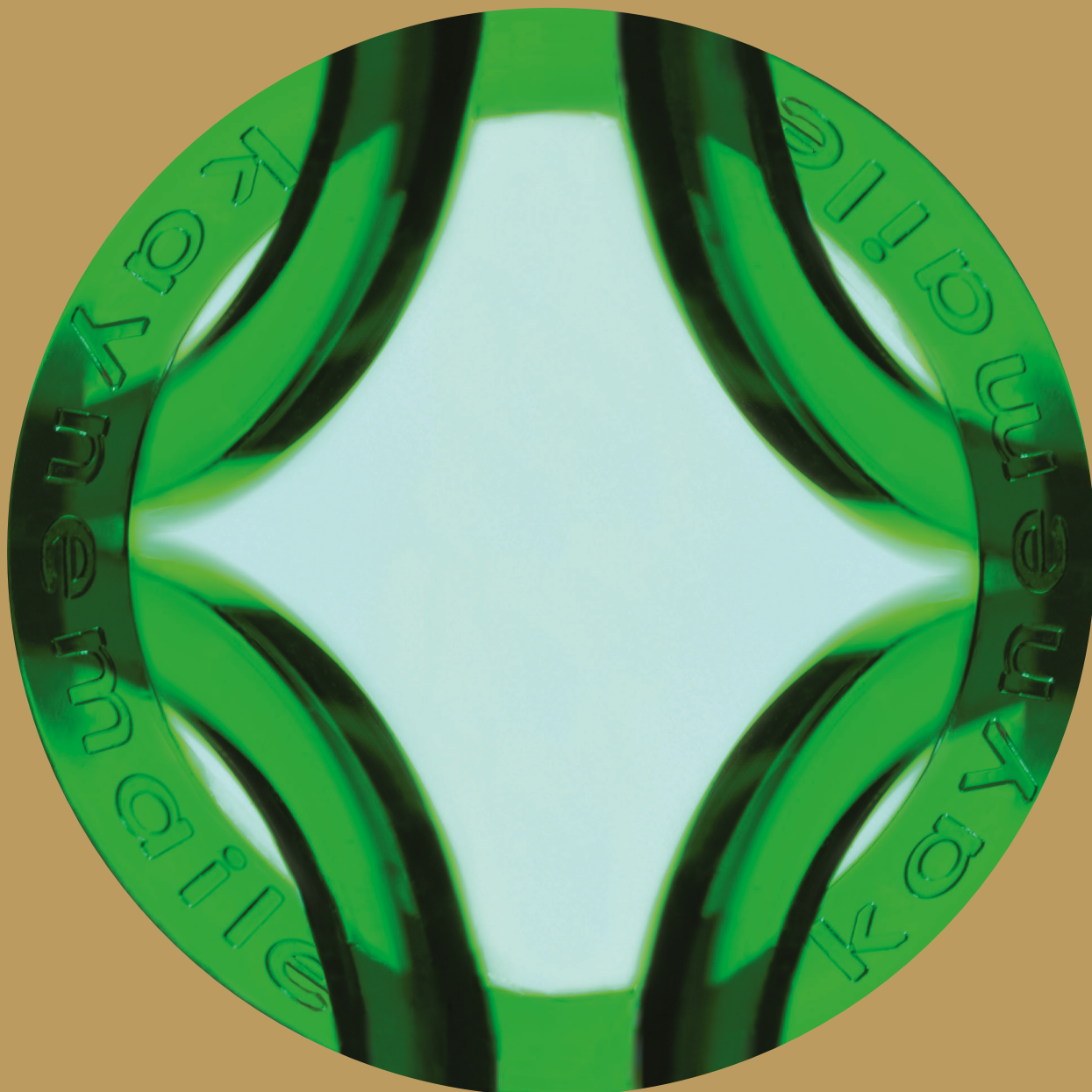


Kaynemaile® 



R·E/8



ISCC PLUS certified
sustainable share
of up to 88% of
manufactured product

**calculated using ISCC PLUS v3.4*

Reduction in the
carbon footprint
of the base polymer
material by
up to 80%

Features high
performance
Makrolon® RE
polycarbonate
from Covestro

100%
chemically identical
to incumbent
fossil equivalent

A true drop-in
solution with
no process
interruption

LEED-enabled,
circular economy,
supports GHG
reduction targets

Pioneering
nil-waste
liquid-state
manufacturing
process

70% reduction
in solar gain
on exterior
installations

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1 About Kaynemaile Architectural Mesh

Kaynemaile is a leading global designer and manufacturer of architectural mesh for commercial, residential, and public buildings. Kaynemaile's architectural mesh technology can be seen on large-scale facades of multiple public buildings throughout the United States to beautify exteriors and reduce solar gain by up to 70%. Kaynemaile is also used extensively for interior screening and custom decorative features.

Kaynemaile appears on building exteriors as well as interiors in several U.S. cities including Atlanta, Columbus, Dallas, Des Moines, Detroit, Galveston, Los Angeles, New York, Santa Clara,

and Seattle. Internationally Kaynemaile has provided design solutions in Australia, Belgium, China, Dubai, Germany, Italy, New Zealand, Saudi Arabia, Singapore, South Korea, the UK, and Vietnam. Kaynemaile mesh is also utilized as a design material for civic artworks and large-scale theatrical productions.

Kaynemaile has been awarded the IF Material Award, NYCxDesign Award for Best New Architectural Product, Architecture MasterPrize for Building Envelope and Construction Materials, and Civil+Structural Engineer Yearbook of Engineering Achievement 2021 and 2022 for Environmental and Sustainability.

2 Kaynemaile's Circular Economy Commitment

Throughout its 20-year history, Kaynemaile has been dedicated to producing the highest quality product with the lowest environmental impact possible through low-impact, durable, zero waste, and recyclable environmental processes. Its manufacturing facilities run on 100% certified renewable energy.

As our mesh is made from a single chain polymer, the material can be effectively cleaned back to its original state using the same process that was used to produce it originally. This includes each of the colors we use – which are all inorganics so they can be stripped back out using low-energy processes and fed back in to produce new virgin materials.

As an architectural product, Kaynemaile mesh is extremely robust and scratch resistant. It is stronger and lighter than glass, with a **strength to weight ratio** greater than stainless steel, Kaynemaile's strength accumulates with more rings in a screen. The larger the screen, the stronger it is. Kaynemaile mesh is also super lightweight,

weighing only 0.6 lbs. per square foot (3kg m²), 1/8th of a steel equivalent, making it appropriate for where a low static loading on buildings is required. Being lightweight and robust makes installation of large-scale screens functionally straightforward and faster than traditional panel-based façade systems.

With the adoption of *Makrolon®RE* by Covestro as its base material – an engineering-grade polymer made through a mass-balanced Bio-waste process – Kaynemaile RE/8 now fully embraces the circular economy model. A circular product was the goal from the start. Production technology evolution, expertise, and with an outright commitment to designing long-term sustainability into our architectural mesh range, now makes this possible.

RE/8 architectural mesh is comprised of an industry first cradle-to-gate carbon neutral polycarbonate by Covestro, a leading global producer of advanced polymers. This advanced polymer offers an 80% reduction in CO₂ compared to traditional fossil-fuel based polycarbonates.

3 The circular economy

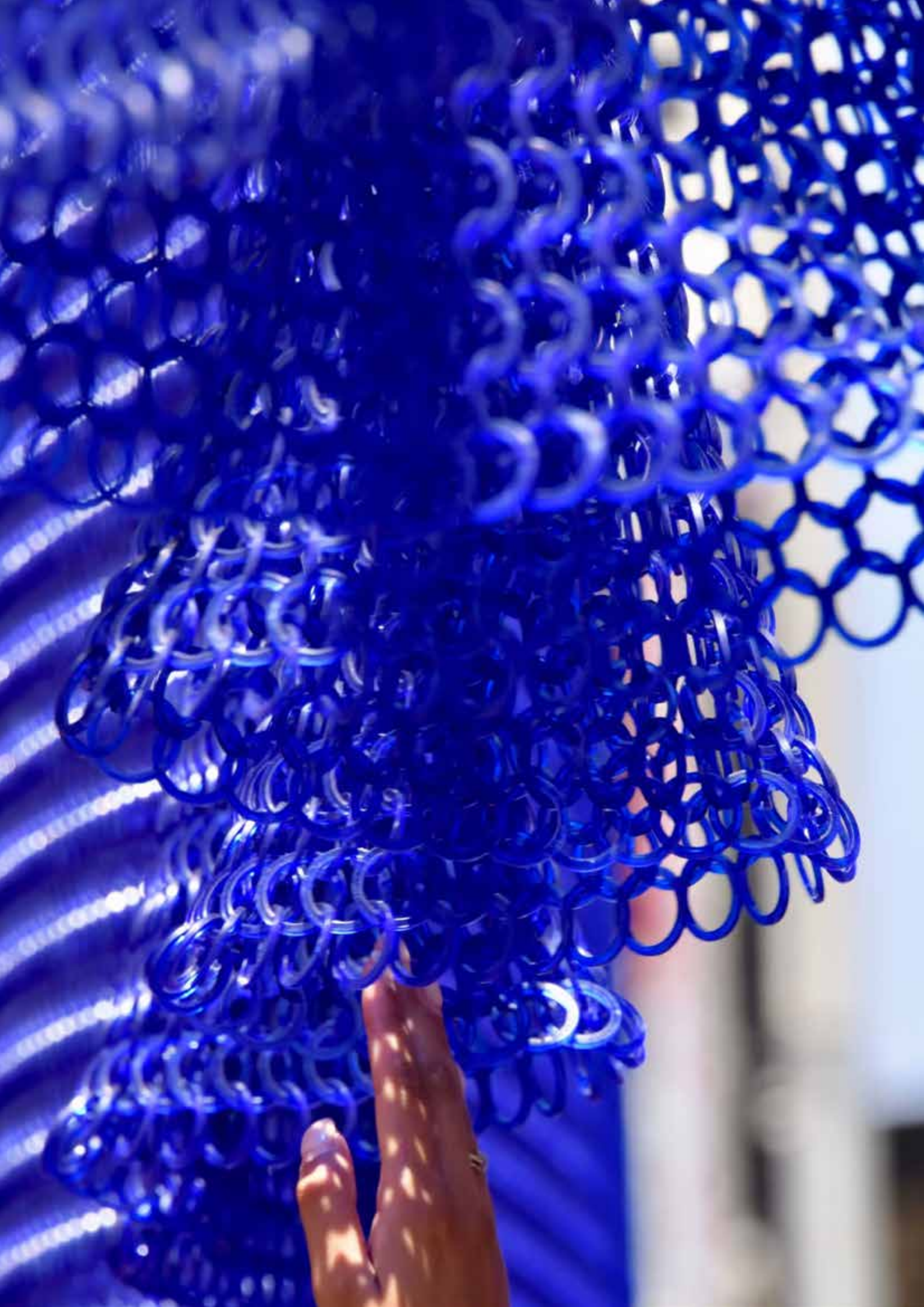
The concept of the circular economy is based on the idea of keeping resources in use for as long as possible, maximizing their value and minimizing waste. This involves designing products and systems with the end of life in mind, with a focus on reducing waste and pollution, and regenerating natural systems. The circular economy seeks to create a closed loop system where waste is minimized and resources are reused as completely as possible, multiple times.

The importance of the circular economy in today's world cannot be overstated. Our current linear economy is based on a take-make-dispose model that is not sustainable. We are rapidly depleting natural resources and creating massive amounts of waste and pollution. The circular economy offers a new way of thinking about resource use and waste management, with the potential to reduce environmental impacts and create economic benefits.

The circular economy has the potential to create new business opportunities and jobs, while also reducing the environmental impacts of traditional linear production and consumption. By designing products with circularity in mind, companies can reduce waste, save resources, and create new revenue streams through reuse and recycling.

Crucially, the circular economy allows for the use of scarce resources, or even those whose typical consumption creates negative environmental impacts, such as fossil fuels. This is because in a circular economy, inputs are not destroyed – they are made into one object or material which is at its end-of-life broken down and remade into a new material, producing little to no waste.





4 U.S. Building Regulations and the Timely Relevance of Kaynemaile RE/8™

The US Green Buildings Council's (USGBC) LEED certification is the gold standard of energy reduction certifications and the most commonly recognized environmental certification program available for objects in the built environment. Its standards continue to evolve and become more stringent, requiring ever more of architects, builders, and operators of existing structures. In 2023, USGBC began work on its next generation of standards, which will be guided by the [Future of LEED Principles](#), aiming to “swiftly” decarbonize the building industry, while inspiring and recognizing adaptive and resilient built environments.

Additionally, President Biden's [Executive Order 14057 \(The White House, Executive Order on Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability\)](#) encourages the United States Federal Government to lead by example in sustainable construction. It sets ambitious targets for Federal buildings to reduce emissions, improve efficiency, and modernize facilities. It requires all Federal agencies to achieve net-zero emissions across all buildings by 2045, while also reducing greenhouse gas emissions by 50 percent from buildings, campuses, and installations by 2032 (relative to 2008 levels). For larger buildings, that deadline is even sooner: new construction and modernization projects greater than 25,000 gross square feet are required to achieve net-zero emissions 15 years earlier, in 2030.

The executive order further establishes a Buy Clean policy to promote use of construction materials with lower embodied emissions (such as RE/8). Embodied carbon refers to the lifecycle GHG emissions resulting from the extraction, manufacturing, transportation, installation, maintenance, and disposal of goods, including building material goods, and makes up an increasingly large share of building-related emissions, accounting for up to 50 percent of total GHG emissions (California Energy Commission, [Final 2021 Integrated Energy Policy Report](#)).

Some states, including California, are setting even more ambitious climate goals for building construction. In September 2022, Governor Newsom signed [Assembly Bill 2446](#), which requires the California Air Resources Board to develop a framework for measuring and reducing the embodied carbon of building construction materials, primarily at the materials production stage, with a target of a 40 percent net reduction in greenhouse gas emissions no later than the end of 2035, and an interim target of a 20 percent net reduction by the end of 2030. The state has cited construction as a major target of decarbonization efforts, calling them “a high priority in California state policy” (California Air Resources Board, [Embodied Carbon](#)).

5 Makrolon®RE by Covestro

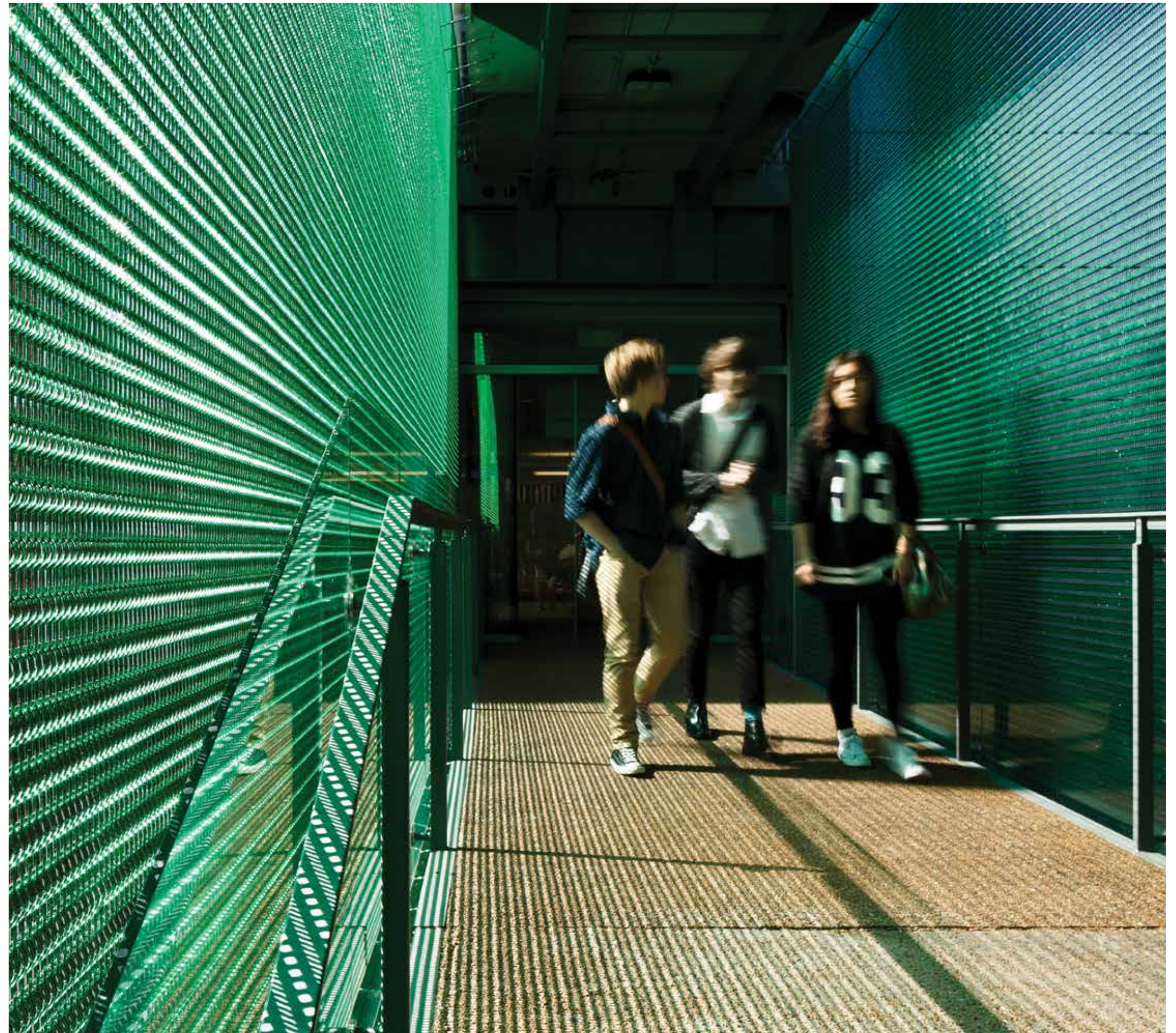
Makrolon®RE is made by Covestro, one of the world's leading manufacturers of high-quality polymer materials and their components. With its innovative products, processes and methods, the company helps enhance sustainability and the quality of life in many areas.

Covestro supplies customers around the world in key industries such as mobility, building and living, as well as the electrical and electronics sector. In addition, polymers from Covestro are also used in sectors such as sports and leisure, cosmetics and health, as well as in the chemical industry itself.

The company is committed to becoming fully circular and is striving to become climate neutral by 2035 (scope 1 and 2). Covestro operates approximately 50 production sites in Europe, Asia, and the United States.

6 Kaynemaile RE/8™ Data and the Covestro Mass Balance Approach

All Kaynemaile products are now made with Makrolon RE, a new polymer made of 88% bio-mass content, part of the Makrolon® RE series of polymers from Covestro. This is a true drop-in solution, entailing no process interruption and no change in performance from previous materials. The biomass-based product is 100 percent chemically identical to its fossil fuel equivalent, retaining the same performance concerning physical, mechanical, thermal, optical, fire retardant, and weathering properties. Kaynemaile mesh is exactly the same, but it is now made using a material which significantly reduces its overall carbon footprint.





7 RE/8™ and The benefits of Makrolon® RE

Introduced in 2021, Makrolon® RE grades are cradle-to-gate climate neutral, the result of an assessment of a partial product life cycle from resource extraction (cradle) to the factory gate, also referred to as cradle-to-gate assessment. The methodology of its Life Cycle Assessment is based on the ISO 14040 standard, critically reviewed by German testing agency TÜV Rheinland on the basis of a plausibility check. The calculation considers biogenic carbon sequestration based on preliminary supply chain data and replacing electricity grid mix with renewable electricity used for the manufacturing process. No offsetting measures have been applied.

Since receiving the ISCC PLUS mass balance certification for two of its European sites in 2020, Covestro has been supplying polycarbonates partly sourced from renewable feedstock. They are attributed via the mass balance approach and lead to a significant carbon footprint reduction. In 2021, the company acquired Guarantee of Origin certificates from unsubsidized photovoltaic renewable electricity plants located in Germany for its plant located in Uerdingen. They are allocated to the specific electricity needs of selected mass-balanced products for both chlorine electrolysis – essential to the production of polycarbonate – and other process steps. As a result, selected Makrolon® RE grades become climate-neutral*.

*The product carbon footprint is the result of the LCA calculation acc. to ISO 14040/14044 critical review by TÜV Rheinland with preliminary value chain data, cradle to gate (partial product life cycle from resource extraction (cradle) to the factory gate from Covestro), biogenic carbon included, impact assessment acc. to CML 2001 - Aug.2016, replacing key raw materials with mass balanced bio-circular ones according to ISCC PLUS, without offsetting measures and no burdens from first life. Bio-circular attributed via mass balance according to ISCC PLUS.

8 What is mass balancing and why is it important?

Covestro applies a mass balance method in producing Makrolon® RE which is ISCC PLUS certified by [International Sustainability & Carbon Certification](#) and applies physical and chemical traceability.

A mass-balancing approach allows for a partial replacement of traditional virgin fossil feedstocks with renewable materials from biomass or end-of-

life materials such as bio waste and residues.

Through the mass balance approach, alternative raw materials are introduced into the value chain while taking advantage of the existing chemical infrastructure with its high efficiency and economies of scale, accelerating the transition of the industry to a circular economy of plastics.

Principle of Mass Balance Approach

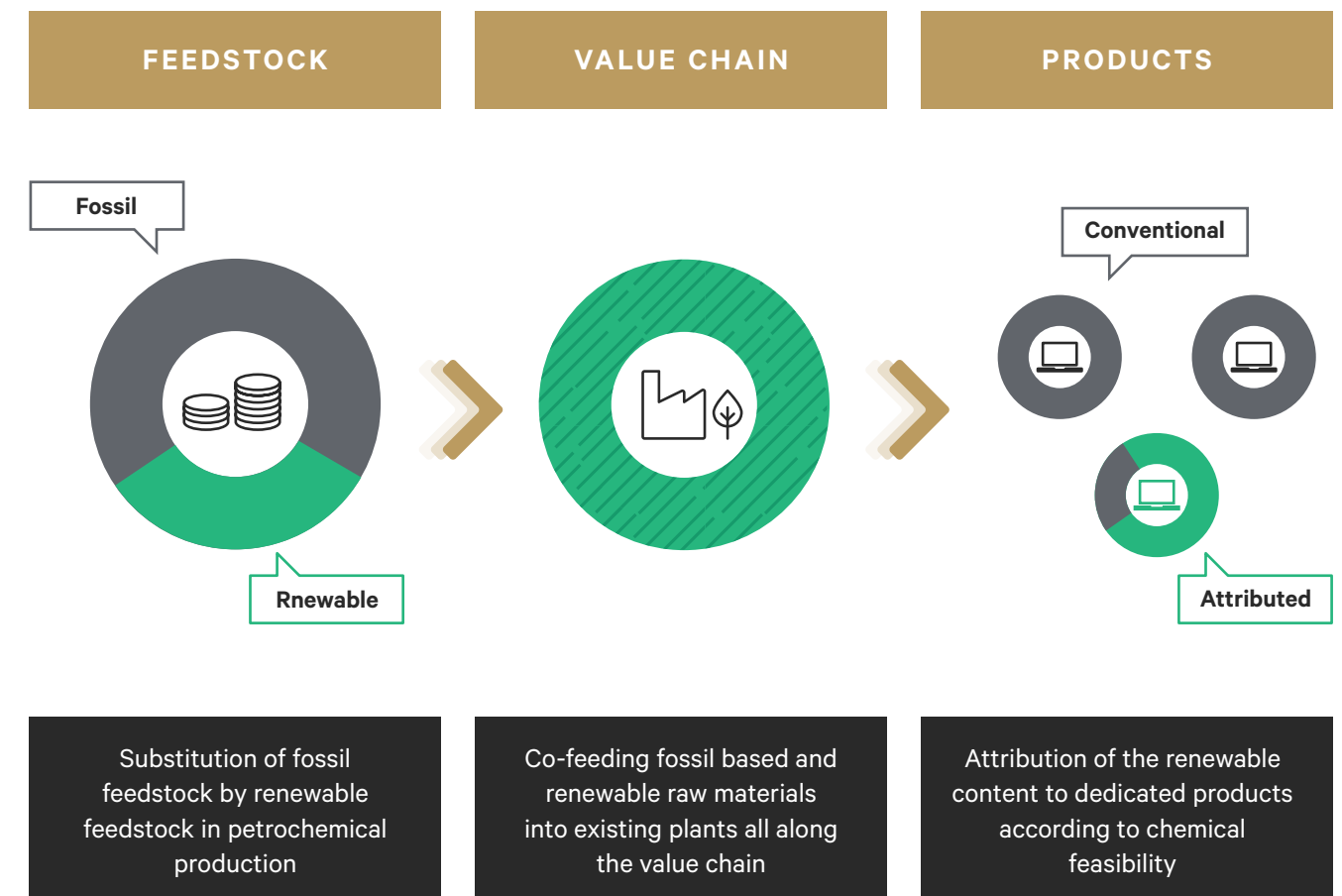
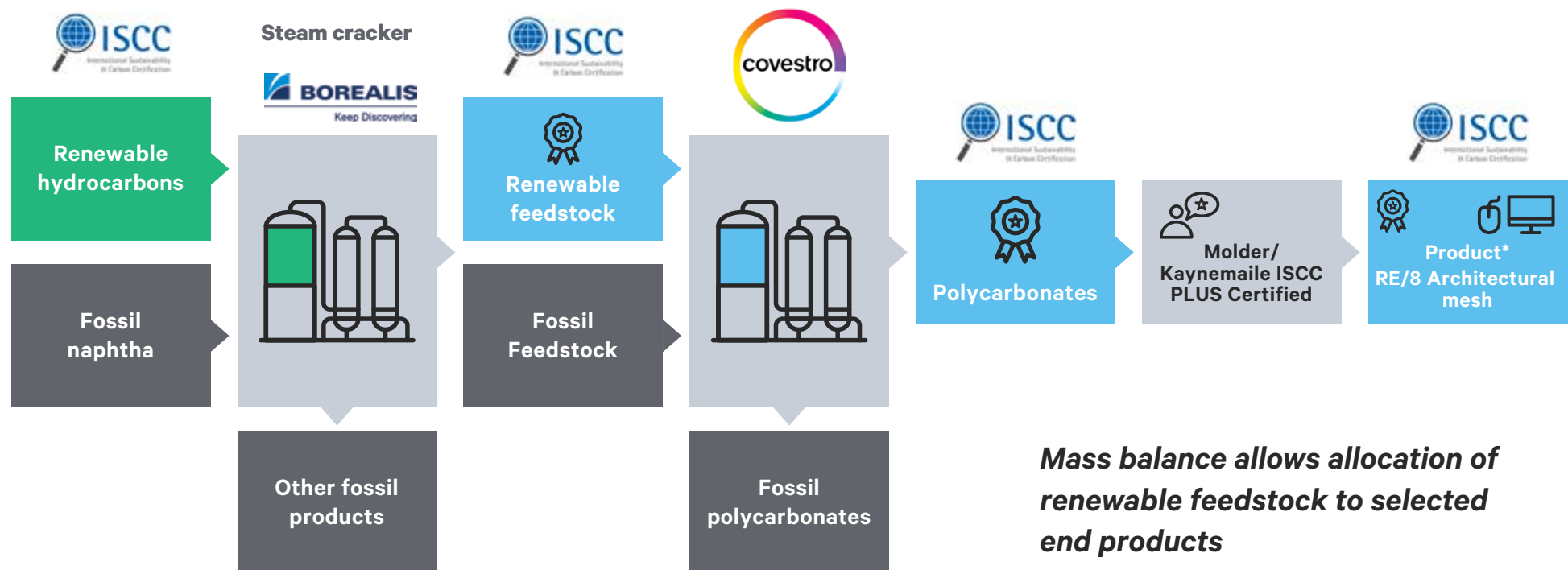


Illustration based on Nova institute



*ISCC= International Sustainability & Carbon Certification

Fossil
 Bio-based
 Mass based

9 RE/8™ for Architects, Specifiers, and Constructors

With this move to Makrolon® RE, Kaynemaile positions itself and its clients advantageously in several ways. Its product is now made with a material which generates 80% less carbon output during its production via a mass balancing process. Finding a high-performance material resulting from a low carbon circular production and manufacture has been the goal of Kaynemaile since its founding. Now, Kaynemaile RE/8 Architectural Mesh benefits architects, builders, and architectural specifiers in several aspects.

- RE/8 will contribute to overall compliance with city, state and federal building codes, recommendations, and goals through the significant reduction (80%) in CO2 associated with the manufacture of the product.
- RE/8 will contribute to lowering a building's overall carbon footprint at construction and installation, and throughout the operation of the building's life.
- RE/8 is highly certified as ISCC PLUS, LEED-enabled, and measured by TÜV Rheinland, a German-headquartered global leader in independent inspection services.
- RE/8's 70% solar heat reduction properties will better enable preference for Kaynemaile's exterior façade solutions by architects seeking to implement passive heat mitigation technology into new building designs.





Hot Places, Cool Facades: The WonderCool Effect

The United States' fastest growing cities and states – and the destination of the most internal immigration – are all in states set to be adversely impacted by climate change in the near future.

Kaynemaile products can help here in several ways. Typically made of many layered pieces of mesh which are kinetically active, their movement allows cooling air flow throughout a space. Another of Kaynemaile's unique elements is its solar reduction properties; by protecting from direct sunlight and not restricting the cooling effects of air movement, Kaynemaile reduces the total energy costs required to cool buildings in hot climates.

Unlike steel mesh products which act as conductive energy stores, Kaynemaile mesh remains at a near ambient temperature, reducing both radiant heat through direct sunlight (EMR) and thermal conductive heat from entering the interior of a building, by up to 70%. This gives the ability to let daylight in and manage the passive solar gain—all while maintaining visual transparency. Kaynemaile calls this unique combination of attributes the 'WonderCool Effect.'

Recent demographic shifts across the United States show that both the fifteen fastest-growing large cities and the fifteen cities with the largest numeric increase in population are highly concentrated on the southern and western regions of the country. In 2022, the U.S. Census Bureau noted that Arizona, Texas, Florida, and Idaho all had several cities and towns among the fifteen fastest growing. ([U.S. Census Bureau, Fastest-Growing Cities, May 2022](#)) Of particular note:

A large proportion of these growing population centers and many of the fifteen most populous cities in the entire the country (heavily concentrated in Texas and California) are in the Sunbelt region from Florida to California where most of the top 20 hottest counties – those that by the year 2053 will have more than 100 days where the heat index will exceed 100°F ([Fortune, America's 'extreme heat belt'](#)) estimates that 107 million people in the United States will experience days above 125°F annually in the next 30 years. ([First Street Foundation, Heat Factor](#)); that will be nearly a quarter of the country's projected population living in extreme heat conditions.

Dr. Sara Meerow, professor at ASU's School of Geographical Sciences and Urban Planning, [spoke to The Guardian](#), noting, "The extreme heat that cities are experiencing now is caused by a combination of climate change and the urban heat island effect. Rapid urban expansion, which means more impervious surfaces like roads and buildings and waste heat from cars and buildings, typically exacerbates the urban heat island effect, which means these cities are even hotter."

These facts have two immediate implications: there will be significant new construction in these Sunbelt locations, and that all new structures must incorporate aggressive heat mitigation features.



Kaynemaile's Origins

The polycarbonate mesh has its origins in the Armory department of The Lord of the Rings film trilogy and has evolved into an international business based on its patented liquid injection manufacturing process coupled with a compelling design aesthetic.

Kaynemaile architectural mesh has its origins in the 80,000 handwoven rings made with an electroplated polypropylene plumbing tube coated in pure silver from which founder Kayne Horsham developed the method used to make each suit of chainmail on the Lord of the Rings films as its Art Director of Creatures, Armour, and Weapons.

Over several years, Horsham created and patented an injection molding process to mass produce lightweight polycarbonate chainmail — named 'Kaynemaile' after a nickname actor Viggo Mortensen gave the armor on the set of the films. However, instead of producing chainmail for movies and fashion, Kayne Horsham decided to apply the technology towards architectural applications and builders, dividing interior spaces and protecting building exteriors.

“From the very start of our company we have sought the solution that Covestro’s mass-balance technology is now able to deliver,” says Kayne Horsham. “Our vision is for an architectural product with extremely low environmental impact.”

Kaynemaile® 

www.kaynemaile.com

