



# Designing Out Plastics

A BLUEPRINT FOR HEALTHIER BUILDING MATERIALS

SEPTEMBER 2025



# Foreword

By Gina Ciganik, Chief Executive Officer — Habitable

## HIDDEN IN PLAIN SIGHT

Take a moment right now to look around you. Look at the floor, windows, furniture, countertops, ceiling, and paint. Chances are that many of the building materials surrounding you are wholly or in part made of plastic. Carpet, paint, vinyl flooring, fabrics, couch cushions, PVC pipes—even that solid surface countertop are all made with plastic.

You might be surprised to read in this report just how much plastic is used in the building and construction sector, and even more shocked to learn about the extraordinary growth projections in the coming decades. While most plastics reduction efforts focus on packaging, the reality is that we are encasing ourselves in buildings that are made from plastic—plastic that is literally hidden in plain sight.

We also make visible the full life cycle of issues caused by all these plastics. At their origin, nearly all start out as fossil fuels. For those of you prioritizing climate mitigation by electrifying your buildings, you may not realize that as demand for fossil fuel energy has declined, the industry has shifted oil, gas, and coal into feedstocks for the plastic materials you are using. At their end of life, which is a lot shorter than you think—plastic products become waste, flooding into our environment. And between their origin and end of life, they are exposing us to toxic chemicals and microplastics that are increasing disease and health harms for all life. Tragically, the consequences are disproportionately borne by people of color, low-wealth communities, and children. Yes, our children are bearing the brunt of this burden.

I spent nearly 20 years as a housing developer, building and

rehabilitating thousands of sustainable, healthy housing units—or at least I thought so. Frankly, back then it wasn't on my radar just how much our buildings have morphed into places that are more similar to my childhood plastic Barbie house than I ever imagined possible.

## LEADING THE WAY TOWARD HEALTH

I am optimistic that we can fix this. Many beautiful, timeless, cost-competitive, healthier, no- or low-plastic product alternatives exist. This report provides examples of leaders that are shifting their practices and policies and already reducing plastic building materials in favor of healthier alternatives.

The U.N. Environment Programme and the International Energy Agency predict that 2.5 trillion square feet of buildings will be added to the Earth by 2060, doubling what exists today. The building and construction sector has tremendous power to accelerate planetary health, for everyone, everywhere.

My hope is that this report will be a turning point, awakening you and our industry peers to the scale of plastic building materials hiding in plain sight. That the rigorous science in the pages that follow will inform you about the unintended harms caused when we choose plastic building materials. And that the solutions and examples contained in this report will inspire you to choose the healthier, timeless, and beautiful alternatives that are already available. As the title suggests, it's a blueprint for you to follow and share.

**Together, we can design out plastics.**

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## ABOUT HABITABLE

Habitable (formerly Healthy Building Network) has a vision: all people and the planet thrive when the materials economy is in balance with nature. Our team of researchers activate science to reduce pollution, mitigate climate change, and create a healthier and more equitable future for all. Our Informed™ initiative supports built environment practitioners in selecting products with safer chemicals to improve the health of humans and the environment.

This work was generously supported by a grant from Beyond Petrochemicals.



**BEYOND**  
Petrochemicals  
PEOPLE OVER POLLUTION



# Executive summary

For decades, plastics have been seen as the solution to so many challenges in the building sector. They're lightweight, malleable, and appear to be durable. **In reality, plastics create far more problems than they are intended to solve.**

They produce pollution throughout their life cycle, from their origins in fossil fuel extraction to end-of-life disposal, including greenhouse gases that contribute to climate change, toxic chemicals and microplastics that impact human health and the environment, and waste that lasts for centuries on land and in waterways. While all people and the global environment are impacted by plastic pollution, children, communities of color, Indigenous communities, and low-wealth communities face the greatest harm.

Despite these problems, plastics have become ubiquitous in the building and construction sector over the last several decades.

The good news? **It doesn't have to be this way.** Most plastic building materials have healthier, more sustainable alternatives that are readily available. Industry-leading designers and builders are already making the switch away from plastics. By actively working to reduce or eliminate the use of plastic building products, built environment practitioners can take pride in leading the way to a better world.



## INFORMED™: TRANSLATED RESEARCH

Habitat's [Informed™](#) product guidance translates our deep research into a simple red-to-green ranking system to help decision makers choose healthier building materials.

	<b>Best in Class</b>
	<b>Better</b>
	<b>Good</b>
	<b>Reduce</b>
	<b>Avoid</b>
	<b>Worst in Class</b>

# Key takeaways

**1**

## Plastics harm human and environmental health at every stage of their life cycle, from extraction through production and disposal.

- Plastics are fossil fuels in another form: 99% of plastics are made from oil-, natural gas-, or coal-based petrochemicals, undermining efforts to reduce fossil fuel use and greenhouse gas emissions.
- Chemicals used to create plastics pollute our air, water, soil, and bodies. They have been linked to cancer, reproductive issues, developmental harm in children, asthma, obesity, and many more health impacts.
- Microplastics have been found throughout human bodies—including in our hearts, brains, and placenta—fueling growing concerns about their contributions to negative health outcomes.
- Plastic pollution harms all people and the planet, but communities near plastic manufacturing, transportation, and disposal facilities—which are disproportionately communities of color, Indigenous communities, and low-wealth communities—as well as children bear a greater burden.

**3**

## The building sector's heavy reliance on plastics creates a unique and severe danger to human and environmental health.

- The sector uses 70% of all PVC (vinyl) produced globally and 30% of all polystyrene—two of the most hazardous plastics.
- Plastic building materials make buildings less fire resistant, burning faster and hotter while generating more toxic chemicals than natural materials—posing an escalating threat as climate change fuels more severe wildfires.

**2**

## The building sector is a leading driver of plastics use and continues to grow.

- The building and construction sector is a major user of plastics—in carpet, vinyl flooring, foam insulation, pipes, cladding, and more. Building and construction accounts for 17% of global plastic production, second only to packaging.
- Without intervention, plastic use in construction is projected to nearly double by 2050, escalating all of plastics' associated harms.
- Due in large part to the building and construction sector's growing use of plastic building materials, the plastics industry is projected to create more plastic in the next 25 years than have been produced in the history of the world so far.

**4**

## Healthier alternatives are already available and can significantly reduce our reliance on plastic building materials.

- Habitable has identified healthier, no/low-plastic alternatives for many plastic building products. Informed™ product guidance can help developers, designers, builders, homeowners, and policymakers find healthier alternatives to plastics.

## Recommendations

Here are four concrete steps you can take right now to meaningfully reduce plastic use while protecting people and the environment:

1

### Minimize new material use

and reuse existing products when possible

2

### Choose healthier materials

when new products are necessary

3

### Choose long-lived, timeless materials

that remain in place for their full service life

4

### Evaluate recycling claims critically

as recycling often perpetuates rather than reduces the life cycle impacts of plastics

# The role you can play

**Everyone is impacted by plastic use in the built environment. And professionals in the building and construction sector have both unique and collective leadership roles to play in reducing plastic use.**

## Building professionals

Architects, designers, developers, and others who specify or buy building materials can consider impacts throughout the product life cycle—not just during the occupancy phase—when making material selections. By factoring in the full life cycle of pollution and its externalized costs to human health and the environment when specifying materials, you can help the built environment deliver long-term positive impacts that support both the planet and the people who live on it.

## Green building standards

Use assessment tools that consider health impacts for worst-in-class materials such as plastics throughout the supply chain and incentivize selection of materials that have the least adverse impact on human health and the environment throughout the life cycle.

## Real estate investors

Support initiatives that reduce plastics at scale in the built environment, ultimately reducing climate risks and environmental harm while enhancing human well-being.

## Policymakers

Advance no/low-plastic alternatives and incentivize their adoption through policies that phase out unnecessary plastic building materials in favor of safer options, prioritizing elimination of the most hazardous plastics such as PVC and polystyrene.

## Philanthropic funders

Actively communicate and integrate plastic building product reduction into your funding strategy with your partners and align collective action to support a built environment that is healthy and equitable for all.

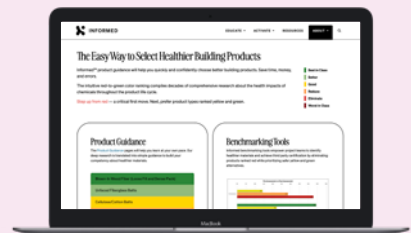
### Ready to do more?

Visit [Habitable's](#) website for more ways you can drive change.



### Get Informed™

Use our [Informed™](#) product guidance to select healthier alternatives in your work.





# Introduction

**In the mid-20th century, plastics emerged as the seemingly ideal answer to humanity’s material needs in virtually every setting—including our buildings. Today, it’s clear how wrong that thinking was.**

Plastics are polluting our planet and our bodies, putting our communities and climate at risk. In this report, we’ll explain why plastics are a problem, reveal the harm they’re causing, and present alternatives for plastic building materials.





# The problem with plastics

Plastics are synthetic or semi-synthetic materials made of polymers and chemical additives. Modern synthetic plastics came onto the scene about 100 years ago.<sup>1</sup>

**Almost all plastics—99%—are manufactured from fossil fuels: oil, natural gas, or coal.<sup>2</sup>**

Plastics are highly versatile and lightweight. These traits have helped make them ubiquitous in our lives. From your toothbrush, to your clothes, to the carpet under your feet and paint on your walls, plastics are all around you. And, as you'll learn, they are also inside you.



**Today we increasingly recognize that the downsides of plastics far outweigh their benefits.**

- Derived from fossil fuels, plastics release greenhouse gases at every stage of their life.<sup>3</sup> **Plastic production alone is responsible for over 5% of global greenhouse gas emissions and continues to grow.<sup>4</sup>**
- Plastics generate massive amounts of waste—about 390 million tons in 2019 alone.<sup>5</sup> **This is almost as much as the combined weight of all humans on the planet (an estimated 430 million tons).<sup>6</sup>**
- **Chemicals used to create plastics pollute our air, water, soil, and bodies** and have been linked to cancer, reproductive issues, children's developmental harm, asthma, obesity, and many more health impacts.<sup>7-10</sup>
- Plastics last a long time and do not biodegrade.<sup>11</sup> **But they do break down into small particles called microplastics, which are now ubiquitous in the environment and in human bodies, including in our hearts, brains, and placentas.<sup>12-14</sup>** And research suggests they contribute to a range of negative health outcomes, including cancer and infertility.<sup>14</sup>

## The health harms that plastics cause are especially severe for vulnerable individuals.

Children are more susceptible than adults to harmful impacts from chemical and microplastic exposures because of their small size and rapid growth and development. Even before birth, chemicals and microplastics are transferred to babies in utero, meaning they are born with brains and bodies already contaminated with plastics and chemicals.<sup>15,16</sup>

Additionally, adults and children living in communities near manufacturing, transportation, and disposal facilities are also severely impacted.<sup>17,18</sup> For example, in the United States, more than 150,000 people—including 40,000 children—live within 3 miles of a facility that produces one exceptionally harmful type of plastic: polyvinyl chloride (PVC, also called vinyl). Each year these PVC facilities release more than 1.6 million pounds of hazardous chemicals into the air and water, exposing nearby residents to toxic harms.<sup>19</sup> Cross-country shipment of the hazardous raw materials needed to make PVC puts millions more people at risk of exposure through spills, explosions, and toxic leaks.<sup>20,21</sup>

### **Plastics are already creating untenable problems for people and the planet.**

And yet, industry is on track to create more plastics in the next 25 years than have been produced in the history of the world so far.<sup>5,a</sup>

## Plastic building products are the new frontier for fossil fuels.

Even as we recognize the harms that plastics cause, there is an ever-growing demand for plastic production and use. This is no accident.

### **As energy markets shift away from oil, natural gas, and coal toward renewables, the fossil fuel industry is strategically pivoting to plastics made from petrochemicals.**

Fossil fuel companies are leveraging large marketing and litigation campaigns to keep plastic demand high and growing.<sup>22-24</sup> And as plastic bans and restrictions focus on packaging, industry has turned its sights on other plastic products—including building materials, locking fossil fuels into the same structures we're trying to decarbonize.<sup>25</sup>





# Plastics in building materials

Building materials are one of the top uses of plastics.<sup>26-28</sup> In fact, the building and construction sector accounts for 17% of global plastic use, second only to packaging.<sup>26</sup>

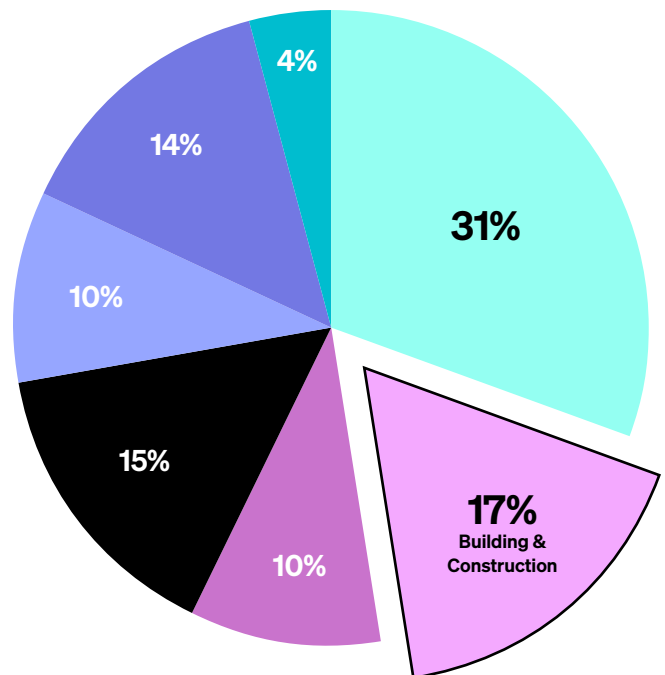
Plastics in the building and construction sector are found in products like flooring, pipes, insulation, siding, adhesives, sealants, and more. Outside of buildings, infrastructure pipes (for water distribution or sewage collection) also account for a very large amount of plastic use.<sup>28,29</sup>

## What is the “building and construction” sector?

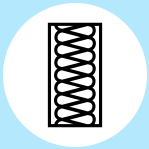
The building and construction sector includes new construction and renovation of buildings, as well as infrastructure like roads and bridges.

PLASTIC USE BY SECTOR IN 2019<sup>26</sup>

- PACKAGING
- BUILDING & CONSTRUCTION
- TEXTILES
- CONSUMER & INSTITUTIONAL PRODUCTS
- TRANSPORTATION
- ELECTRICAL/ELECTRONIC
- OTHER



**PLASTICS ARE FOUND THROUGHOUT BUILDINGS,  
FROM ATTIC INSULATION TO BASEMENT PLUMBING**



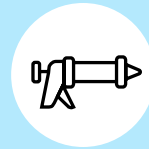
**Insulation**

- Polyisocyanurate
- Expanded polystyrene
- Extruded polystyrene
- Spray polyurethane foam



**Flooring**

- Most carpet
- Vinyl flooring
- Rubber flooring



**Most Adhesives &  
Sealants**



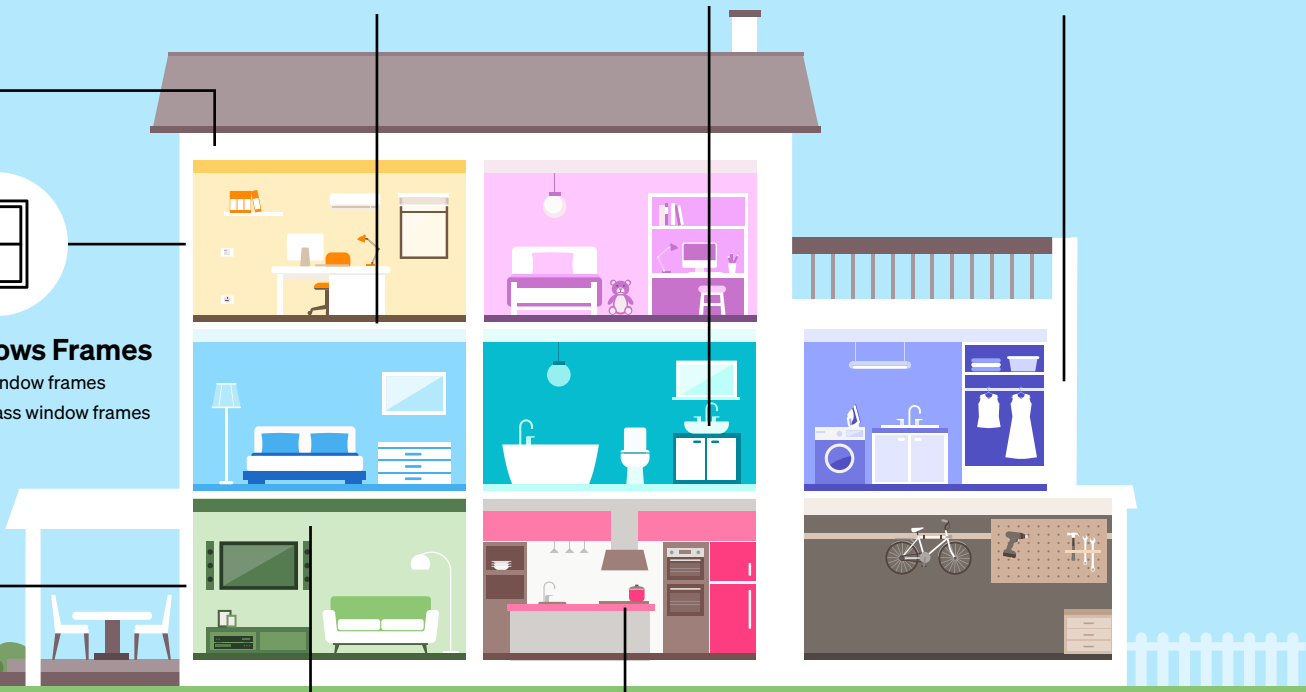
**Siding/Cladding**

- Vinyl siding
- Polypropylene/polymeric siding
- Faux stone/brick/wood siding



**Windows Frames**

- Vinyl window frames
- Fiberglass window frames



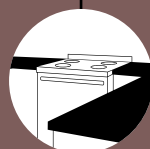
**Cabinetry &  
Doors**

- Composite wood materials



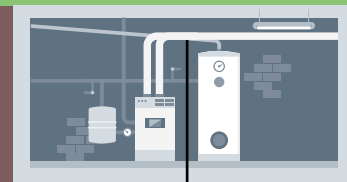
**Paint**

- Latex paint



**Countertops**

- Solid surface
- Plastic laminate



**Pipes**

- PVC pipes
- PEX pipes

## Unique harms caused by plastic building products

Whether used in construction or other applications, plastics harm people and our planet throughout their life cycle (for more details, see [Plastics 101: Know the Costs](#)). Plastic building products, in particular, create human health and environmental impacts that other plastic products do not.

Building construction and demolition expose workers to health harms unique to plastic building products. For instance, the cutting of plastic products like foam insulation generates dust and microplastics that construction workers may inhale and accidentally swallow,<sup>30,31</sup> these microplastics, and additives like flame retardants pose serious health hazards.<sup>32–36</sup> During demolition, workers are again exposed to toxic plastic chemicals and microplastic dust.<sup>30,36</sup>

In order to meet building code requirements, plastics—which are inherently flammable—must include chemical flame retardants for certain applications. Ironically, these chemicals are usually toxic themselves and can escape from products into the environment. They do not improve fire safety for many applications and can make building fires more toxic.<sup>37–41</sup>





During building fires or wildfires, the presence of plastic building products puts people and the environment at risk. Plastic building materials burn faster and hotter than natural materials while releasing more toxic chemicals.<sup>42-47</sup> As a result, occupants may have less time to safely exit a burning building containing plastic products than one with natural materials.<sup>48</sup> Fire fighters are also harmed when they breathe in and absorb toxic chemicals released by burning plastics, increasing their risk for cancer and other diseases.<sup>45-47,49-53</sup> Long after a fire is extinguished, plastic building products' toxic legacy lives on in the water and soil, as well as the dust and air inside nearby homes that survived the flames.<sup>42,47,54-56</sup> With climate change fueling more severe wildfires,<sup>47</sup> use of no/low plastic building products that are more fire resistant (e.g. stucco, brick, natural stone, and fiber cement siding)<sup>57,58</sup> is an important part of resilience planning.

## Fire fighters push for less plastics in buildings

“We know that when plastics burn, they emit carcinogens and increase the risk of occupational illness and death for firefighters,” says General President of the International Association of Fire Fighters (IAFF) Harold Schaitberger. The IAFF is calling on “developers, builders, and code officials to reduce and restrict the use of plastics in building construction.”<sup>59</sup>

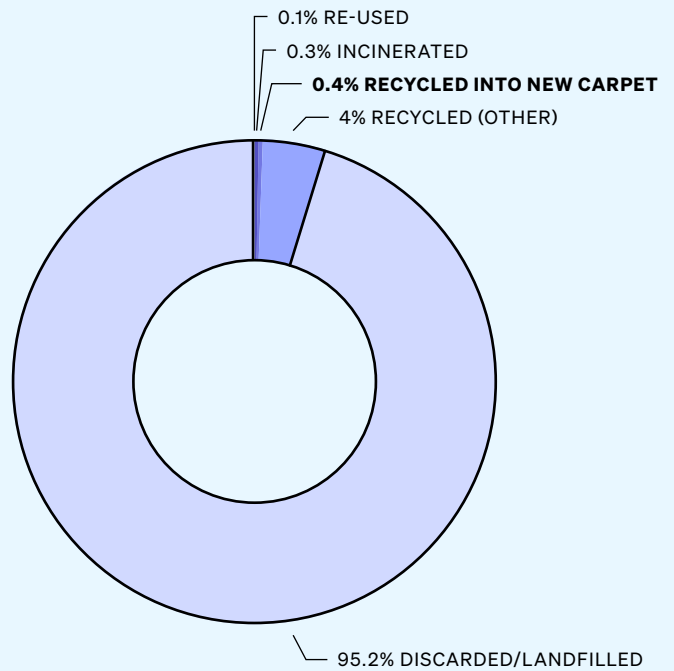
# Trash talk

By and large, carpet and other plastic building products are ultimately single-use, disposable products.

Carpet has become a poster child for plastic recycling in the built environment due to well-publicized take-back programs. In reality, less than 0.5% is recycled into new carpet.<sup>60</sup> Most of the rest is landfilled or burned, with a small fraction downcycled into products that will be landfilled or burned at the end of their life. Few other building products are recycled at all.<sup>28,61,62</sup>

Some 2 million tons of carpet are discarded annually in the U.S. That's 1.2 million tons of plastics—about the same weight as all plastic straws, bags, and water bottles used in the U.S. each year.<sup>64</sup>

**CARPET END-OF-LIFE STATISTICS<sup>63</sup>**



**Plastic in carpet discarded**  
in the U.S. each year



**Plastic water bottles, bags, and straws used**  
in the U.S. each year

# A growing problem

Without intervention, the Organization for Economic Cooperation and Development (OECD) warns that plastic production for construction will nearly double by 2050,<sup>65</sup> escalating all of plastic’s associated harms. Unless we do something, the built environment plastic demand will surpass current demand for plastic packaging in 25–30 years.<sup>26,66,b</sup>

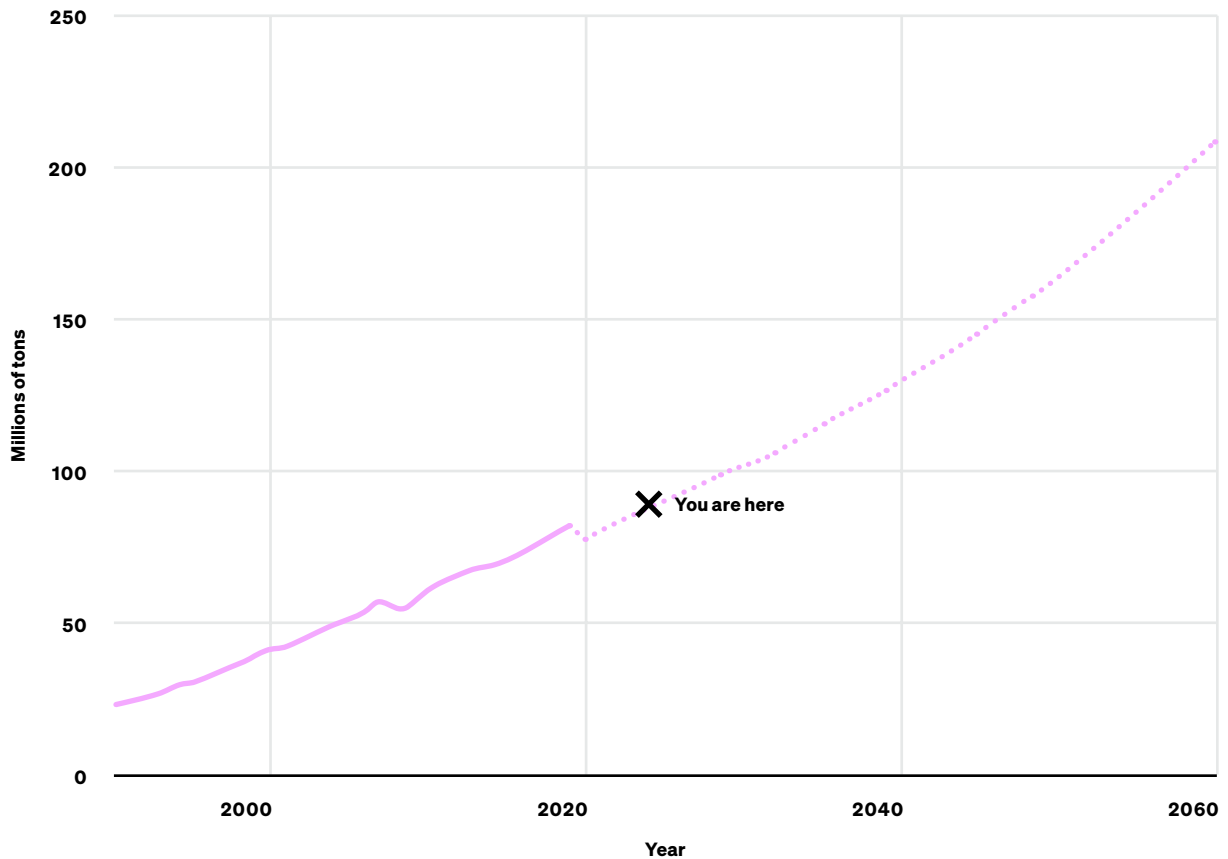
### Who is the OECD?

Working with over 100 countries, the OECD is a global policy forum that promotes policies to improve the economic and social well-being of people around the world.

## HISTORICAL AND PROJECTED PLASTIC USE FOR BUILDING AND CONSTRUCTION<sup>26,66</sup>

From OECD. Historical data is through 2019, with projections starting in 2020. The drop between 2019 and 2020 reflects reduced plastic consumption in building and construction during the COVID-19 pandemic.<sup>5,26,66</sup>

**—** HISTORICAL  
**⋯** PROJECTED





# Taking action

## Where to begin

If you specify or buy building materials, influence green building standards, invest in real estate, or influence policy, you have the power to reduce the use of plastics in the built environment.

A great place to start is with two of the most toxic plastics that exist today: polyvinyl chloride (PVC or vinyl) and polystyrene.

Both of these plastic types are commonly used in building products. Both require toxic chemicals in production and pollute throughout their life cycle.<sup>67</sup> And both are widely considered among the most toxic plastics, with organizations and businesses around the world targeting them for phase out.<sup>67-71</sup>

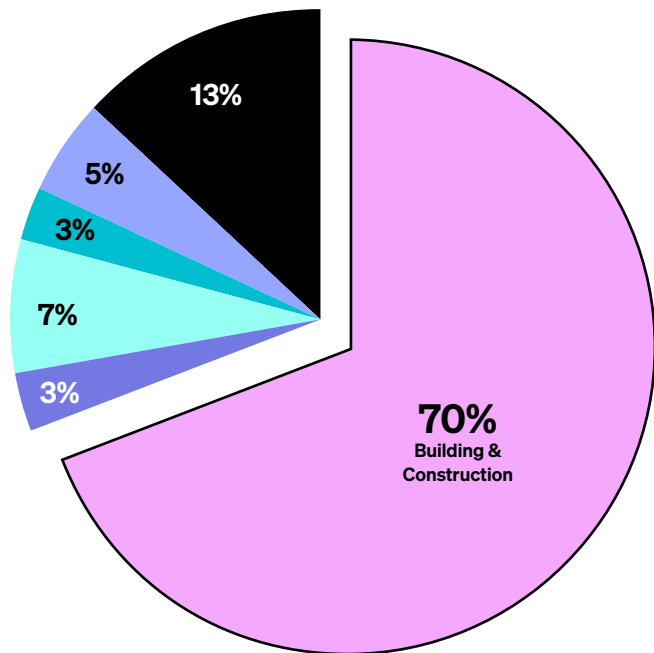


# Polyvinyl chloride (PVC)

PVC, commonly called vinyl, is used for a wide range of building materials, including pipes and fittings, siding, window frames, roofing and waterproofing membranes, flooring, and more.<sup>72</sup> Building and construction is by far the dominant user of PVC, accounting for 70% of global PVC production.<sup>73,74</sup> In fact, PVC accounts for nearly half of all the plastics used in the building and construction sector.<sup>73</sup> The building and construction sector is also the highest producer of PVC waste; in the EU, the sector is responsible for an estimated 44% of post-consumer PVC waste.<sup>75</sup>

## PVC USE BY SECTOR<sup>73</sup>

- PACKAGING
- BUILDING & CONSTRUCTION
- CONSUMER & INSTITUTIONAL PRODUCTS
- TRANSPORTATION
- ELECTRICAL/ELECTRONIC
- OTHER



## Toxic cargo

The 2023 train derailment in East Palestine, Ohio, where five railcars of vinyl chloride burned, created an environmental and public health disaster, with contamination spreading through the atmosphere and affecting at least 16 states.<sup>78,79</sup> This represents just one of nearly 1,000 chemical incidents involving vinyl chloride—the building block for PVC—that occurred across the U.S. between 2010 and 2023. These incidents include explosions, fires, leaks, and spills at manufacturing facilities, railways, roads, and ports. That’s an average of more than one incident per week.<sup>78</sup> Fires, explosions, and other incidents at PVC-related facilities have killed at least 71 people and injured over 600 globally since 2010.<sup>80</sup> Future disasters involving PVC-related chemicals are avoidable by transitioning to healthier, no/low-plastic materials.

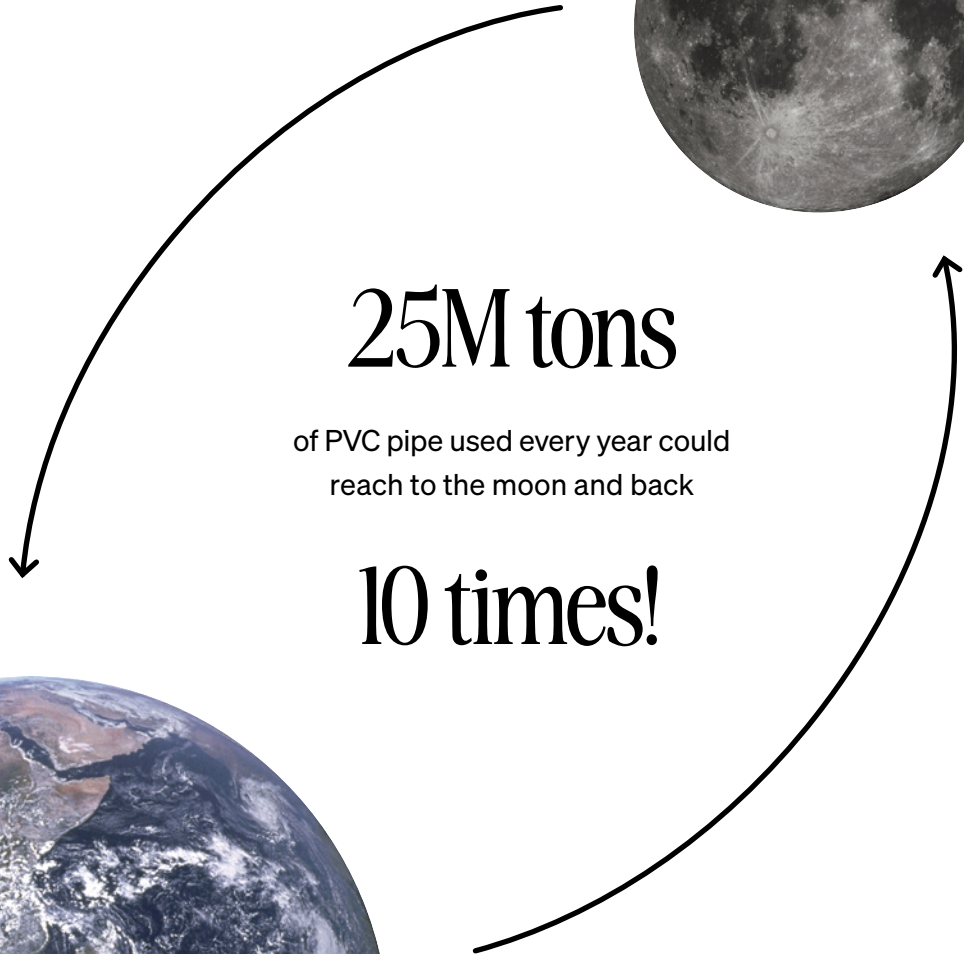
Globally, about 25 million tons of PVC are used each year for pipes and fittings.<sup>72,73</sup> This would equal almost 2.5 million miles of 4-inch drain pipe, which could reach to the moon and back 10 times.<sup>72,73,76,77</sup>



**25M tons**

of PVC pipe used every year could reach to the moon and back

**10 times!**

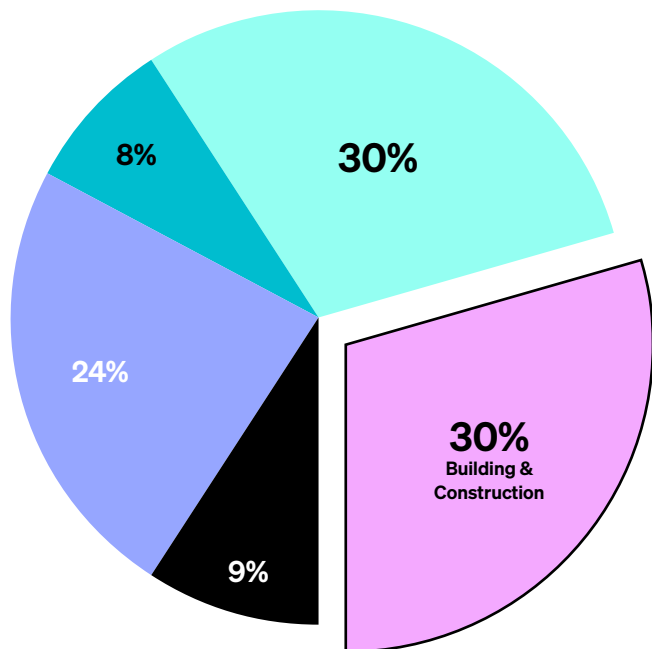


# Polystyrene

The building and construction sector uses polystyrene mainly for insulation: expanded polystyrene, or EPS, and extruded polystyrene, or XPS. All told, the sector is responsible for 30% of the total global amount of polystyrene produced, the same amount as packaging.<sup>73</sup>

## POLYSTYRENE USE BY SECTOR<sup>73</sup>

- PACKAGING
- BUILDING & CONSTRUCTION
- CONSUMER & INSTITUTIONAL PRODUCTS
- ELECTRICAL/ELECTRONIC
- OTHER



## Beach burden

Building materials are a significant source of polystyrene releases to oceans and waterways.<sup>81,82</sup> One study found that polystyrene building materials were responsible for more than half of foam plastic debris and litter on Toronto-area beaches and surface waters. Sources of construction foam pollution include spills of polystyrene beads (used to manufacture insulation) and pieces of insulation blowing out of new construction sites, demolitions sites, and landfills.<sup>82</sup>



# Myths and misperceptions

Below are some common misconceptions that fuel continued plastic use.

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## Myth: Recycled content

“This plastic product is sustainable because it contains recycled content.”

### REALITY CHECK

- **Recycled content in products may not be what you think it is.** One vinyl flooring manufacturer claims 39% recycled content in their product, but the product contains 0% recycled flooring. The “recycled content” is limestone filler generated as part of a production process—not actually material recycled from an existing product.<sup>83,84</sup> And the product still contains up to 40% new plastic.<sup>83,85</sup>
- **Recycled plastics often contain legacy toxic additives**, perpetuating the harm those chemicals cause to people and the planet.<sup>17,86,87</sup>
- **Products that contain recycled plastics often still use a substantial amount of new plastics.** For example, one manufacturer advertises that their flooring product recycles two plastic bottles per square foot. In reality, it uses 5 pounds of new plastics for every pound of plastic waste.<sup>88–90</sup>

# Myth: Recyclable

“This plastic product says it’s recyclable so it will be recycled.”

## REALITY CHECK

- **The vast majority of plastic building materials are not actually recycled**, even if they are technically recyclable.<sup>28,61,62</sup> This is because it is not practical or economically viable to effectively recycle them at scale.<sup>3,91,92</sup>
- **Many practical challenges prevent widespread recycling of plastic building materials.** New plastics are typically cheaper than recycled options (see “Plastic products are cheaper” on the next page). Reclaimed plastics often do not meet the same performance requirements as new plastics. Many plastic products contain harmful chemicals that shouldn’t be reintroduced into new products. Some building products contain complex combinations of different materials that can’t be easily separated. Additionally, the logistics are challenging: **it can be economically unfeasible to recover plastic materials** (e.g., recover plastic pipes installed in the ground or collect waste from small-scale construction or demolition sites), used materials often must be transported long distances for recycling, and the systems to effectively collect and sort these materials on a large scale are lacking.<sup>28,72,91,92</sup>
- **Recycling often perpetuates rather than reduces plastics’ life cycle impacts** by passing on legacy toxic chemicals into new products, releasing microplastics or other pollution during processing, and supporting continued new plastic production, for example.<sup>93-95</sup> **Recycling alone can’t solve the plastics crisis—we must reduce consumption.**

# Myth: Biobased

“This plastic is biobased so it’s sustainable.”

## REALITY CHECK

- **Plastics derived from non-fossil fuel sources can have most of the same issues as plastics made from fossil fuels.** They can still use hazardous chemicals in their production, generate plastic waste and microplastics, and include hazardous additives. PVC produced using a bio-based input, for example, is still highly problematic.

## Myth: Rely on ecolabels

“This plastic product has 20 different ecolabels so it is healthy.”

### REALITY CHECK

- Claims and product certifications can be confusing and **don't necessarily mean a product is healthier.**
  - Many certifications only consider a subset of the chemicals in products, and **very few certifications consider impacts from the full product life cycle.**
  - Be aware of what each certification considers and the gaps. Look for robust, transparent certifications by independent third parties that consider full life cycle impacts of plastics and other products.
- 

## Myth: Cost

“Plastic products are cheaper.”

### REALITY CHECK

- **Some alternatives to plastic products do cost more to purchase or install. However, others are comparable in price.** As demand for healthier, no/low plastic alternatives grows, their prices are likely to decrease.<sup>96</sup>
- **The price of plastic products ignores the substantial costs of plastics' health and environmental harms**—such as medical costs, environmental damage, and climate change-fueled disaster recovery—that are paid by individuals and governments, not fossil fuel or plastic companies.<sup>97</sup>
- **Prices of new plastics are kept artificially low because of massive government subsidies.** Annual global subsidies for fossil fuels are \$7 trillion plus an additional \$30 billion for plastic polymer production in the top 15 producing countries.<sup>98,99</sup>
- Plastic building products are often thought of as “durable goods,” but they don't always last as long as assumed. **Alternative materials may last longer, resulting in lower lifetime costs.**<sup>100</sup>



# Community impacts

Sharon and Shamell Lavigne live in Cancer Alley, an 85-mile stretch of southern Louisiana where about 200 fossil fuel and petrochemical facilities are located.

Residents of the area suffer from elevated rates and risks of reproductive, maternal, and newborn health harms; cancer; and respiratory ailments such as asthma.<sup>18</sup> These ailments have been tied to health-harming chemicals nearby factories spew into the air and water around them.<sup>18,101,102</sup>

But the Lavignes are fighting back. Sharon Lavigne leads RISE St. James Louisiana, a faith-based grassroots organization that is working to stop the proliferation of petrochemical industries in Cancer Alley.<sup>103</sup> And they're seeing success: in 2018–2019, RISE St. James successfully defeated the construction of a \$1.25 billion plastics manufacturing plant. Today, the group is fighting to prevent Formosa Plastics from building a new, massive multi-billion-dollar plastics plant in their area.<sup>103,104</sup>



Photo credit: Julie Dermansky, Chemical & Engineering News

# “The plastics that we use in our everyday life—the chemicals used to make those items—are being emitted into the air that we’re breathing.”

**SHARON LAVIGNE, RISE ST. JAMES LOUISIANA:**

“My family has lived in St. James Parish, Louisiana, all of our lives. The property has been in our family for five generations. When I was a little girl we had everything in our garden—butter beans, snap beans, mustard greens, okra. We used to go behind the levee and crawfish. You would walk outside, take a deep breath of the clean air, and you wouldn’t get sick.

You can’t fish in that river anymore. We can’t even grow a decent garden anymore. Now the land and everything that grows on it is poison.

When the first plant came, everybody was excited. My daddy would talk about it and he said, “We’re going to have jobs.” And they were glad for jobs. But they didn’t know the other side of the industry coming in here. Most of the jobs, now, are for people that aren’t local.

You better not take a deep breath today. You will get a breath full of chemicals going down your throat. Within a 10-mile radius we have 12 industries and that’s all you see. At night it looks like it’s lit up like Christmas time it’s so many lights out there. And flares. Sometimes flares late at night, sometimes early in the morning, and sometimes during the daytime.

My neighbor on my right side died. The neighbor on my left side died. Just about every household that you would speak to in St. James has someone that was lost to cancer or has cancer now. When I realized these people were dying, I couldn’t understand. I couldn’t understand why so many people were dying. And no one is doing anything about it, no one says anything about it. People are dying rapidly. Industry doesn’t care about us. All they care about is making a dollar. How many more have to die?

The plastics that we use in our everyday life—the chemicals used to make those items—are being emitted into the air that we’re breathing. Come and see. Come and breathe this air. I bet you any money you’re going to leave here with a headache or a stomachache.

Our children and our grandchildren, we want them to stay in St. James. But they can’t if the industries keep coming in to take over our communities. I want our grandchildren to grow up with clean air, clean water, clean soil.

There’s no place like home. I was born and raised here, and this is where I want to stay. The industry will have to go, not us. We will not be a sacrifice for the industry.

Before I was born, a lot of the land was plantations, with slave owners. And now the chemical plants are building for industry on top of slave lands. They’re taking our lives just like the slave owners did to the slaves back then.”

“People buying plastic building materials should know that...even though they may be benefitting from these products, we are dying from it.”

**SHAMELL LAVIGNE, RISE ST. JAMES LOUISIANA:**

“When I started learning more about what these chemicals are doing to our bodies and that there was a connection between the chemicals that are in our water and in the air, and that those chemicals can cause miscarriages and infertility issues, that’s when I started realizing, okay, this may have contributed to my miscarriage.

People buying plastic building materials should know that even though what they are making is helping to build homes, we are bearing the brunt of what those facilities are emitting. Even though they may be benefitting from these products, we are dying from it.

I definitely don’t want to see any more new industry come in. We have enough. I know that somebody has to be the voice for the people. Why not us? Why not me?”

Adapted from interviews and published with permission from RISE St. James Louisiana.<sup>105-110</sup>

[Learn more and support RISE St. James Louisiana](#)



# Cancer Alley, LA

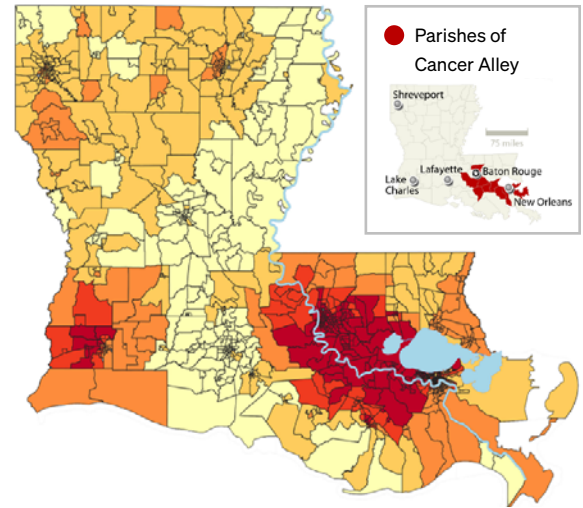
Cancer Alley includes facilities that make plastic precursors and plastics used in building products, including PVC and polystyrene.<sup>111,112</sup> It is one of numerous examples of the environmental injustice that occurs when factories that extract and refine fossil fuels, produce chemicals and plastics, and dispose of plastics are concentrated in or near communities of color, Indigenous communities, and low-wealth communities.

**A choice to use plastic building materials is a choice to perpetuate the health harms and environmental injustices that the Lavignes and their family, friends, and neighbors face every day.** And a choice to use healthier materials is a vote of support for their work to free their communities from the unjust burden of exposure to hazardous chemicals.

## LOUISIANA'S TOXIC AIR<sup>113</sup>

Excess cancer cases per million population, 2014

- 0.0–0.3
- >0.8–7.3
- >17.4–1,470
- 0.3–0.8
- >7.3–17.4
- Data unavailable



Researchers from the Tulane Environmental Law Clinic mapped Louisiana's estimated cancer risk from point sources of pollution.



## PLASTIC-RELATED PLANTS IN CANCER ALLEY<sup>112, c</sup>

- Facility makes PVC, polystyrene, and/or one of their building block chemicals
- Facility makes other plastic and/or plastic building blocks

Map data: ©2025 Google, INEGI



# Selecting healthier, no/low-plastic building products

## Minimize plastics or avoid the worst plastics with Informed™ product guidance

Habitable has researched the impacts on human and environmental health for roughly 250 unique, commonly-used building materials. This deep research has been translated into actionable product guidance called Informed™ to make it easier for teams to take action and select healthier products.

Based on the use and release of hazardous chemicals throughout building products' life cycle, Informed™ ranks product types within product categories using a red (worst) to green (best) spectrum.

Product types that are ranked **yellow** or **green** are healthier options and tend to contain less plastic or avoid the worst plastics—including PVC and polystyrene—while reducing the overall toxic chemical harms over the life cycle of these products.

Visit the Informed™ website to view our complete product guidance, including additional product categories.

### EXAMPLE PRODUCT GUIDANCE: INSULATION

Prefer	Expanded cork boards
	Blown-in wood fiber
	Blown and batt sheep's wool
	Hemp fiber batts
	Wood fiber batts and boards
	Blown-in fiberglass or mineral wool
	Unfaced fiberglass batts
	Formaldehyde-free mineral wool batts and boards
	Blown-in cellulose (loose fill)
	Unfaced formaldehyde-free fiberglass boards
Avoid	Kraft-faced fiberglass batts
	Cellulose/cotton batts
	Blown-in cellulose (dense pack and wet-blown)
	PSK or FSK-faced fiberglass batts
	Standard mineral wool batts and boards
	Standard fiberglass boards
	Halogen-free polyisocyanurate boards
	ASJ- or FSK-faced fiberglass boards
	Expanded polystyrene (EPS) boards
	Standard polyisocyanurate (polyiso) boards
Extruded polystyrene (XPS) boards	
Spray polyurethane foam (SPF)	

Plastic insulation

Visit the **Informed™** website.

## Example healthier, no/low-plastic alternatives

Healthier alternatives to PVC, polystyrene, and other plastic building materials are widely available. The table below provides examples of plastic building products and healthier, no/low-plastic alternatives that can be purchased today.

Product category	Plastic building material	Healthier materials with no/low-plastic <sup>d</sup>
Flooring	<ul style="list-style-type: none"> <li>• Vinyl, e.g., luxury vinyl tile, vinyl composition tile, sheet vinyl</li> <li>• Carpet tile and sheet, broadloom carpet</li> <li>• Rubber tile, sheet rubber</li> <li>• Bio-based polyurethane</li> </ul>	● Linoleum sheet/tile
		● Concrete (no PFAS <sup>e</sup> sealer)
		● Solid wood
		● Ceramic tile (no added lead)
Insulation	<ul style="list-style-type: none"> <li>• Spray polyurethane foam (SPF)</li> <li>• Extruded polystyrene (XPS)</li> <li>• Expanded polystyrene (EPS)</li> <li>• Polyisocyanurate (polyiso)</li> </ul>	● Expanded cork board
		● Wood fiber blown/batt
		● Sheep's wool blown/batt
		● Fiberglass or mineral wool loose fill/dense pack/spray applied
		● Hemp batt
		● Cellulose loose fill/dense pack/wet-blown
Siding/Cladding	<ul style="list-style-type: none"> <li>• Vinyl (PVC) siding</li> <li>• Faux stone/brick/wood siding (polyurethane, polypropylene/polymeric)</li> <li>• Exterior high pressure laminate (also called phenolic) panels</li> <li>• Polypropylene siding (also called polymeric siding)</li> <li>• Polycarbonate panel</li> </ul>	● Fiberglass batt, unfaced or kraft-faced
		● Expanded cork board
		● Anodized aluminum
		● Galvanized steel
		● Natural stone
		● Solid wood
		● Terra cotta/Ceramic
		● Brick/Thin brick veneer
		● Manufactured stone/CMU veneer
		● Fiber cement
		● Lime plaster
● Stucco		

### True sustainability includes health

Sustainability efforts in the built environment have prioritized reducing operational and embodied carbon, but when only these impacts are considered, serious health harms can be missed. By holistically considering all impacts, built environment

practitioners can identify healthier products that are truly better for people and the planet.

**Learn more with Habitable's carbon and health resources.**

# Lead by example

If you specify or buy building materials, influence green building standards, invest in real estate, influence policy, or provide philanthropic funding, you have the power to help avoid the worst plastics and reduce plastic use in the built environment. Healthier and viable alternatives are widely available, often with comparable cost and performance.

## Here are some examples:

### **SERA ARCHITECTS**

installed cork flooring in high traffic areas at their Portland headquarters. Made from natural cork, the material has performed exceptionally well, showing no scuffing, damage, or fading. It is more expensive than most vinyl flooring but cost-competitive with hardwood. While most cork flooring still contains plastic, it typically avoids the worst plastics, including PVC.

### **CANNONDESIGN**

uses linoleum flooring—a healthier, no/low-plastic product—for healthcare facilities, including a children’s care center in Colorado. At a minimal cost premium, the facilities are able to reduce plastic use and toxic exposures while delivering reliable performance benefits.

### **MSR DESIGN**

has used mineral wool boards instead of plastic foam insulation for above-grade wall applications. The material retains its R-value, dries well, and is inherently flame-resistant, delivering critical performance benefits while being cost-effective.

### **MINNESOTA HOUSING**

Projects that receive funding from Minnesota Housing are required to meet the Minnesota Overlay to the Enterprise Green Communities Criteria. In the 2025–26 version of the Overlay, Minnesota Housing incorporated Habitable’s Informed<sup>TM</sup> product guidance, promoting the benchmarking of current practice and the selection of healthier products through optional criteria.

### **CLIF FAMILY FOUNDATION**

works to reduce plastics in buildings as a pathway to advance climate justice and health equity, particularly for fence-line communities impacted by plastics manufacturing. Through Habitable, Clif funding supported demonstration projects in affordable housing that paved the way toward systems change to replace toxic plastics in our homes and communities with healthy bio-based materials.

### **THE CITY OF MINNEAPOLIS**

does not allow the use of vinyl siding on new one-, two-, or three-unit residences, only permitting “masonry, brick, stone, stucco, wood, cement-based siding, and/or glass” for exterior building materials.<sup>114</sup>



# Big impacts

Substituting no/low-plastic alternatives for PVC and polystyrene building products can make a big difference.

See the appendix for additional example impacts and calculation details.

## VINYL SIDING

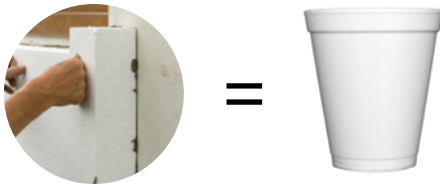
# 21B water bottles



Substituting 25% of global vinyl siding use with a healthier alternative like engineered wood siding, would avoid an estimated 210,000 tons of plastics each year—about the same as almost 21 billion water bottles.

## EPS AND XPS BOARD INSULATION

# 800B foam cups

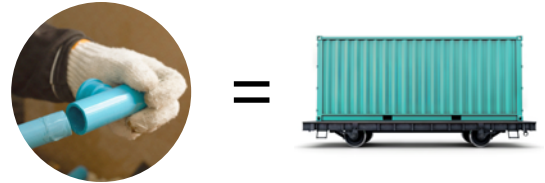


Shifting global use of EPS and XPS in above-grade applications to mineral wool boards would avoid an estimated 4 million tons of plastics each year. That's equivalent to almost 800 billion polystyrene foam cups or about 100 cups for every person in the world.

## PVC PIPE

# 70,000 railcars

Reducing global PVC pipe use by 25% in favor of alternatives (such as copper, iron, concrete, and steel) would avoid an estimated 6 million tons of PVC each year—equivalent to over 70,000 railcars' worth of the PVC building block vinyl chloride.



The 2023 train derailment in East Palestine, OH involved the derailment and burning of five rail cars of vinyl chloride.

## VINYL FLOORING

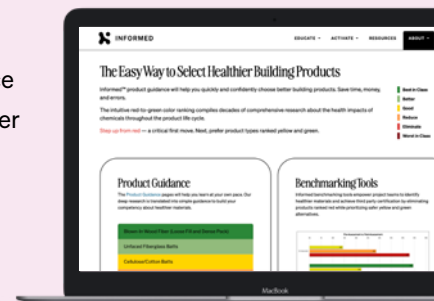
# 39M gallons of gasoline



Shifting 25% of vinyl flooring applications in the U.S. to a product such as linoleum, would avoid an estimated 390,000 tons of CO<sub>2</sub> equivalent each year—about the same amount generated by using 39 million gallons of gasoline.

### Get Informed™

Informed™ product guidance can help you identify healthier alternatives and shift away from the worst plastics, like PVC and polystyrene.



## Call for innovation

Professionals in the building and construction sector, policymakers, and others can make significant progress now to reduce plastics impacts—avoiding the worst plastics, reducing plastics use, and preferring existing healthier no/low-plastic alternatives.

**Looking forward, a truly safe and sustainable built environment also requires innovative materials, designs, and processes that fundamentally rethink construction to minimize plastic use.**

This innovation must include the development of truly healthy products—both improved versions of time-tested materials and new no/low-plastic alternatives. Innovation must also include ways to design differently, such as decreasing overall material use, using longer-lasting products, and designing for deconstruction and reuse.

Collective industry commitment to advancing these innovations can and will create a truly safe and sustainable future for all people and the planet.

## What does “healthy” mean?

At Habitable, we believe that a product is not truly healthy unless it is healthy for all. That means people and the planet are protected from toxic exposures throughout the entire life cycle of the product.

### A truly healthy material is:

- one that minimizes resource extraction by using rapidly renewable resources or waste-derived materials that are free of toxic chemicals and do not generate other hazards like microplastics during processing;
- inherently low-hazard, including all inputs and outputs throughout its life cycle;
- one that publicly discloses all chemicals used in production and ensures this information is traceable through the value chain;
- long-lived and kept in place for its full service life;
- designed for durability, reclamation, reuse, and recycling, and is actually reclaimed, reused, or recycled into similar or higher value products;
- one that generates no waste;
- manufactured and used in ways that uphold equity and human rights throughout its life cycle;
- designed in partnership with communities most impacted.

Few materials today meet this vision of “healthy” and alternatives to plastics can have downsides, too.<sup>f</sup> But as we move toward this vision, we can make significant strides now by selecting healthier materials that reduce hazards to people and the environment across the life cycle. We can do this by scaling up production of alternatives with care, keeping health impacts top of mind, and including communities most impacted by the product life cycle as an integral part of discussions and decision-making.

**CASE STUDY:**

# Pioneering healthier housing with hempcrete

The Lower Sioux Indian Community in Minnesota puts healthier building materials innovation into practice. Their Seed to Sovereignty hempcrete initiative demonstrates how a building product can be healthier for people and the planet when it is made from rapidly renewable resources, minimizes waste, reduces hazards across its life cycle compared to plastics, and advances equity through community-controlled production. By growing, processing, building with, and providing training on how to use this low-carbon construction material, the Lower Sioux are addressing a critical housing shortage while creating jobs for tribal members.

**BACKGROUND AND NEED**

With over 1,100 residents and 1,473 acres of mostly sandy soil, this small tribal nation faces a severe housing shortage of approximately 150–200 homes. Many community members either live in substandard housing with poor insulation against harsh Minnesota winters or lack housing entirely. The Seed to Sovereignty initiative was born from the tribe’s commitment to self-determination and sustainability.



The Lower Sioux Indian Community’s Seed to Sovereignty hempcrete initiative demonstrates how a building product can be healthier for people and the planet.

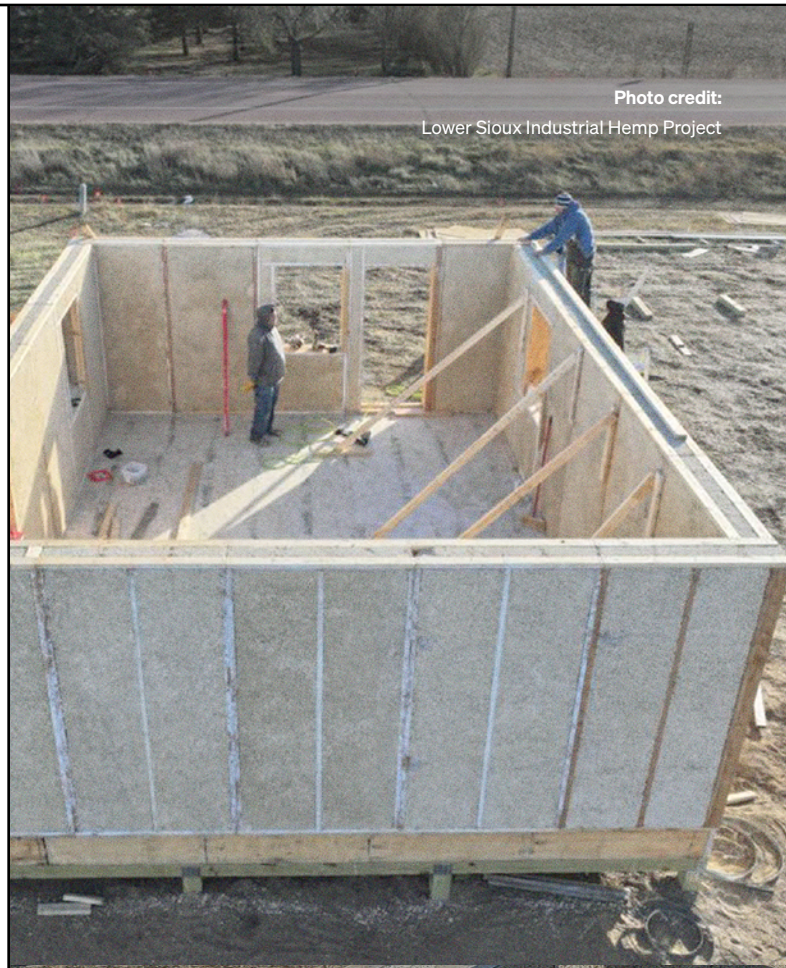


Photo credit:  
Lower Sioux Industrial Hemp Project



Photo credit:  
Lower Sioux Industrial Hemp Project

### THE HEMPCRETE SOLUTION

Hempcrete is a biological and mineral-based material made primarily from hemp hurds, lime, and water.<sup>9</sup> It creates lightweight, self-insulating walls that regulate moisture and resist fire, mold, and pests. Unlike plastic materials, it is environmentally beneficial, sequestering carbon dioxide.<sup>115-117</sup> The 2024 version of the International Residential Code noted the following benefits of hempcrete:

- High thermal performance
- Low embodied carbon emissions during production
- High carbon sequestration in service
- High fire resistance<sup>118</sup>

### COMMUNITY-CONTROLLED PRODUCTION

The tribe has established a vertically integrated operation in their 20,000-square-foot manufacturing facility, controlling the entire process from cultivation to construction. Their facility enables year-round production of hempcrete blocks and panels, significantly expanding their building capacity beyond Minnesota's short construction season.

The project has already achieved success, with a six-person construction team of tribal members building three hempcrete houses in just seven months.

### ECONOMIC AND ENVIRONMENTAL IMPACT

The tribe's hempcrete initiative carries multiple benefits beyond housing. It also creates skilled employment opportunities for tribal members, supports local agricultural development, and demonstrates environmental leadership. Hemp grows quickly, regenerates soil, and often doesn't require fertilizers.

While the reservation has only 500 acres of tillable farmland, their facility can process hemp from up to 2,500 acres. This capacity gap creates opportunities for partnership with local farmers, potentially supporting regional economic development while furthering the tribe's goals.

### LOOKING FORWARD

The Lower Sioux community aims to expand beyond new construction to retrofit existing buildings with hempcrete, addressing both current and future housing needs with healthier alternatives. Their model provides a replicable blueprint for other communities seeking sovereignty through sustainable innovation.

As former tribal council member Earl Pendleton notes, "As the historical caretakers of the environment, Native communities should be leading the change in how the world is built." Through innovation and determination, the Lower Sioux Indian Community is turning this vision into reality.

Adapted from news articles and interviews. Published with permission from The Lower Sioux Indian Community in Minnesota.<sup>115,119-124</sup>

[Visit the Seed to Sovereignty website.](#)



# Recommendations

Everyone should be aware of the impacts that plastic building products have on people and the environment throughout their life cycle. And professionals in the building and construction sector have a critical role to play in reducing plastic use.

This includes people who specify or buy building materials (architects, designers, contractors, building owners, building product retailers, consumers), product manufacturers, green building standards organizations, real estate investors, and policymakers.

**By implementing the following strategies, you can make meaningful reductions in plastic use while protecting people and reducing environmental harm:**

## Minimize new material use

and reuse existing products when possible

## Choose healthier materials

when new products are necessary

## Choose long-lived, timeless materials

that remain in place for their full service life

## Evaluate recycling claims critically

(recycling often perpetuates rather than reduces the life cycle impacts of plastics)

# The role you can play

## Building professionals

Architects, designers, developers, and others who specify or buy building materials can consider impacts throughout the product life cycle—not just during the occupancy phase—when making material selections. By factoring in the full life cycle of pollution and its externalized costs to human health and the environment when specifying materials, you can help the built environment deliver long-term positive impacts that support both the planet and the people who live on it.

## Green building standards

Use assessment tools that consider health impacts for worst-in-class materials such as plastics throughout the supply chain and incentivize selection of materials that have the least adverse impact on human health and the environment throughout the life cycle.

## Real estate investors

Support initiatives that reduce plastics at scale in the built environment, ultimately reducing climate risks and environmental harm while enhancing human well-being.

## Policymakers

Advance no/low-plastic alternatives and incentivize their adoption through policies that phase out unnecessary plastic building materials in favor of safer options, prioritizing elimination of the most hazardous plastics such as PVC and polystyrene.

## Philanthropic funders

Actively communicate and integrate plastic building product reduction into your funding strategy with your partners and align collective action to support a built environment that is healthy and equitable for all.

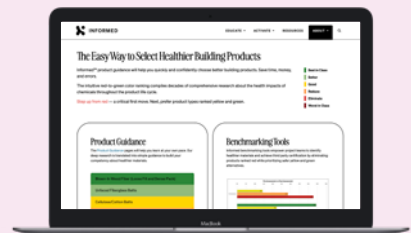
### Ready to do more?

Visit [Habitable's](#) website for more ways you can drive change.



### Get Informed™

Use our [Informed™](#) product guidance to select healthier alternatives in your work.



## Example impacts

**Reducing global PVC pipe use by 25% could avoid each year:**

**6 million tons of PVC**

equivalent to over 70,000 railcars' worth of the PVC building block vinyl chloride

---

**Reducing global vinyl siding use by 25% and shifting to a product such as engineered wood siding, could avoid each year:**

**210,000 tons of plastics**

about the same as almost 21 billion water bottles

---

**230,000 tons of vinyl chloride**

which could fill about 2,600 railcars

---

**280,000 tons of CO<sub>2</sub> equivalent**

about the same amount generated by using 29 million gallons of gasoline

---

**Shifting the use of EPS and XPS board insulation in above-grade applications to mineral wool boards globally could avoid each year:**

**4 million tons of plastics**

equivalent to almost 800 billion polystyrene foam cups or about 100 cups for every person in the world

**Reducing PVC flooring use by 25% in the United States alone and shifting to a product such as linoleum, could avoid each year:**

**150,000 tons of plastics**

about the same as almost 15 billion water bottles

---

**160,000 tons of vinyl chloride**

which could fill about 1,800 railcars

---

**390,000 tons of CO<sub>2</sub> equivalent**

about the same generated by using 39 million gallons of gasoline

---

**Reducing PVC flooring use by 25% in Europe alone and shifting to a product such as linoleum, could avoid each year:**

**84,000 tons of plastics**

about the same as 8 billion water bottles

---

**87,000 tons of vinyl chloride**

which could fill about 980 railcars

---

**430,000 tons of CO<sub>2</sub> equivalent**

about the same amount generated by using 43 million gallons of gasoline

## Calculation details

### A NOTE ON UNITS:

Numbers throughout the report are provided in United States customary units, including tons. Most international sources use the metric system. Here in the appendix where indicating specific numbers as provided by these sources, we maintain the units used in the cited source. Tonnes = metric tons.

### FOR ALL APPLICABLE CALCULATIONS:

It was assumed that a water bottle weighs approximately 9.25 grams per Recycling Today.<sup>89</sup> The ratio of vinyl chloride to PVC is 1.03:1 per Chlorine and Building Materials.<sup>111</sup> Per Toxic Free Future, an average tank car carries 177,111 pounds of vinyl chloride.<sup>21</sup> Greenhouse gas equivalencies were calculated using an EPA calculator.<sup>125</sup>

### STATEMENT:

**One manufacturer advertises that their flooring product recycles two plastic bottles per square foot. In reality, it uses 5 pounds of new plastics for every pound of plastic waste.**

### CALCULATIONS BASED ON:

Percentage of plastic content identified using the Health Product Declaration.<sup>88</sup> It is unclear what part is being contributed by recycled plastic bottles based on the disclosure. The amount of recycled plastic was estimated based on the typical weight of a water bottle per Recycling Today.

The area weight of this specific product could not be determined, so the Common Product area weight was used for the estimate of total weight of plastic.<sup>90</sup>

### STATEMENT:

**PVC accounts for nearly half of all the plastics used in the building and construction sector.**

### CALCULATIONS BASED ON:

OECD Global Plastics Outlook estimates 76.9 million tonnes of plastic use in building and construction worldwide in 2019 (includes primary and secondary plastics). This includes 35.8 million tonnes of PVC.<sup>73</sup>

**STATEMENT:**

**Globally, about 25 million tons of PVC are used each year for pipes and fittings. This would equal almost 2.5 million miles of 4-inch drain pipe, which could reach to the moon and back 10 times.**

**CALCULATIONS BASED ON:**

OECD Global Plastics Outlook estimates that 51.4 million tonnes of PVC were used globally in 2019.<sup>73</sup>

Percentage of global PVC production that goes to pipes and fittings was 45% in 2018 per European Commission.<sup>72</sup>

PVC4Pipes notes that the annual European PVC pipe tonnage (4.3 million tonnes) converted into a 110 mm drain pipe at 1.7 kg/m, would equal 735,294 km. For this calculation, 110 mm drain pipe is assumed to be about the same weight per foot as 4-inch drain pipe.<sup>76</sup>

Per the National Aeronautics and Space Administration (NASA), the moon is an average of 238,885 miles from earth.<sup>77</sup>

**STATEMENT:**

**Reducing global PVC pipe use by 25% could avoid each year: More than 6 million tons of PVC—equivalent to over 70,000 railcars worth of the PVC building block vinyl chloride.**

**CALCULATIONS BASED ON:**

OECD Global Plastics Outlook estimates that 51.4 million tonnes of PVC were used globally in 2019.<sup>73</sup>

The percentage of global PVC production that goes to pipes and fittings was 45% in 2018 per European Commission.<sup>72</sup>

**STATEMENT:**

**Reducing global vinyl siding use by 25% and shifting to a product such as engineered wood siding, could avoid each year:**

- 210,000 tons of plastics—about the same as almost 21 billion water bottles
- 230,000 tons of vinyl chloride—which could fill about 2,600 railcars
- 280,000 tons of CO<sub>2</sub> equivalent—about the same amount generated by using 29 million gallons of gasoline.

**CALCULATIONS BASED ON:**

The projected global demand for vinyl siding was expected to reach 397 million square meters in 2024.<sup>126</sup>

Percent weight plastic, PVC, and area weight for both PVC siding and engineered wood were gathered from the Common Product database and Cladding Informed™ product guidance development.<sup>58,127</sup>

Embodied carbon data was generated from the Building Emissions Accounting for Materials, BEAM, calculator. Vinyl estimates were taken using Vinyl Siding / Vinyl Siding Institute / 0.040" Double 4.5" [Industry Avg | US & CA] and engineered wood siding estimates were taken using Engineered Wood Siding & Trim / LP / SmartSide / 5/16" (8 mm).<sup>128</sup>

**STATEMENT:**

**Reducing PVC flooring use by 25% in Europe alone and shifting to a product such as linoleum, could avoid each year:**

- 84,000 tons of plastics—about the same as 8 billion water bottles
- 87,000 tons of vinyl chloride—which could fill about 980 railcars
- 430,000 tons of CO<sub>2</sub> equivalent—about the same amount generated by using 43 million gallons of gasoline

**CALCULATIONS BASED ON:**

3 billion square meters of flooring are consumed each year in Europe, with vinyl accounting for roughly 10%.<sup>129</sup>

Percent weight plastic, PVC, and area weight for both PVC flooring and linoleum were gathered from the Common Product database.<sup>130,131</sup> We used the Common Product for LVT as a proxy for all vinyl flooring because a specific breakdown by product type is not available, and LVT includes an intermediate amount of PVC compared to other vinyl flooring Common Products.

Embodied carbon data was generated from the Embodied Carbon in Construction (EC3) Tool. Search terms for vinyl flooring were material=LVT, geography=Europe. Search terms for linoleum flooring were material=Linoleum, geography=Europe. The average kgCO<sub>2</sub>e across all returned Environmental Product Declarations (EPDs) was used to calculate the carbon difference.<sup>132</sup>

**STATEMENT:**

**Reducing PVC flooring use by 25% in the United States alone and shifting to a product such as linoleum, could avoid each year:**

- 150,000 tons of plastics—about the same as almost 15 billion water bottles
- 160,000 tons of vinyl chloride—which could fill about 1,800 railcars
- 390,000 tons of CO<sub>2</sub> equivalent—about the same generated by using 39 million gallons of gasoline.

**CALCULATIONS BASED ON:**

5.746 billion square feet of vinyl flooring was used in the United States in 2022, including LVT (glue down, click, loose lay, WPC and SPC), VCT, and residential sheet vinyl. This does not include commercial vinyl sheet or residential “resilient tile” which may also be vinyl.<sup>133</sup>

Percent weight plastic, PVC, and area weight for both PVC flooring and linoleum were gathered from the Common Product database.<sup>130,131</sup> We used the Common Product for LVT as a proxy for all vinyl flooring because a specific breakdown by product type is not available, and LVT includes an intermediate amount of PVC compared to other vinyl flooring Common Products.

Embodied carbon data were generated from the Embodied Carbon in Construction (EC3) Tool. Search terms for vinyl flooring were material=LVT, geography=US. Search terms for linoleum flooring were material=Linoleum, geography=US. The average kgCO<sub>2</sub>e across all returned EPDs was used to calculate the carbon difference.<sup>132</sup>

**STATEMENT:**

**Shifting the use of EPS and XPS board insulation in above-grade applications to mineral wool boards globally could avoid each year:**

- 4 million tons of plastics—equivalent to almost 800 billion polystyrene foam cups or about 100 cups for every person in the world

**CALCULATIONS BASED ON:**

7,200,000 tonnes of EPS were consumed worldwide in 2022, and 53% of EPS was used in construction projects.<sup>134</sup>

The OECD estimates that 6.31 million tonnes of polystyrene are used in the building and construction sector. Using estimates of EPS in building and construction above, and assuming all polystyrene is either EPS or XPS, the remaining 2.64 million metric tonnes of polystyrene are used in XPS.<sup>73</sup>

Percent weight polystyrene, R-per-inch, and density for EPS, XPS, and mineral wool were gathered from the Common Product database.<sup>135–137</sup>

Volumes of EPS and XPS used for above-ground applications are from Table 2–6 in Lassen, et al. This is data for Germany specifically, but since no more general data were identified, it is used as an estimate of global usage breakdown.<sup>81</sup>

The average weight of a 16-ounce hot beverage styrofoam cup was determined to be 4.7 grams in a 2006 study.<sup>138</sup>

The UN estimates the world’s population to be about 8 billion people.<sup>139</sup>

Carbon data was not included in the metric calculation. Carbon emissions associated with insulation products vary widely across manufacturing locations and around the globe. Using mineral wool in place of polystyrene insulation can have a carbon trade-off, but it is also possible to choose products that achieve carbon savings.

- a OECD Global Plastics Outlook projects total plastic production 2025–2049 to be 16,285 million tonnes. Plastic production from 1950–2024 is estimated to total 12,193 million tonnes. Limited data is available for plastic production prior to 1950, but even assuming 1950 levels of production in each of the prior 15 years only marginally increases the total plastic production to date.
- b Per OECD, for 2025, projected plastics use in packaging is 161 million tonnes and in building and construction is 84 million tonnes. In 2050, plastics use in building and construction is projected to be 153 million tonnes, almost double the 2025 value. Plastic use in building and construction is projected to be 160 million tonnes in 2052 and 164 million tonnes in 2053, surpassing the 2025 plastic packaging value. 1 tonne is about 1.1 tons.
- c The map shows existing plastic-related facilities located in the nine Cancer Alley parishes: Ascension, East Baton Rouge, Iberville, Jefferson, Orleans, St. Charles, St. James, St. John the Baptist, and West Baton Rouge. It includes facilities that make the most common plastic polymer resins: polyethylene, polypropylene, polyvinyl chloride (PVC), polyethylene terephthalate (PET), and polystyrene and their main chemical ingredients from the Plastic Plants Inventory. Facilities that produce chlorine, ethylene dichloride, vinyl chloride, and/or PVC are identified as associated with PVC production and facilities that produce benzene, ethylbenzene, styrene, and/or polystyrene are identified as associated with polystyrene production. These facilities may also produce other plastics or plastic building blocks. Ethylene is used to produce both PVC and PS. Because it is also used to make polyethylene, and it is unclear whether the ethylene produced at the facilities is used for PVC/PS, ethylene producing facilities are listed as other plastic on the map.
- d For the purposes of this table, healthier materials are “preferred” (ranked yellow or green) in Habitable’s Informed™ product guidance<sup>58</sup> and “low-plastic” is defined as 0.03 lb/ft<sup>2</sup> or less based on Habitable’s Common Product research.<sup>7</sup> The pipes considered are either entirely no-plastic or almost entirely plastic with small quantities of additives. Exact weights of individual products will vary based on the thickness and density of the product.
- e PFAS stands for per- or polyfluorinated alkyl substances, sometimes called “forever chemicals.”
- f For example, biological materials may use toxic pesticides or contribute to clearing of forests. Minerals and metals often use carbon-emitting high-temperature processing, and mining them can harm the environment and neighboring communities.
- g While more information on a proprietary reactive additive is needed, this hempcrete solution is almost entirely made of known substances that reduce hazards compared to the life cycle of plastic products.

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