

WHY CARBON MATTERS

Its Impact on Human Health and the Future of Design

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SHOULD WE RETHINK THE DEFINITION OF HUMAN-CENTERED DESIGN?



It's a ubiquitous term in the interior design industry — and rightly so. After all, if we're not designing for people, who will recognize great design? And how will we continue to provide value and drive continued business?

Human-centered design has been around forever, and its meaning continues to evolve. We've recently expanded the definition to not only include how a person experiences a space but to also consider how the materials in the space may affect the people in it.

It's now time to expand our definition again.

In our quest for biophilic design, our conversations around "healthy materials," and our drive to create experiences that go beyond meeting basic needs, we've completely glossed over the greatest threat to human health in the 21st century: climate change.

And as designers, we've left the job of reducing carbon emissions to professionals that consider the operational energy use of buildings and haven't paid attention to all the carbon emissions that come from producing the building materials themselves.

Until now.

It's a fact that buildings and construction account for 40 percent of total global greenhouse gas emissions. And experts say that carbon emissions from the built environment need to peak within the next 15 years for Earth to have a chance of staying below the global warming tipping point.

Within that same time period, we will construct 900 billion square feet of new buildings and major renovations globally.

Knowing this, architects and designers have a huge opportunity to consider the humans of the present and the humans of the future in our process. Human-centered design needs to consider the humans involved in the supply chains of materials and products we specify into projects. It needs to consider the humans who will live, work, learn, and heal in the buildings we're designing now. And it needs to factor in the carbon emissions of the products and buildings we work with every single day.

Seem impossible? With the right knowledge and tools, it's easier than you might think.

Lisa Conway

Lisa Conway
Vice President, Sustainability
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A CLOSER LOOK AT CARBON

With concern mounting for our warming planet, how well do you understand the relationship between carbon and human health?

Scientists studying climate change say rising temperatures and sea levels will set in motion more health risks around the globe. As designers, architects, and

manufacturers, you are uniquely positioned to mitigate this impending crisis by taking steps to neutralize, and potentially reverse, our impact on the climate.

Time is of the essence, though. The urban built environment accounts for 75 percent of annual global greenhouse gas emissions, with buildings alone accounting for 39 percent¹. If the design community implements greener manufacturing processes and building principles now, the Earth's ecosystem will have a chance to retain its balance. By familiarizing yourself with the science behind carbon emissions and offset opportunities, you'll be better equipped to protect the planet, and our health.

CARBON DEFINED

Carbon dioxide—a colorless gas produced by burning fossil fuels, such as coal, natural gas, and oil, and through respiration—is the most prevalent greenhouse gas in the atmosphere². And since greenhouse gases absorb heat, warming the planet, a key to preserving clean air and water and slowing the effects of climate change is understanding carbon.

Today, the concentration of carbon in the atmosphere is dangerously high. When levels in the atmosphere surpass 400 parts per million (ppm), the Earth becomes warm enough to melt off chunks of ice in Greenland and Antarctica. We're already at that point. Carbon dioxide in the atmosphere surpassed 400ppm in 2013 for the first time in recorded history and continues to climb—making our current levels higher than ever recorded in the last 400,000 years³.

How did we get here? The industrial revolution marks a known tipping point. Though this era brought many innovations, namely the transition from hand production to machine manufacturing processes involving chemicals, iron, and steam power, it also required burning fossil fuels, significantly increasing the amount of carbon released into the atmosphere. These changes have profound effects on our health.

CARBON EMISSIONS AND HUMAN HEALTH

In the study of geology, monumental change happens at a glacial pace—literally. Scientists estimate that at the time of the last ice age, about 20,000 to 11,000 years ago, carbon dioxide

levels increased from 200 to 280ppm—a shift that occurred over the course of 6,000 years. More recently, we've seen carbon levels rise from 280ppm to more than 400ppm in less than 200 years. "I call it an explosion," says Pieter Tans in a documentary chronicling climate change called *Ice on Fire*. Tans leads the Global Greenhouse Gas Reference Network. "It's instantaneous in the geologic timeline," he adds.

Climate change impacts core determinants of human health, such as clean air, safe drinking water, sufficient food, and shelter⁵. According to the Centers for Disease Control and Prevention (CDC), climate shifts caused by increased carbon dioxide levels lead to more air pollution and allergens, while also impacting water quality and supply—in turn causing respiratory allergies, asthma, Lyme disease, mental health issues, and more.

The solution? We need to emit less carbon into the atmosphere and remove some of the excess that currently exists there to create a climate fit for life. Interface, the global flooring leader in sustainability, is committed to viewing carbon as a resource, rather than an enemy⁶. Since the mid-90s, the company has implemented strategies to reduce waste, energy, water usage, and greenhouse gases by setting aggressive goals and continuously innovating. Though Interface products already have an embodied carbon reduction focus, the company is determined to do more, with a goal of being carbon negative by 2040. As members of the design community tasked with imagining and bringing to life the buildings and products of tomorrow, you have the ability to set in motion profound change by lowering your carbon footprint and pushing forward the climate change dialogue.

¹ Architecture 2030: https://architecture2030.org/2030_challenges/2030-challenge/

² Environmental Protection Agency: <https://www.epa.gov/ghgemissions/overview-greenhouse-gases>

³ NASA. The Relentless Rise of Carbon Dioxide: https://climate.nasa.gov/climate_resources/24/graphic-the-relentless-rise-of-carbon-dioxide/

⁴ Spencer Weart, August 2012. <https://www.scientificamerican.com/article/discovery-of-global-warming/>

⁵ World Health Organization: Climate Change and Health. Published February, 2018: <https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health>

⁶ Interface video: FYI | Carbon. Released January, 2019: https://www.youtube.com/watch?v=mumgbxLdz_E&feature=youtu.be

CALCULATE YOUR CARBON FOOTPRINT WITH EC3

Resources that can help you compare the amount of embodied carbon emitted by each product are essential, such as the newly available Embodied Carbon in Construction Calculator (EC3) tool. The EC3 tool enables users to assess the embodied carbon in their supply chain, which allows them to specify and procure lower-carbon options, based on available products.

With the EC3 tool, designers can ask: How many carbon emissions are being released to make the product I'm specifying? "If you're not choosing carbon-smart finishes, you're missing the biggest opportunity you have to make a difference on climate," says Mikhail Davis, Director of Technical Sustainability at Interface. To better understand the relationship between embodied carbon emissions and the built environment, utilizing the EC3 tool is a great place to start.

Go to buildingtransparency.org to learn more.

CARBON BY THE NUMBERS

According to the World Health Organization

7 MILLION premature deaths are caused by air pollution every year

250,000 additional deaths are projected to result from climate-sensitive diseases (heat stress, malnutrition, dengue, and malaria) from 2030 onward

2 TO 1 BENEFIT-COST RATIO

Health gains from climate action are double the cost of mitigation policies at a global level

\$2-4 BILLION/YEAR = the projected cost of health concerns caused by climate change by 2030



Perkins & Will/Interface Global Headquarters/Photo: Nick Merrick

THE FUTURE OF DESIGN IS SUSTAINABLE

Through research and strategic specification of materials, designers can create spaces that produce measurable benefits backed by science. "Those of us specifying and making products for the built environment every day can have such a positive impact on both the planet and overall health outcomes," says Lisa Conway, VP of Sustainability at Interface. "The power of smart specification decisions and understanding what is behind the materials we use is immense." Sourcing materials that limit or reduce carbon emissions is a vital step, and one manufacturers and designers can take today.

Interface is currently exploring raw materials that absorb carbon from the atmosphere and using them to make products. The company's CircuitBac™ Green Carpet tile backing, available on specific products manufactured in Europe, actually stores more carbon during its life cycle than it emits. Sourcing materials that limit or reduce carbon emissions is a vital step, and one manufacturers and designers can take today.

Spreading awareness and education also is essential. Interface co-founded the Materials Carbon Action Network (materialsCAN) to offer the industry a forum to discuss carbon and explore specification solutions. Major firms, such as Gensler, are part of the network, making carbon a more visible topic⁷.

This fall, the design community also will have access to the Embodied Carbon in Construction Calculator (EC3), created in collaboration with the Carbon Leadership Forum by Skanska USA, Microsoft, and C Change Labs.

UNDERSTANDING CARBON OFFSETS

When manufacturers know their products are not yet carbon neutral, even with carefully sourced materials and cleaner processes, they can seek out ways to achieve a net-zero impact. Here is where carbon offsets can make a significant impact. Carbon offsets serve as a catalyst for the change needed to improve the health of the planet by enabling manufacturers to take responsibility for their own carbon footprint. Companies, such as Everland and Bluesource, ease the process of identifying offset projects by providing manufacturers guidance about their levels and sources of carbon emissions as well as a database of opportunities to reduce them.

For manufacturers, the first step to reducing carbon emissions is calculating how much is being produced by a given process, project, or product. Next, it is imperative manufacturers implement greener processes and more environmentally conscious decisions where possible to neutralize or reduce their overall footprint. When internal reductions are uneconomical or even impossible, such as emissions necessary for the transport of materials, then offset projects provide additional opportunities to pull carbon out of the atmosphere. This is especially important since companies rarely control every element of a product's supply chain.

While carbon offsets are by no means the single solution to the climate problem, they do fund real action. High-quality offset projects are thoroughly vetted by a third party to ensure the emission reductions are impactful and that the revenue from offsets flows to those enacting the change, creating a demand for others to conserve the environment. In the process of offsetting carbon, you're also ensuring more positive—and necessary—changes become a reality.

As we move toward another pivotal point in the fight to preserve our health and quality of life—one where carbon levels in the atmosphere could hit 600-700ppm, which is warm enough to melt all land ice masses and significantly raise seas⁸—large and small changes to reduce carbon emissions matter more than ever. To preserve our natural resources and replenish the quality of our air and water, start with carbon smart specification choices and cleaner building design. The time to act is now.

⁷ Interface materialsCAN website: materialsCAN.org

⁸ *Ice on Fire* Documentary. Directed by Leila Conners. Produced by Leonardo DiCaprio, Leila Conners, George DiCaprio, Mathew Schmid. HBO Films, Appian Way Productions. Released May, 2019.

HOW TO TALK ABOUT CARBON

When it comes to the carbon lexicon, where seemingly opposite terms such as *climate positive* and *carbon negative* carry the same meaning, scientific language can be challenging to navigate. As architecture and design firms evaluate ways to reduce their carbon footprint and make better choices for customers by designing projects with carbon in mind, understanding these core terms is a vital step.

GREENHOUSE GAS

Greenhouse gases are gases that absorb and trap heat in the atmosphere—including carbon dioxide, methane, and nitrous oxide—thereby warming the planet. These gases are emitted through various manufacturing processes, including the creation of building materials.

Why it matters? Carbon dioxide is the most prevalent greenhouse gas in the Earth's atmosphere, accounting for about 82% of all greenhouse gas emissions⁹, and it's one we can proactively reduce.

EMBODIED CARBON

Embodied carbon encompasses the carbon dioxide emitted during the extraction, manufacture, transport, and construction of building materials. For the design community, reducing embodied carbon needs to be a priority.

Why it matters? Architecture and design firms have an immense opportunity to push climate change initiatives forward by proactively working to reduce embodied carbon.

OPERATIONAL CARBON

Operational carbon is defined as the carbon dioxide emitted during the operational or in-use phase of a building. Architects, manufacturers, and designers can limit and reduce operational carbon through strategic systems and processes.

Why it matters? Operational carbon accounts for current and long-term use of a building, which means the amount of carbon dioxide emitted during its life cycle will greatly impact our carbon footprint in the near future and long-term.

WHOLE CARBON

Whole carbon includes **operational carbon + embodied carbon**. Architecture and design firms can design operational efficiencies and specify products with the goal of reducing whole carbon to minimize overall emissions.

Why it matters? All carbon emissions contribute to climate warming, so both operational and embodied measures need to be accounted for when considering ways to offset the carbon footprint of your project or product.

CARBON FOOTPRINT

A carbon footprint is the total amount of carbon emissions produced by an individual, event,

company, or product. In the design realm, this includes the measure of everything from the energy required to produce a product to the emissions associated with material sourcing—each step is assigned an “emissions factor.” Global Warming Potential (GWP) is a means of measuring carbon footprint and can be found on a product's Environmental Product Declaration (EPD).

Why it matters? A product's carbon footprint provides a holistic measure of its impact on climate change.

CARBON NEUTRAL

Carbon neutrality occurs when the amount of carbon emitted in the atmosphere is equivalent to the amount of carbon pulled out of it, creating a net-zero impact. Achieving carbon neutrality is the only way manufacturers and companies can ensure they are not contributing to a warming planet.

Why it matters? It's completely possible to achieve carbon neutrality today through strategies such as purchasing carbon offsets.

CARBON OFFSET

A carbon offset is a reduction in the emissions of carbon dioxide to compensate for those made elsewhere, often by funding projects that remove carbon from the atmosphere or prevent it from being released.

Why it matters? Even the most clean and efficient manufacturing processes may emit carbon somewhere in their life cycle, including the supply chain. By funding offsets, like Bluesource's clean-cookstove initiative, companies can achieve a zero carbon impact.

CARBON NEGATIVE

A negative carbon footprint is a good thing and describes the reduction of a company's or product's carbon footprint to less than neutral, meaning it actually removes carbon dioxide from the atmosphere. This is sometimes referred to as “Climate Positive.”

Why it matters? Over the next 30 years, it's estimated that three-quarters of the built environment will be new or renovated¹⁰, which means architects and designers must act now to ensure carbon emissions do not continue to climb.



Perkins & Will/Interface Global Headquarters/Courtesy of Interface

6 IMMEDIATE STRATEGIES TO REDUCE EMBODIED CARBON

- 1 Reuse materials, material waste, and buildings whenever possible** to eliminate the need to create new materials and construction.
- 2 Understand potential “heavy hitters”** from a carbon standpoint and pay attention to the embodied carbon of those materials, such as concrete, steel, irresponsibly sourced wood, glass, insulation, aluminum, carpet, wallboard, and ceilings.
- 3 Look for transparency documentation, such as Environmental Product Declarations (EPDs)**, on the products you specify. Take note of recycled and bio-based content, as this *can* be a sign of reduced embodied carbon.
- 4 Engage and educate suppliers, partners, and other vendors about embodied carbon** and ask for their current and future strategies for reducing its impact.
- 5 View each project as an individual carbon footprint** and introduce strategies for getting clients to a carbon neutral state. Potentially, encourage clients to purchase carbon offsets for any remaining carbon footprint.
- 6 Brush up on your carbon knowledge** with resources including Project Drawdown (drawdown.org), the Carbon Leadership Forum (carbonleadershipforum.org), Architecture 2030 (architecture2030.org), and the book: *The New Carbon Architecture: Building to Cool the Climate* by Bruce King.

⁹ The U.S. Environmental Protection Agency: <https://www.epa.gov/ghgemissions/overview-greenhouse-gases>

¹⁰ Architecture 2030: <https://architecture2030.org/about/faq/#toggle-id-3>

CERTIFICATIONS AND LABELS

Design certifications, such as LEED and the International Living Future Institute's Declare Label program, now include language around reducing carbon emissions rather than solely relying on indirect measures of such, like energy use or recycled content. The latest version of LEED—LEED v4.1—also is more accessible, with simplified credits to strengthen participation. At the same time, shifts in the Declare Label program further encourage companies to disclose a product's carbon emissions. Incorporating carbon metrics into these core environmental certifications sets a high precedence for the future of design and its impact on our environment.

KEY CHANGES IN LEED V4.1

- Confusing credits with little or no adoption have been simplified (EPD Option 2 and Material Ingredients Optimization) or eliminated (Raw Material Source & Extraction Reporting).
- EPD Option 2 ("Multi-Attribute Optimization") now gives manufacturers multiple options for showing how they have reduced their product's carbon footprint.
- Stronger focus on reducing the climate impact of the full lifecycle of a building, for both Operational Carbon emissions from building energy use and Embodied Carbon emissions from building material supply chains.

DECLARE LABEL UPDATES

The International Living Future Institute's Declare Label program traditionally provides LEED v4 compliant ingredient disclosures and maintains a Red List of ingredients they consider worth avoiding, if possible, offering a narrow definition of what makes a material "healthy." In October, manufacturers unveiled the first Declare Labels that also disclose the product's carbon footprint, bringing climate impact into the "healthy materials" discussion for the first time.

GREEN CIRCLE CERTIFIED ENVIRONMENTAL FACTS LABEL

Many designers are used to looking for green certifications and labels when they select products, but what labels can we look for to find lower embodied carbon products? The clear leader in this area is the Certified Environmental Facts Label from GreenCircle Certified, LLC which shows over 30 environmental facts on the label, including the carbon footprint and any reductions in carbon footprint of the product. This label can also tell designers whether the product contributes to the Multi-Attribute Optimization (EPD Optimization) point in LEED v4.1, which now requires reduced embodied carbon.



Perkins & Will / Interface Global Headquarters/Courtesy of Interface

HOW TO TALK ABOUT CLIMATE CHANGE

WITH PROJECT DRAWDOWN'S KATHARINE WILKINSON

Interior Design and *Interface* spoke with Dr. Katharine Wilkinson, author and VP of communication and engagement at Project Drawdown—a global research organization that identifies climate solutions—about how to move forward conversations about carbon neutrality and sustainable design while calling others to action. Wilkinson recommends a seven-point strategy for talking about climate change: 1. Own your voice, 2. Tell the truth, 3. Make space for "feels," 4. Share solutions, 5. Connect the dots, 6. Picture possibility, and 7. Talk together. Here, she addresses all seven in a Q&A.

How can architects and designers use their influence to mitigate climate change?

Katharine Wilkinson: A good place to start is with some personal reflection. If this is an issue you care about, why do you care about it? You don't have to be a scientist, an activist, or a policy-wonk to make a really important contribution—so starting from a personal place and then rippling out from there is one way to bring your professional perspective to the conversation. What is really powerful is when people come to this topic with an authenticity rooted in who they are and what they care about.

Where can the design community find the most accurate and up-to-date information about the impact of carbon and ways to offset it?

KW: Project Drawdown aims to be a world-leading and expansive resource for climate solutions—so definitely check out Drawdown.org and our New York Times bestselling book *Drawdown*. I've learned a lot about design- and building-related climate solutions from the Living Building Challenge, the Rocky Mountain Institute, and leaders in the space like Erin Meezan, Lindsay Baker, and Jonathan Rose. Oh, and architecture2030.org.

In what ways can we shift climate-change discourse to be more emotionally intelligent?

KW: Questions are always an incredibly powerful place to start—not yes or no, fact-based questions, but questions that come from a place of inquiry and openness. For example: Is sustainable design something you have been thinking about generally or related to a particular project? There may be some folks who are incredibly committed to this topic, but there are a lot of people who are on the fence or slightly ambivalent, so beginning to tease out glimmers of interest or concern is a step. Co-creating a vision almost always feels better than "telling and selling." That's true on design and it's true on climate.

What types of solutions can the design community implement now?

KW: In the world of design and architecture, I think there are three big solution areas. First, create or retrofit buildings and spaces to be highly energy efficient—utilizing natural and LED lighting,

building automation or smart thermostats, efficient windows and insulation, green and white roofs, etc. Second, incorporate renewable energy, perhaps through on-site solar electricity generation or geothermal heating. Third, opt to use sustainable materials, like bamboo, re-used items, or recycled materials. "Less" and "enough" are really powerful words. But that's just the beginning. What opens up if you think about nature as a design partner?

For folks who may be less interested in climate change, are there other ways to engage them on solutions?

KW: Per our name, Project Drawdown hopes humanity actually reaches drawdown, which means the point in time when the rising concentration of greenhouse gases in the atmosphere actually stops rising and begins to decline year-over-year. But it's also important to think about multi-solving. So we're not just solving for emissions, we are solving for a lot of more near-term, tangible needs. In the process of shaping a climate-safe future, hopefully we can also create a much better present.

Are there distinctive contributions the field of architecture and design can make?

KW: So much so. We're in this moment of really needing the power of imagination. As we think about how to build a climate-safe future, we need the creative horsepower of the design community. Designers also sit at such an interesting nexus of conversation, with clients, with suppliers. Being messengers across those spaces is really powerful.

What types of conversations are most effective when it comes to spreading awareness?

KW: It's about an exchange. We should be *relating* as much as we're relaying information. If you're trying to bring someone along this journey of doing something differently or trying something innovative, then being able to share stories about how that has worked and, particularly, about the people involved and the benefits, is meaningful. In a moment where we need to be engaging as boldly as we can, it's important to think about what you uniquely can do and then use your magic to do that.



Images courtesy of Gensler



To earn a LEED platinum certification, the design team limited use of finished materials, exposing much of the building's construction, and implemented water stewardship systems, such as mitigating stormwater runoff with vegetated bioswales for landscape regeneration. A life cycle analysis (LCA) was done to select lower embodied carbon concrete and steel. For the interiors, the design team sought to minimize materials and waste. HARC's headquarters manages to protect and restore the balance of its 3.5-acre site through strategic use of native and water-smart plant species. The building also utilizes energy efficient geothermal heat exchange, natural light, and solar photovoltaic roof panels.

Nearly all aspects of HARC's headquarters are designed to reduce carbon emissions, positioning it to become one of the first commercial net-zero energy buildings in Texas. The building currently produces more on-site energy than it uses to realize a net zero operational energy goal. In terms of carbon, this means over the course of a 25-year lifespan, HARC could eliminate 2,415 tons of carbon dioxide in the atmosphere—the equivalent of planting 56,282 trees—making a strong case for green design.

CHIC WITH A FOCUS ON CARBON

INSIDE A PROJECT THAT GOES BEYOND LEED

Imagine a commercial space that actually reduces the amount of carbon in the atmosphere through strategic design.

The Houston Advanced Research Center (HARC), a research hub that provides independent analysis on energy, air, and water issues in The Woodlands in Texas, exemplifies how this can become a reality. The center, established as a not-for-profit research organization in 1982 under the vision of sustainability advocate and philanthropist, George P. Mitchell, taps into the ecology of its surroundings to further its mission: To provide independent analysis on energy, air, and water issues to people seeking scientific

answers and to operate as a research hub by finding solutions for a sustainable future.

Working with external building and design partners, the design team succeeded in creating a LEED Platinum certified green building—the most environmentally stringent certification issued by the U.S Green Building Council. "From its program of work to its LEED Platinum facility, HARC walks-the-talk," notes Lisa Gonzalez, HARC's President and CEO. "The organization's new headquarters is an exemplar for environmental stewardship, building efficiency, community outreach, and affordable net zero in the Gulf Coast Region."



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To learn more visit interface.com/carbonneutral

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