal oil pipes, valves and flanges 3. Develop a regular insulation monitoring and maintenance program.	Energy loss reduction of up to 90% and steam pressure optimization (Source: U.S. Department of Energy) Improved worker safety (uninsulated valves are considered as a safety hazard)	6-12 months	High
6	Install Variable Speed Drives for compressors	1. Install one VDSD for each set of compressors. 2. Link the discharge pressure with variations in the pressure requirement.	Electricity and cost savings	15-30 months	High
7	Replace low efficiency motors with high efficiency motors	1. Estimate the efficiency of electric motors (Electric Motor Efficiency). 2. Purchase high-efficiency motors to replace low-efficiency motors upon failure and for new purchases. Motors with the Premium Efficiency IE3 Standard efficiency label are recommended at a minimum. 3. Prioritize upgrading large motors as savings associated with energy	Energy and cost savings	30 months	High
8	Install temperature and humidity control	1. Install temperature and humidity sensors in the center of workshops (i.e. optimal distance from the HVAC units). 2. Establish set point for temperature (e.g. 28-30°C) and humidity (60-70%) on sensors. 3. Connect the temperature and humidity sensors to the HVAC system to automatically turn the HVAC system off when the set points are met.	Electricity and cost savings Improved employee wellbeing	More than 12 months	High
9	Heat recovery from hot wastewater	1. Check the temperature of all pipes, valves, traps and fittings in the steam distribution system using a thermal imaging camera to predict potential failures. 2. Monitor the operating conditions and temperature of electrical and mechanical devices (e.g. motors, equipment, electric panels). 3. Take timely corrective actions when excessive heat is detected and components are about to fail (e.g. basic maintenance). Keep records of broken equipment and replacement parts. 4. Reinforce staff training to prohibit wasteful practices.	Energy and cost savings Improved production efficiency Enhanced workers' safety	0-3 months	High

Note: See adidas' Environmental Good Practice Guide & Toolkit for additional opportunities

Source: Charter research.

ENERGY EFFICIENCY PROGRAMS BY COUNTRY

Select energy efficiency programs by country.

TABLE A2 | Energy Efficiency Programs

CHINA	**Climate Stewardship 2030** CNTAC and implemented by CTIC, with funding with Fashion Climate Fund **Clean by Design** Apparel Impact Institute **Stockholm International Water Institute (SIWI)** Supported by SIDA Consultants appointed by SIWI- Asia Consulting Group
VIETNAM	**IFC Vietnam Improvement Program (VIP)** Partnership with the Clean Technology Trust Fund and the Korean Green Growth Trust Fund **Race to the Top (RttT)** Mill Optimisation **GIZ – Energy Management Trainings** **WWF Greening Textile Program** Aims to primarily help tier 2 and 3 textile mills in Vietnam improve water and energy management **World Bank Vietnam Energy Efficiency for Industrial Enterprises Project (VEEIE)** Aims to improve energy efficiency in Vietnam's industrial sector
CAMBODIA	**IFC Cambodia Improvement Program (CIP)** Facilitates innovative aggregation approaches to scale up resource efficiency in industries by engaging leading global brands and their supply chain partners
INDONESIA	**Unido Resource Efficient and Cleaner Production (RECP)**
BANGLADESH	**Partnership for Cleaner Textile (PaCT)** Goal is sustainable water resources management & positive environmental change in textile wet processing sector **Sweden Textile Water Initiative (STWI) 2015-2018** Resource efficiency program including energy and GHG emissions
ITALY	**Euratex - Save Energy in Textile SMEs (SET) project** EU EED mandatory energy audit programme for large businesses- local consultancy support **INVITALIA - National Fund for Energy Efficiency**

Source: Charter research.

RENEWABLE ENERGY OFFERINGS BY COUNTRY

Renewable energy offerings in select countries.

TABLE A3 | Renewable Energy Options

	TYPE OF RENEWABLE ENERGY							
	SELF-OWNED ON SITE	LEASING	PHYSICAL PPA	FINANCIAL PPA	CAPEX OFFSITE INVESTMENT	LOCAL CERTIFICATES	INTERNATIONAL RENEWABLE ENERGY CERTIFICATES	FUNDING OPPORTUNITIES/ SUBSIDIES
CHINA	Yes	Yes	Piloting in few provinces only	N/A	Available	GEC – not validated by RE100	iREC GoldPower TIGRs	Feed in Tariff (FiT) based onsite projects offer good potential savings opportunities (in many cases without the incentive)
VIETNAM	Yes	Yes	Piloting scheme	N/A		N/A	IREC	Until 2021, FiTs will vary, ranging from 6.67 US cents per kilowatt hour to 10.87 US cents per kilowatt hour depending on the type of solar power technology and region of deployment
CAMBODIA	Yes	Yes	N/A	N/A	N/A	N/A	Tracking and verification systems not currently available, making certificate purchasing unreportable against renewable and GHG reporting	No FiT currently in place in Cambodia
INDONESIA	Yes	Yes	N/A	N/A	N/A	N/A	Tracking and verification systems not currently available, making certificate purchasing unreportable against renewable and GHG reporting. South Pole is offering iRECs from one plant in Bali – quantity is limited	FiT policy, introduced in July 2016, targets development of 250 MW of PV capacity in 22 provinces. FiTs are granted for period of 20 years in the range of USD 0.145-0.25/ kWh and vary by regions.

TABLE A3 | Renewable Energy Options (Cont.)

	TYPE OF RENEWABLE ENERGY							
	SELF-OWNED ON SITE	LEASING	PHYSICAL PPA	FINANCIAL PPA	CAPEX OFFSITE INVESTMENT	LOCAL CERTIFICATES	INTERNATIONAL RENEWABLE ENERGY CERTIFICATES	FUNDING OPPORTUNITIES/ SUBSIDIES
BANGLADESH	Yes	Yes	N/A	N/A	N/A	N/A	Tracking and verification systems not currently available, making certificate purchasing unreportable against renewable and GHG reporting	No FiT currently in place in Bangladesh
ITALY	Yes	Yes		Yes		Yes	Market is mature - facilities can procure renewable energy through the grid through many suppliers Guarantee of Origin certificates are available to procure unbundled, prices are ~3 Euro/MWh	Electricity generated from renewable energy sources is promoted through VAT- and real estate tax deductions. The electricity from renewable energy sources fed into the grid can be sold on the free market or to the GSE on a guaranteed minimum price ("ritiro dedicato").

Source: Charter research.