

Glass Fibers

Chemical and Environmental Justice Impacts in the Glass Fiber Life Cycle

Many AEC professionals may not be aware that the building products they specify can have environmental justice impacts.

Product manufacturing often involves the use and release of toxic chemicals throughout the supply chain, impacting human and environmental health and contributing to environmental injustice.

As built environment practitioners seek to reduce the environmental justice harms caused by their material selections, understanding the role that glass fibers play can help raise awareness of potential impacts.



WHAT IS ENVIRONMENTAL JUSTICE?

The Environmental Justice Health Alliance for Chemical Policy Reform (EJHA) defines environmental justice (EJ) as a set of principles and a grassroots-led movement that “arose in response to the disproportionate exposure of communities of color and low-income communities to harmful pollution, toxic sites and facilities, and other health and environmental hazards.”¹

Read more about the
[Principles of Environmental Justice.](#)

This study explored the chemical and environmental justice impacts of glass fibers manufactured at fiberglass insulation manufacturing facilities in the United States for use in lightweight residential batt and blown-in insulation.

You may be familiar with glass fibers through their use in fiberglass insulation, glass fiber-reinforced concrete, and glass fiber-reinforced plastics for bathtubs, doors, and window frames.²⁻⁴ Fiberglass insulation is commonly used in new construction and energy efficiency upgrades. While mineral-based materials such as glass fibers often pose fewer hazards across their life cycle than synthetic materials, it is important to consider how they compare to alternatives and the potential to further reduce any health impacts.

Habitable assessed the chemical hazard and environmental justice impacts of glass fibers according to five criteria:

- 1 avoid hazardous chemicals
- 2 prevent accidents
- 3 prevent pollution and waste
- 4 abide by environmental regulations
- 5 prevent disproportionate and cumulative impacts.

Habitable's analysis considered the four major manufacturers of residential fiberglass insulation in the United States. We identified 22 facilities that manufacture glass fibers for lightweight residential batt and blown-in fiberglass insulation.⁵⁻¹² All were included in this study. This research was conducted from 2021–2022.

Learn more about Habitable's research process in our [Chemical and Environmental Justice Impacts Methodology](#).

Key Findings:

- Glass fibers are derived primarily from recycled glass and mineral-based inputs. Some of the chemical inputs for glass fiber production are hazardous, and glass fiber manufacturing can release hazardous heavy metals.
- We identified no hazardous chemical incidents—such as fires, spills, and other nonroutine releases—related to glass fiber manufacturing.
- Glass fiber production facilities generate over 1 million pounds of related hazardous chemical waste, including releases to the air and water, each year.
- Many facilities that make glass fibers have a history of noncompliance with U.S. Environmental Protection Agency (EPA) regulations, with 14% of facilities in significant violation for all of the previous 12 quarters.
- The combined communities surrounding glass fiber manufacturing have a higher percentage of people of color, low-income households, and limited English-speaking households than the U.S. overall.

CRITERIA FOR CHEMICAL AND ENVIRONMENTAL JUSTICE IMPACTS	FINDINGS ON GLASS FIBERS
<p>Avoid hazardous chemicals</p>	<p>25–80% of inputs are recycled glass. Some recycled glass inputs may contribute to hazardous metal releases. Other inputs are primarily mineral-based.</p> <p>About 35% of chemicals used as inputs for glass fiber production (4 chemicals) are hazardous to human health.</p> <p>One chemical is highly reactive or flammable.</p> <p>None of the chemical inputs used for glass fiber production are volatile.</p> <p>Releases of several heavy metal compounds are possible as a result of the process to make glass fibers.</p> <p>The glass fibers used in insulation are not considered hazardous.</p>
<p>Prevent accidents</p>	<p>No chemical incidents related to glass fiber manufacturing were identified.</p>
<p>Prevent pollution and waste</p>	<p>Facilities manufacturing glass fibers for residential fiberglass insulation in the United States report that they:</p> <ul style="list-style-type: none"> • generate almost 1.2 million pounds of hazardous glass fiber-related chemical waste on average each year (combined); • release an average of 1,200 pounds of hazardous glass fiber-related chemicals into the air and water each year (combined). <p>Some of this waste and these releases may be tied to other processes at these facilities.</p>
<p>Abide by environmental regulations</p>	<p>41% of glass fiber facilities had significant violations of EPA regulations within the previous 12 quarters.</p> <p>14% of facilities had significant violations in every quarter.</p>
<p>Prevent disproportionate and cumulative impacts</p>	<p>Compared with the United States overall, the combined communities surrounding the fiberglass manufacturing facilities have a:</p> <ul style="list-style-type: none"> • higher percentage of people of color (about 46% near glass fiber facilities versus 39% in the U.S. overall); • higher percentage of low-income households (about 37% versus 33%); • higher percentage of limited English-speaking households (about 5% versus 4%); • similar percentage of children as the nation overall (about 22%).^a <p>We further found cumulative impacts:</p> <ul style="list-style-type: none"> • Two fiberglass facilities are located in close proximity to each other, compounding the negative health impacts on that community. • Some cities with fiberglass manufacturing facilities contain no other industrial sites that release and/or manage hazardous chemicals; whereas, other cities contain many other industrial sites—up to 27 in one instance. • One city that we researched contains more than 20 other industrial sites. • In 2019, each individual city experienced collective releases of hazardous chemicals ranging from 1 pound in one location to 1.2 million pounds in another.

Research Details

EPA reports violations quarterly. Compliance data for glass fiber facilities is from July 2022.

TRI analysis was based on data through the 2019 reporting year. Average annual releases and waste represent the most recent five years for which data was available at the time of the research (2015–2019).

Habitable used EJScreen version 1 (2020), including U.S. Census Bureau American Community Survey data for 2014–2018.

Sources specific to glass fibers are included below and in the accompanying spreadsheet. See Habitable's Chemical and Environmental Justice Impacts Methodology for other sources used in our analysis. More background on glass fibers can be found in the full [case study](#).

- a Because the two Kansas City facilities are so close together, some individuals live in the overlapping area of these two fenceline zones. At the time of the research, this double counting was not accounted for in the EJScreen analysis, therefore the demographic information is approximate.

Sources

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