



COTTON SUSTAINABILITY BASICS





CLIMATE CHANGE



WATER USE



CIRCULARITY

SUSTAINABILITY

Conversations around climate change, waste, and sustainability are ever-present for any company creating products destined for consumers. Understanding the facts behind the materials going into these products is key to making positive changes and contributing to a better future for our planet.

We're here to weed through the myths and present the facts around 3 key sustainability issues:

1. *Climate Change*
2. *Water Use*
3. *Circularity*

Keep reading to learn more about cotton's role in each of these important topics and how we're committed to a more sustainable future. There's no time to waste.



CLIMATE CHANGE.

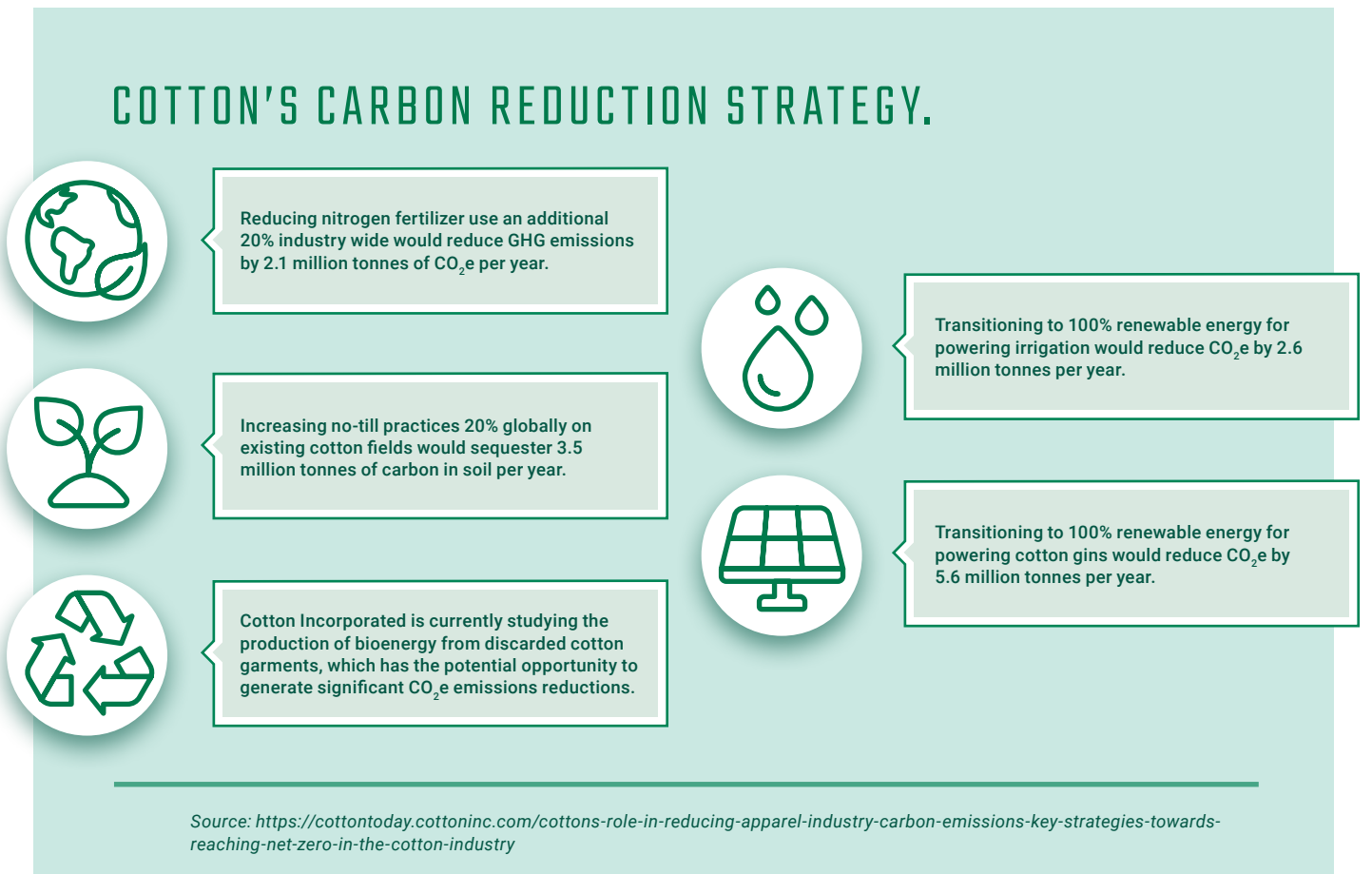
THE FACTS.

- Greenhouse gas emissions are a growing concern for all industries and efforts to reduce emissions are becoming priority among companies. The Fashion industry alone contributes to more than 8% of greenhouse gases annually.¹
- As global focus on climate change increases, so has attention to carbon capture and sequestration. The cotton plant has a natural ability to remove carbon from the atmosphere via photosynthesis. For every 1 kg of fiber produced, 1.54 kg of CO₂ is captured in that fiber.²
- Cotton growers today are using more efficient irrigation systems, crop inputs and technologies while increasing the amount of cotton produced per acre. This has helped reduce their production footprint; however, the U.S. Cotton industry also has sustainability goals to reduce greenhouse gas emissions by 39% and increase soil carbon by 30% in the 10 years between 2015 and 2025.³

The need for a net zero carbon pathway could not be more urgent. Carbon sequestration, or the process of capturing carbon from the atmosphere and storing it safely, is an important aspect of balancing greenhouse gas emissions in our atmosphere. The cotton industry is committed to reducing the amount of GHG emissions released and capturing more carbon from the atmosphere during the cotton growing process. Both reducing GHG emissions and increasing carbon capture are key towards reaching a net zero future.

A report from the World Resources Institute (WRI) published an emission reduction roadmap, laying out a path for the apparel industry to move towards net-zero greenhouse gas emissions⁴. Cotton producers around the globe have made extensive progress in using best management practices aimed at improving soil health and sequestering carbon in the ground. With some strategic shifts in cotton production, a reduction of 13.8 million metric tons, or 35% of the total WRI target, could be achieved.^{4,5}

USING NO-TILL⁶ PRACTICES CAN SEQUESTER AS MUCH AS 450 KG OF SOIL ORGANIC CARBON PER HECTARE PER YEAR.⁷



With increasing adoption of best management practices, sequestration carbon continues to increase. Using no-till⁶ practices in certain regions can sequester as much as 450 kg of soil organic carbon per hectare per year.⁷ This carbon sequestration can be further enhanced by using cover crops⁸, which is also becoming an increasingly frequent practice.⁹ If all the cotton farms in the world employed conservation tillage techniques, the global cotton acreage would remove emissions equivalent to taking 3.5 million passenger cars off the highways every year!⁷

RESEARCH SHOWS THAT REMOVING CARBON FROM THE ATMOSPHERE AND STORING IT IN PRODUCTS, EVEN TEMPORARILY, REDUCES THE WARMING OF THE ATMOSPHERE.¹⁰

Cotton production naturally sequesters carbon in the soil and in the fiber itself, transforming carbon dioxide and sunlight into cellulosic fibers (i.e., cotton lint). Since the cotton plant and fiber naturally stores carbon, your cotton clothes can help to keep carbon out of the atmosphere. That's right—by buying and owning cotton clothing, you are keeping carbon (and thus, carbon dioxide) out of the environment until the cotton decomposes, releasing the carbon as carbon dioxide (CO₂). The science on the benefits of temporarily storing carbon is still evolving, but the research shows that removing carbon from the atmosphere and storing it in products, even temporarily, reduces the warming of the atmosphere.¹⁰ The longer you wear your cotton, the more benefit this stored carbon creates. When a cotton t-shirt is no longer usable, it can be recycled or even composted where the carbon will return to the soil where it can be further stored out of the atmosphere.^{18,19}

The choices we make every day—even what fiber we use—have an impact on the planet and climate crisis. Learn more about cotton's carbon impact here:
<http://cottonworks.com/cotton-sustainability-basics>





WATER USE.

THE FACTS.

- Water is a critical and renewable resource and like all plants, cotton needs water to grow. However, cotton is an inherently drought-tolerant crop.
- While the majority of U.S. cotton receives its water from natural rainfall, cotton growers in some regions apply irrigation. These growers are increasing the efficiency of irrigation to produce more cotton with less water.
- In the U.S., 64% of cotton produced requires no irrigation, 31% receives supplemental irrigation, and only 5% is fully irrigated.^{11,12}

It's a simple fact that plants require water to grow—cotton is not excluded. But did you know that most of the water used to produce all global cotton is naturally occurring from rainfall?^{11,12,23} With just one acre-inch of rain, modern cotton varieties tend to yield at least 50 pounds of lint and 75 pounds of seed¹³—enough to make more than 170 t-shirts and feed more than 10 cows.¹⁴

Contrary to popular belief, cotton is not a water-intensive crop, whether it is grown conventionally or organically. Cotton plants are naturally drought and heat tolerant and can be grown in regions where the water supply is limited. Agriculture accounts for about 73% of global water usage, but cotton production accounts for only about 3% of all water used for agriculture production.¹⁵

SINCE 1980, U.S. COTTON YIELDS HAVE INCREASED BY 111%¹⁷ AS IRRIGATION WATER USE HAS DECREASED BY 58%.¹⁶

MAKE EVERY DROP COUNT.

Contrary to popular belief, cotton is not a water-intensive crop, whether it is grown conventionally or organically.^{11,12} When it comes to cotton production water requirements in the U.S., it breaks down like this:



64%
Requires no irrigation at all^{11,12}



31%
Receives supplemental irrigation^{11,12}



5%
Fully irrigated^{11,12}



U.S. cotton growers have made tremendous progress in water stewardship—from 1980 to 2020, irrigation water use decreased by 58%.¹⁶ Capturing rainwater is a simple way that farmers conserve water and use natural resources to grow cotton. Additionally, innovations on the farm have made a huge impact to reduce water consumption—improved sprinkler technologies, use of soil moisture sensors to drive irrigation decisions, and laser leveling of fields are three examples that have helped increase water use efficiency.

Water is a critical renewable resource that must be used responsibly. By utilizing best management practices in agriculture and efficient manufacturing and finishing processes beyond the field, cotton can play an important role in improving water use in the textile supply chain.

Learn more about cotton's water usage here:
<http://cottonworks.com/cotton-sustainability-basics>

AGRICULTURE ACCOUNTS FOR ABOUT 73% OF GLOBAL WATER USAGE, BUT COTTON USAGE ACCOUNTS FOR ONLY ABOUT 3% OF ALL WATER USED FOR AGRICULTURE PRODUCTION.¹⁵





CIRCULARITY.

THE FACTS.

- Cotton is inherently circular. It's grown from the earth and biodegrades when it ultimately returns to the earth.
- Cotton can be reused, recycled¹⁸, and returned¹⁹ to the earth, unlike most synthetic fibers.
- Recycle and reuse options for cotton include pre-and-post consumer recycling methods, bioenergy production, new biobased building blocks, biodegradable packaging, and even dyes made from recycled cotton plant materials.

From raw material sourcing to the secondary market, the lifecycle of consumer products and fashion is under the microscope. Companies and consumers are looking for natural, sustainable products that aren't limited to a single use lifecycle. When it comes to evaluating how the textile industry sources, produces, uses, and disposes of materials, cotton is in an excellent position to contribute to the conversation. The cotton industry has already taken huge strides to minimize its use of natural resources^{16,20}, and to create a circular path from the soil to the shopper's wardrobe—and back again.

Recycled pre- and post-consumer cotton textiles can be used in a wide variety of apparel and nonwoven products, ranging from garments, wet wipes, filters and automotive applications. Additionally, a new study is ongoing to turn cotton into new biobased building blocks through a chemical recycling process. Since cotton is nearly pure cellulose, a naturally occurring sugar molecule, researchers at North Carolina State University and Cotton Incorporated have identified a process to turn cotton back into cellulose, a biobased product that could be used to make sustainable chemicals and additives.²¹

It's important to remember that recycling and reuse isn't just about textiles—did you know that parts of the cotton plant, traditionally considered waste, can be used again? Some

COTTON CAN BE REUSED, RECYCLED¹⁸, AND RETURNED¹⁹ TO THE EARTH, UNLIKE MOST SYNTHETIC FIBERS. COTTON PRODUCERS HAVE ACCESS TO A SUITE OF REGENERATIVE AGRICULTURAL PRACTICES THAT ARE KNOWN TO HELP IMPROVE SOIL HEALTH, BIODIVERSITY, WATER AND AIR QUALITY, AND IMPROVE FARM PRODUCTIVITY.²⁴

REUSE. RECYCLE. RETURN.



companies have successfully used cotton burrs, an agricultural waste product consisting of cotton “leftovers”, to create biodegradable packaging that can be composted after use. Cotton gin waste can also be used to produce a bio-synthetic sulfur dye that utilizes natural materials instead of petroleum-based dyestuff.²²

You know cotton as comfortable, durable and incredibly versatile—a natural fiber that can be used in products as wide-ranging as shirts, sheets, wet wipes and 3D-printed products. Whatever product you choose to make, there is a circular path ahead when you make it with cotton.

Learn more about cotton's commitment to circularity here:
<http://cottonworks.com/circularity>

RECYCLING AND REUSE INCLUDES PARTS OF THE COTTON PLANT THAT WOULD TRADITIONALLY BE CONSIDERED WASTE.





SOURCES.

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2. Calculated based on these assumptions using a cotton carbon formula: 1) Cotton is approximately 95% cellulose 2) Cellulose is 44% carbon (based on the molecular formula for cellulose) 3) Every unit of carbon removed from the atmosphere represents 3.667 units of CO₂e removed (based on the molecular formula of carbon dioxide). Source: Wakelyn, P.J. (2006). Cotton Fiber Chemistry and Technology (1st ed.). CRC Press. Chapter 3

3. Cotton LEADS – Sustainable Cotton Production. (2019). Cotton Carbon Footprint U.S. <https://cottonleads.org/sustainable-production/carbon-footprint-united-states/>

4. <https://www.wri.org/research/roadmap-net-zero-delivering-science-based-targets-apparel-sector>

5. <https://cottontoday.cottoninc.com/cottons-role-in-reducing-apparel-industry-carbon-emissions-key-strategies-towards-reaching-net-zero-in-the-cotton-industry/>

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7. Franzluebbers, A. J. (2010). Achieving Soil Organic Carbon Sequestration with Conservation Agricultural Systems in the Southeastern United States. Soil Science Society of America Journal, 74(2), 347–357. <https://doi.org/10.2136/sssaj2009.0079>

8. Beneficial crops such as winter wheat, cereal rye or winter radish that are planted between periods of cotton plantings to enhance soil health, reduce soil erosion and improve cotton planting. Source: <https://www.cottonworks.com/en/resources/production-dictionary/cover-crops/>

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16. Field to Market: The Alliance for Sustainable Agriculture, 2021. Environmental Outcomes from On-Farm Agricultural Production in the United States (Fourth Edition). ISBN: 978-0-578-33372-4. Page 26

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To learn more about cotton's sustainability initiatives, contact your Cotton Incorporated account representative.

Learn more at cottonworks.com
and cottontoday.com.



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