

## Erratum 2023 Decarbonisation Research Tech Tailors

Estimating anything at a global scale is immensely complex. In our 2023 research paper, we estimated global apparel production at 115 Mt. We based our estimates on Statista sales volume data and apparel freight garment data. Upon some critical feedback, we decided to reassess our estimation.

### **Production volume**

Tech Tailors estimated global apparel production volume based on Statista sales volume data. According to Statista, in 2022, 170 billion garments were sold<sup>1</sup>. When accounting for both initial (never sold) and secondary (sold, returned and not sold again) overproduction, production volume is estimated at 276 billion garments<sup>2</sup>. As mentioned in the methodology section of our research paper, the Statista sales numbers could also include historic and second hand sales, therefore inflating Tech Tailor's estimates.

276 billion garments is a long way off from other estimates, which are all between 50–150 billion garments. However, the sources for the 50–150 billion garments produced are often not included, so we do not know what they're based on, making it difficult to assess the validity of this figure.

At this point we therefore do not adjust our total production estimate.

### **Average Garment Weight**

For our initial analysis, we looked at freight data to estimate a weighted average garment weight. Tech Tailor's estimate was 0.416 kg per garment produced. This seemed quite high, considering socks and underwear are also included in apparel production. Therefore, we reassessed average garment weight by a more simplistic approach: physically weighing our own clothes. This resulted in an average garment weight of 0.337 kg per garment produced.

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<sup>1</sup> <https://www.statista.com/outlook/cmo/apparel/worldwide>

<sup>2</sup>

<https://techtailors.eu/wp-content/uploads/2024/03/Tech-Tailors-Research-Decarbonisation-Overproduction.pdf>

## Total Garment Weight Produced

Tech Tailors initial analysis estimated global apparel production at:  
276B garments x 0.416 kg per garment = 114Mt

With corrected garment weight, global apparel production is estimated at:  
276B garments x 0.337 kg per garment = 93Mt

## Comparison

Now, let's compare Tech Tailor's findings to the findings of industry reports and literature to put these numbers into perspective.

Table 1: Production weight comparison

	<a href="#">TT initial</a>	<a href="#">BCG/GFA*</a>	<a href="#">Textile Exchange</a>	<a href="#">Academic Literature</a>	TT corrected	<a href="#">EEA (EU)</a>
Garment weight excluding fastenings (kg)			0.13	0.24		
Garment weight including fastenings (kg)	<b>0.42</b>	0.40			<b>0.34</b>	
Total garment weight consumed (B)	64	<b>62</b>	20	36	55	
Total weight garments produced (Mt)	114	111	35	65	93	
Total weight yarn produced (Mt)			<b>49</b>	<b>91</b>		
Total kg produced per capita	14	14	4	8	12	
Total kg consumed per capita	8	8	2	5	7	<b>6</b>

\*2017 estimates, not corrected for apparel sales growth 2022

Table 1 demonstrates the findings of different reports and research papers. The figures in bold reflect absolute values, the other figures are derived based on the following assumptions:

Table 2: 2022 assumptions

Overproduction rate (in units)	38%
Overproduction rate (in weight)	44%
Population in B	7.95
Total garments produced in B	276
Total garments sold in B (Statista)	170
Cutting loss from yarn to garment <sup>3</sup>	29%

\*Overproduction is weight is higher because critical fit garments are returned more often and are heavier than non-critical fit garments

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[https://www.researchgate.net/publication/352504043\\_Assessing\\_Environmental\\_Impact\\_Reduction\\_Opportunities\\_Through\\_Life\\_Cycle\\_Assessment\\_of\\_Apparel\\_Products](https://www.researchgate.net/publication/352504043_Assessing_Environmental_Impact_Reduction_Opportunities_Through_Life_Cycle_Assessment_of_Apparel_Products)

The most obvious discrepancy is the total weight of garments produced between Textile Exchange and the other sources. Before we blindly compare these numbers, it's important to take the following aspects into consideration:

- What's included in garment weight?
- What's in scope for total weight?

Tech Tailor's research approximated garment weight including fastenings (zippers, buttons, hooks etc.). Textile Exchange 'only' looks at fibre used for apparel production. Furthermore, Tech Tailor's research looked at all apparel production (including leather clothes and fur clothes). Textile exchange 'only' looks at natural and synthetic fibres. When accounting for both fastenings and leather and fur production, Textile Exchange's estimates are probably  $\pm 2\text{Mt}$  too low. This, however, still doesn't explain the remaining  $\pm 50\text{Mt}$  discrepancy between Textile Exchange estimates and those of Tech Tailors, BCG, and academic research.

So let's delve into the underlying discrepancies. First, let's acknowledge that the data in this industry does not allow for a definitive answer. Every report (Tech Tailor's, Textile Exchange's, BCG's) therefore relies on an array of assumptions. It's not to say one is right and the other is wrong. However, we can assess the validity of the outcomes by using a triangulation approach.

The first thing that stands out is average garment weight. BCG, academic literature and Tech Tailors all conclude that (whether derived or estimated) average garment weight is between 0.24-0.40 kg. Using Textile Exchange's data, the average garment weight would be 0.13 kg. Which seems low.

The second thing that stands out is the average kg of apparel consumed per capita. Following Textile exchange's data, the average person would consume 2.5 kg of apparel per year. BCG's data would suggest 8 kg per person, and academic literature and Tech Tailor's findings suggest 7 kg per person. According to the EEA, the average European consumed 6 kg of apparel in 2022. Suggesting Textile Exchange's estimates are too conservative.

All in all it seems that Textile Exchange's estimates are too conservative, while Tech Tailor's estimates could be inflated. The truth probably lies somewhere in the middle. When more reliable data is available, we will update our findings accordingly.

## Sources Detailed

### TECH TAILORS ESTIMATE

TOTAL APPAREL MARKET 2022 PRODUCED				
	children	women & men		Total
	non-upper wear		upper wear	
Giga units sold	59.39	62.17	48.81	170.37
Giga units produced	76.59	80.18	119.21	275.97
Giga kg sold	14.41	22.35	27.58	64.34
Giga kg produced	18.58	28.83	67.35	114.76

Apparel fibre produced: 114 MT

### TEXTILE EXCHANGE ESTIMATE

<https://textileexchange.org/app/uploads/2023/11/Materials-Market-Report-2023.pdf>

Global fiber production increased from around 112 million tonnes in 2021 to a record 116 million tonnes in 2022, after a slight decline in 2020 due to COVID-19. In the last 20 years, global fiber production has almost doubled from 58 million tonnes in 2000 and is expected to grow to 147 million tonnes in 2030 if business continues as usual.

## Report scope: Beyond apparel

Fiber and materials are used for a broad range of applications. This report covers the overall fiber and materials production independent of their usages. The fibers and materials may be used for apparel, home textiles, technical textiles, or any other application.

Textile Exchange has conducted a desk research and stakeholder consultation to estimate the percentages of the global fiber and materials volumes by application. While solid figures do not exist on a global level, the graphic on the right side is meant to visualize the rough average percentage estimates by application for the different fibers and materials. The main purpose of the graph is to show that the percentages used for apparel vary by fiber and material and that only parts of all fibers and materials produced and covered in this report are used by the apparel and home textile industry.

Please note that the percentages keep changing over time and that huge regional differences exist as well.

**Cotton** is mainly used for apparel accounting for around 60-70% of the total cotton fiber production. Around 20-30% of all cotton is used for home textiles, and about 10% for other products.

**Wool** is also mainly used for apparel accounting for around 60-70% of the total sheep wool. Approximately 30-40% of all sheep wool is used for home textiles and the remaining part for other applications.

**Other animal fibers** such as cashmere, mohair, alpaca, and silk are predominantly used for apparel.

Around 60-80% of **down and feathers** are used for home textiles such as bedding and pillows. A smaller percentage is used for apparel.

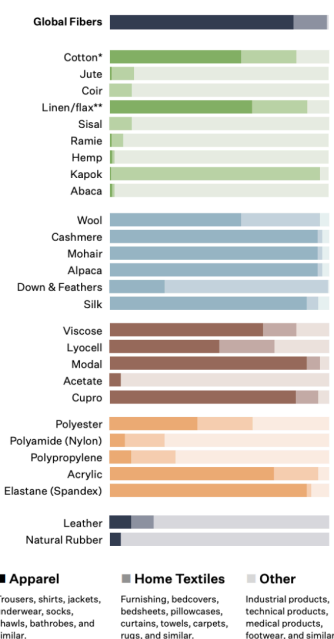
Around 30-60% of **polyester** fibers are used for apparel, 20-35% are used for home textiles, and the remaining part for various other applications.

**Polyamide** fibers are used in various applications. The percentage estimates range widely from less than 10% to more than 50% of the global polyamide fiber production being used for apparel. A significant share of polyamide fibers is used for home textiles such as carpets as well as technical and industrial applications.

**Manmade cellulose**s such as viscose, lyocell, modal, and cupro are mainly used for apparel with around 50-80% of their production. An exception is acetate fibers, used primarily for cigarette filters, and only a small percentage (about 5%) is used for apparel.

**Leather** is mainly used for footwear with around 40-50% of its production. Around 5-10% are used for apparel, 10-15% for home textiles, and the remaining part for other applications such as leather goods (bags), the automotive industry or other products.

**Natural rubber** is mainly used for tires with around 65-70% of its production. Only a small percentage is used for apparel.



Apparel fibre production estimate overall report: 43% of total global fibre = ±49Mt

Both exclude leather and fur production.

1. Global production volumes\* The compilation of global market data is challenging. The collection of primary data from the suppliers is beyond what is possible within the scope of this report, so we rely on secondary data from industry associations, international organizations, governmental organizations, standard setters, and research institutes. We do our best to provide an accurate and reliable picture of the market, but data gaps and inconsistencies are very common for global market data and modelling has to be applied for some data.

### BCG/GFA ESTIMATE

[https://globalfashionagenda.org/download-resource/?file-name=Pulse-of-the-Fashion-Industry\\_2017%20\(2\)&file-id=4270&file-resource-id=30469](https://globalfashionagenda.org/download-resource/?file-name=Pulse-of-the-Fashion-Industry_2017%20(2)&file-id=4270&file-resource-id=30469)

GFA and BCG project that the overall apparel consumption will rise by 63%, from 62 million tons today to 102 million tons in 2030—an equivalent of more than 500 billion T-shirts. Concurrently, soaring demand for apparel—much of it from developing nations—will see the annual retail value of apparel and footwear reach at least €2.0 trillion by 2030 (an over 30% increase of €500 billion between now and then).

BCG Retail value projection 2015–2030 based on: Euromonitor International. (2017, January 18). [Apparel and Footwear 2017]; The Economist Intelligence Unit. (2017). [Footwear: Market demand (% real change pa) and Clothing: Market demand (% real change pa)]; Mintel Group Limited. (2017). [Footwear: Retail market value in USD adjusted to 2016 prices]. Forecast using constant 2016 prices and fixed 2016 exchange rates 11 Steffen, W., Richardson, K., Rockstrom, J., Cornell

Consumption in 2017 62 Mt, with 38% overproduction that would amount to total production weight of: 100Mt.

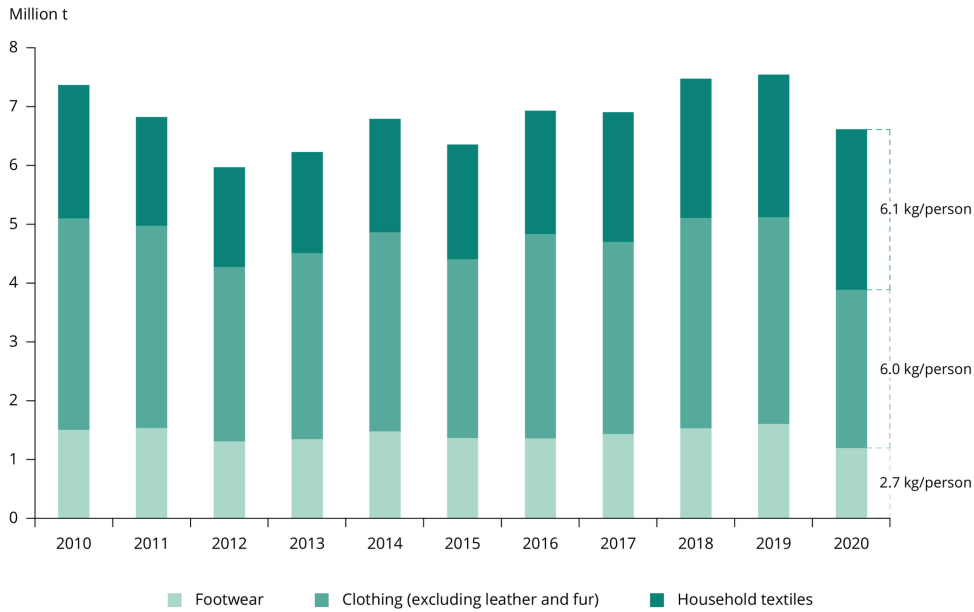
### European Environment Agency (EEA)

<https://www.eea.europa.eu/publications/textiles-and-the-environment-the/textiles-and-the-environment-the>

6kg of apparel bought per year per person in EU



Figure 2. EU-27 estimated consumption of clothing, footwear and household textiles (excluding fur and leather clothing) for the period 2010–2020 (million tonnes and kilograms per person)



Large amounts of raw materials are used for textile production. To produce all clothing, footwear and household textiles purchased by EU households in 2020, an estimated 175 million tonnes of primary raw materials were used, amounting to 391kg per person. Roughly 40% of this is attributable to clothes, 30% to household textiles and 30% to footwear.

In 2020, ±2.5 Mt of apparel was bought in the EU.

## STATISTA

<https://www.statista.com/statistics/263154/worldwide-production-volume-of-textile-fibers-since-1975/>

Chemicals & Resources > Chemical Industry

### Production volume of chemical and textile fibers worldwide from 1975 to 2022

(in 1,000 metric tons)

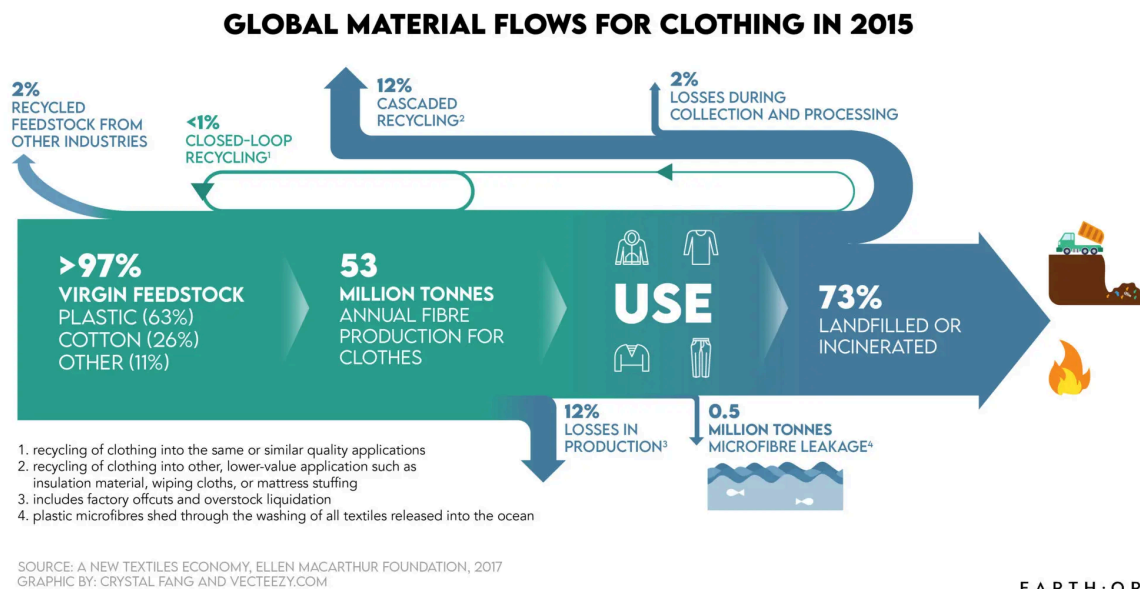


Global textile fibre production: 114Mt

Assuming ±40% apparel: ±46Mt

## Ellen MacArthur:

<https://archive.ellenmacarthurfoundation.org/assets/downloads/A-New-Textiles-Economy.pdf>



2017 annual fibre production for apparel 53 Mt

## Euromonitor:

<https://www.commonobjective.co/article/volume-and-consumption-how-much-does-the-world-buy>

2016 apparel consumption 107 billion units (according to Statista ±180 billion units)

Can't access the database to verify.

## Academic Research

<https://dash.harvard.edu/bitstream/handle/1/37365025/JACOBS-DOCUMENT-2020.pdf>

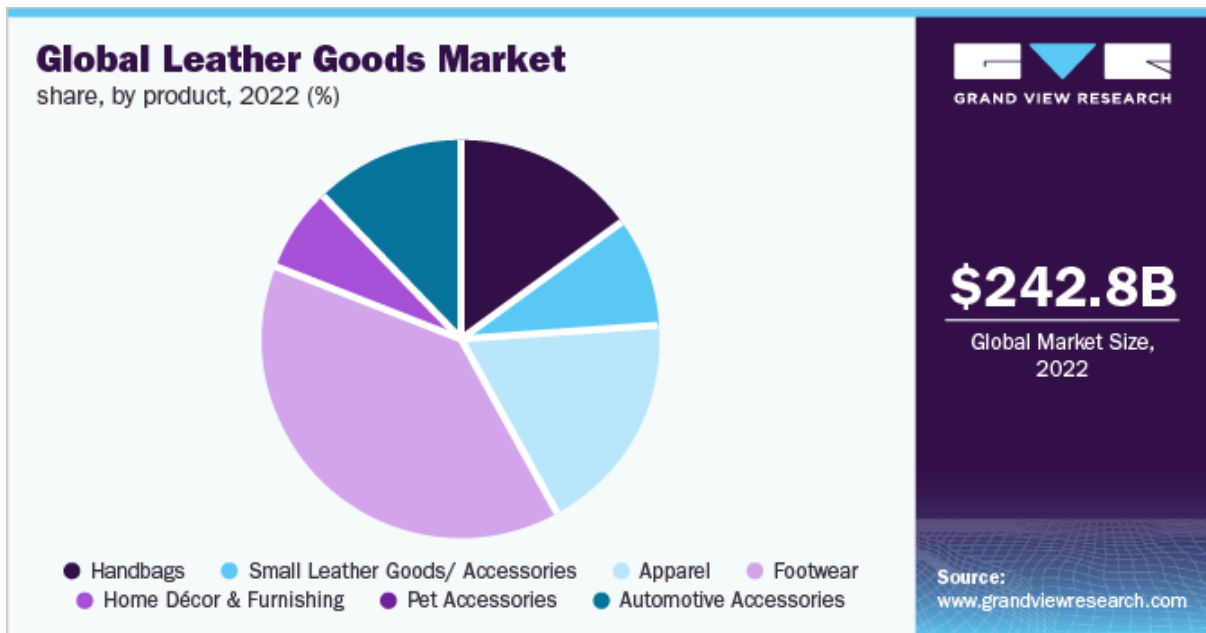
As the world's population grows, apparel consumption is expected to increase from 56 million metric tons today (2018) to 92 million metric tons by 2030, a rise of 63% (Eder-Hansen et al., 2017)



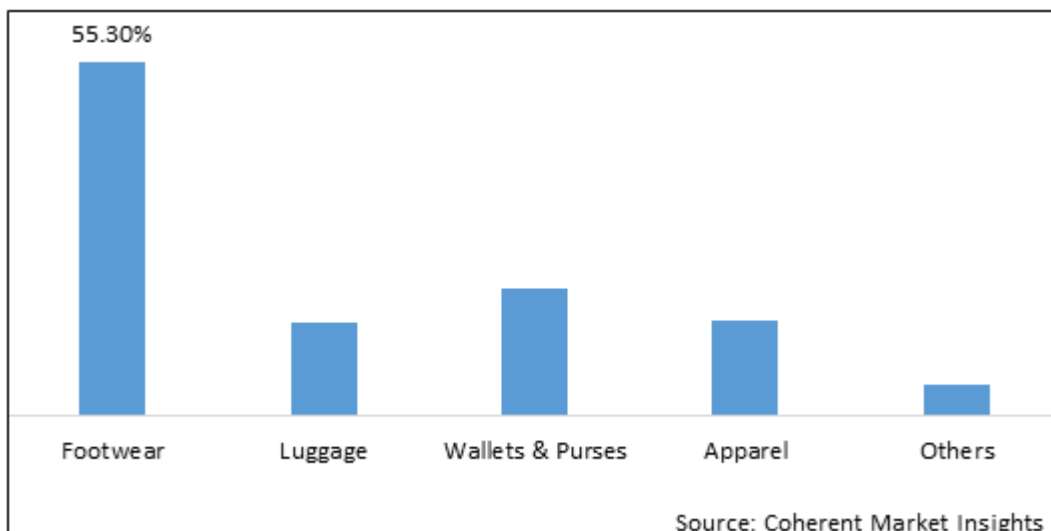
Of the nearly 91 million metric tons of yarn annually produced for apparel.

The 2015 – 2050 CAGR resulting from the averaged results was 1.1%, which increased global consumption per capita from 11.4 kg in 2015 to 16.5 kg in 2050, a difference of 45%

## Leather Data

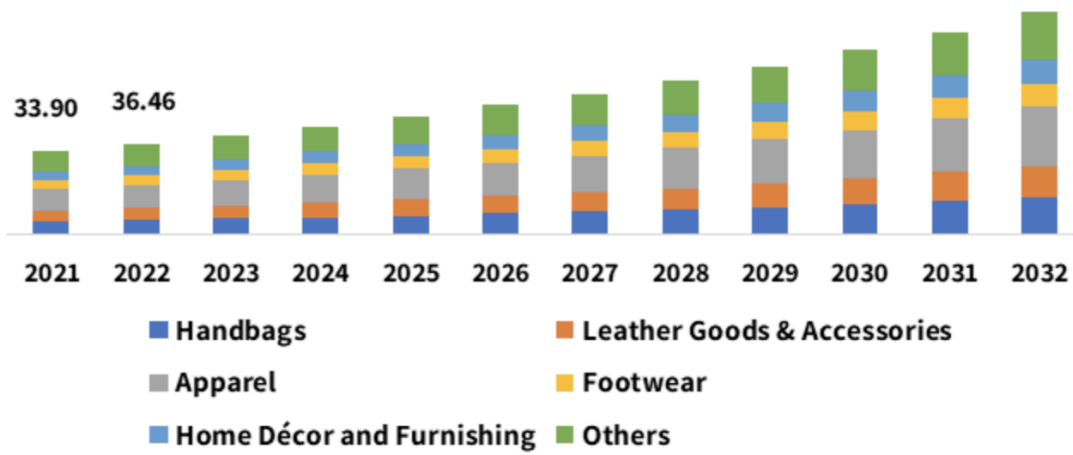


<https://www.grandviewresearch.com/industry-analysis/leather-goods-market>

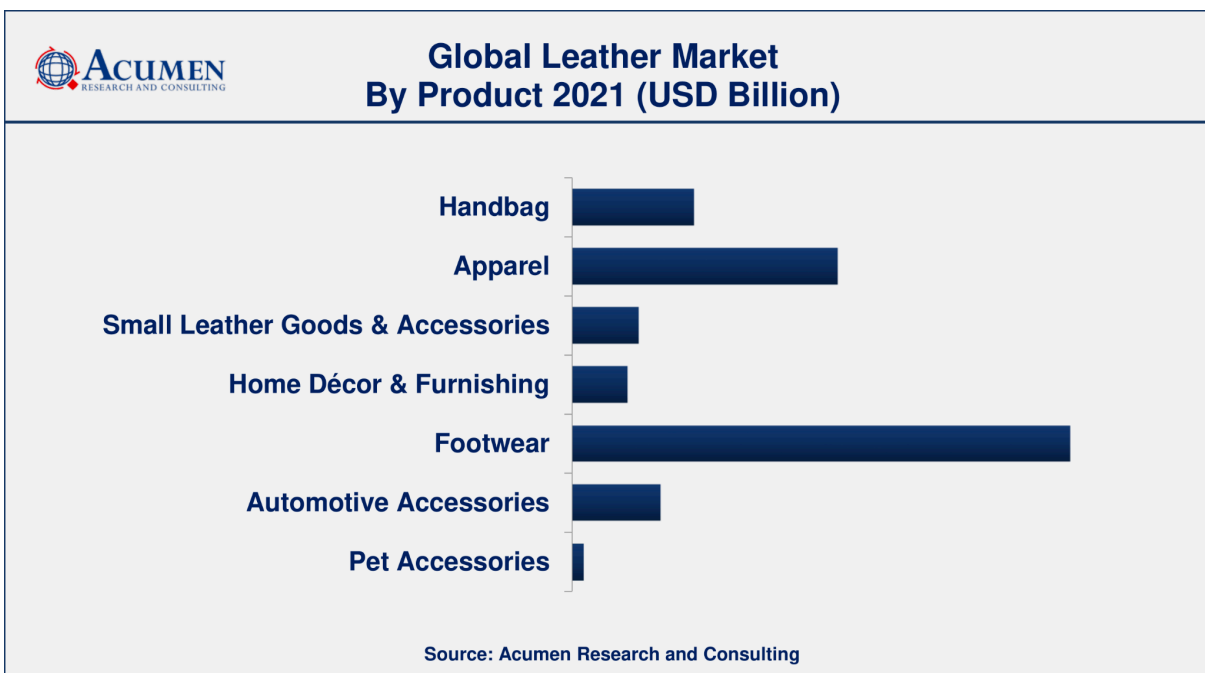


<https://www.coherentmarketinsights.com/market-insight/leather-goods-market-1439>

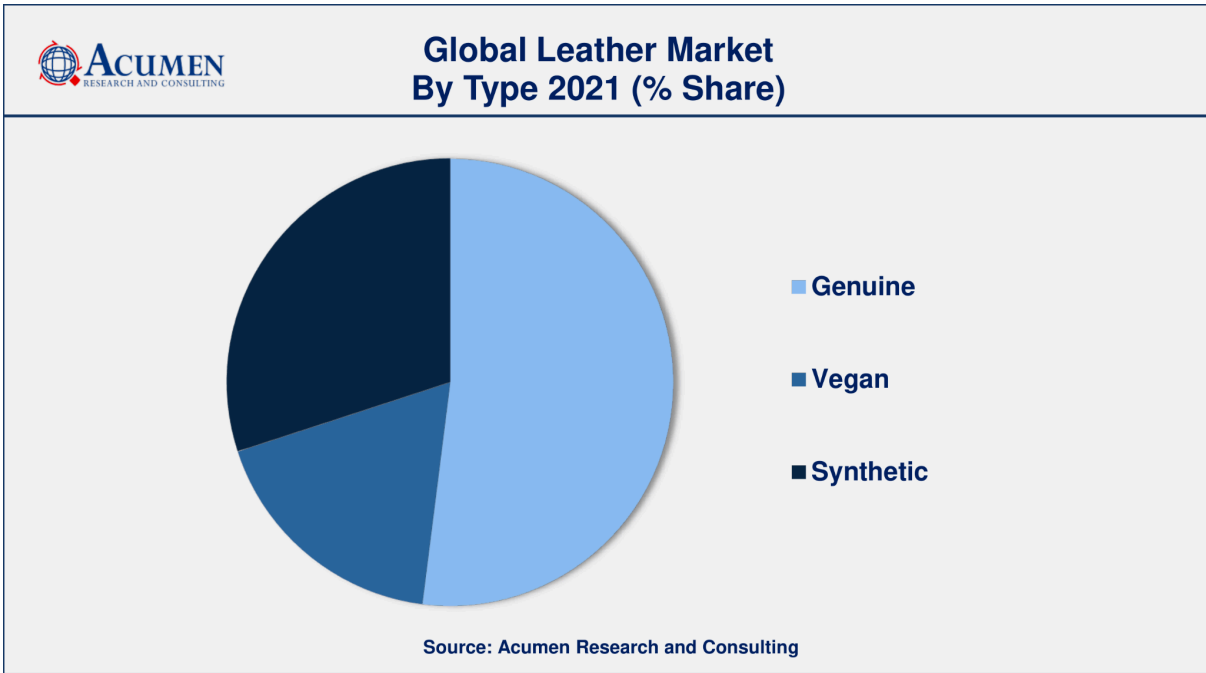
### Global Leather Goods Market Size, By Product 2021 - 2032 (USD Billion)



Source: [www.gminsights.com](http://www.gminsights.com)



Source: Acumen Research and Consulting

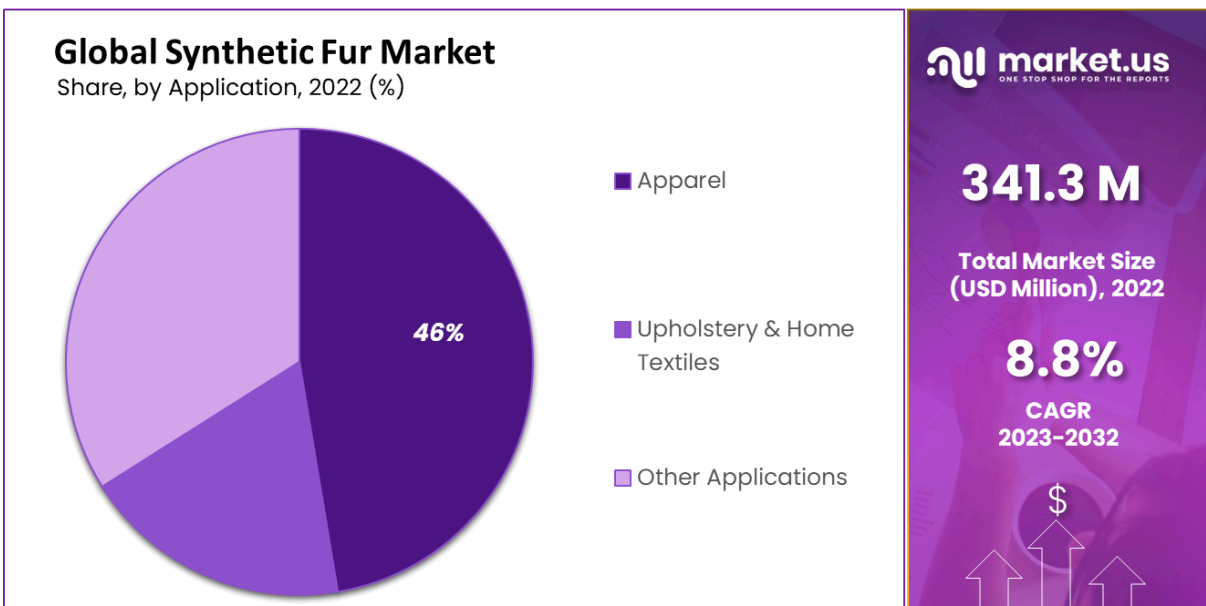


<https://www.acumenresearchandconsulting.com/leather-market>

Leather would add ± 0.25B kg to the apparel total

[https://circulareconomy.europa.eu/platform/sites/default/files/2023-10/WearRepair\\_casestudy.pdf](https://circulareconomy.europa.eu/platform/sites/default/files/2023-10/WearRepair_casestudy.pdf)

**Fur:**

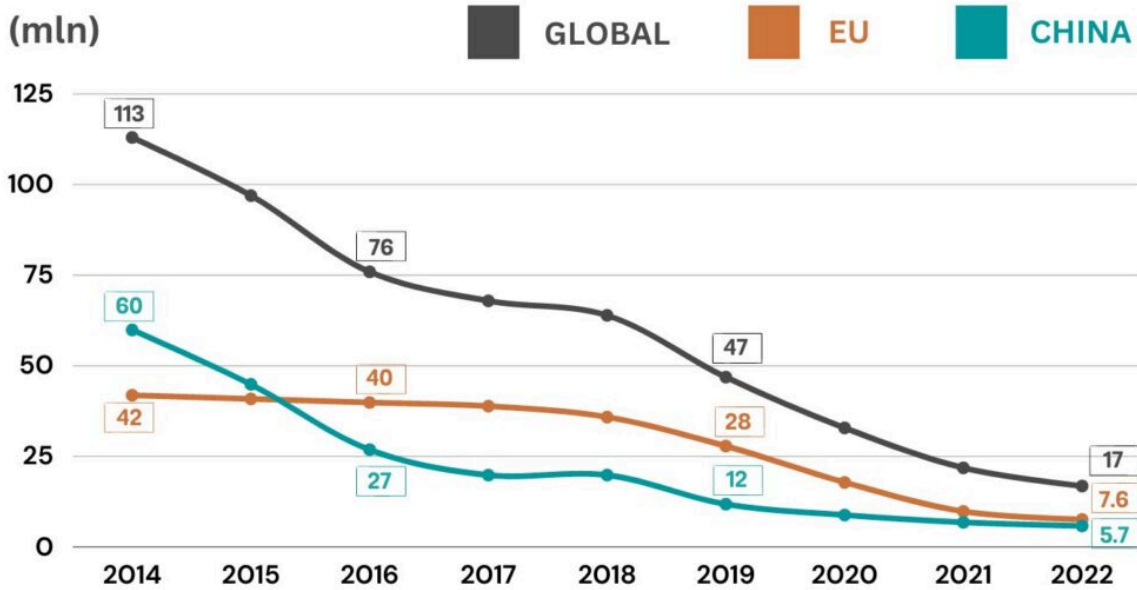


<https://market.us/report/synthetic-fur-market/>

Synthetic fur: apparel market share 46%

<https://www.furfreealliance.com/global-mink-fur-production-halved-in-two-years/>

## MINK FUR PRODUCTION



Graph depicts number of felts

<https://www.hsi.org/news-resources/fur-trade/>

- 2021: Europe 12m, China 27m, North America 2.3m & Russia 600,000

41.9 million felts?

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