

CIRCULAR DESIGN- GLOSSARY

FURNITURE
& FURNISHINGS

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INTRO

We believe the very first step to a 'circular future' is accessible information and awareness. This Circular Design Glossary aims to improve understanding of the circular economy and design, with a particular focus on furniture and furnishings. We're striving for clear definitions of key concepts, combined with an illustration of each. We've tried to select tangible and inspiring applications within the furniture and furnishings sectors – from sofas to lighting.

To understand the circular future we're moving towards, let's first take a quick look at our current 'linear' model. We live in a world in which the economic system follows 'take-make-waste' logic. Our current 'linear economy' extracts finite resources to make products that are used – largely not to their full potential – and then thrown away, generating waste and pollution. And then we churn out yet more new chairs, tables, and lamps.

Meantime, climate change and socio-economic inequalities confirm that the linear economic model isn't working for either the environment, people, or businesses. So how can we transform this throwaway paradigm into a just, regenerative and sustainable system? We believe the answer lies in the 'circular economy.' This economic system incorporates nature's cyclical models, where nothing is lost, and everything flows and persists as a valuable resource to living beings and ecosystems. In short, the circular economy is based on three

fundamental principles: eliminate waste and pollution, keep products and materials in use, and regenerate natural ecosystems.

Along with these three principles, a thriving circular economy requires prioritizing social inclusion, equity, fairness, and the health and well-being of workers, consumers, and local communities. As such, we have included terms in this glossary that highlight social standards and practices.

At the heart of the circular economy is design, deployed up front as a powerful tool to determine how something is manufactured, used, and ultimately discarded. Design choices – according to the Ellen MacArthur Foundation – are responsible for 80% of the environmental impact of products, systems, and services.

Our glossary’s ultimate goal is to build bridges and enable collaboration by turning circular concepts into shared language and accessible practices. As illustrations, we have included established as well as emerging designers and brands working towards the transition to a circular economy. All company features in this glossary are non-sponsored. While we had to choose only one illustration per concept, we know there are many other incredible circular practitioners out there, creating amazing furniture and furnishings. We look forward to connecting!

LINEAR ECONOMY



CIRCULAR ECONOMY



Image Courtesy of SOMA_studiomilano

01

BIODEGRADABLE

Biodegradable describes everything that can be disintegrated by bacteria, fungi, or a biological process. In general, biodegradable products and packaging will break down on their own in a landfill or when otherwise released into the natural environment. Unlike compost, however, which results in nutrient-rich dirt, biodegraded materials sometimes remain problematic. Some plastics, for example, biodegrade – over a very long period of time – but the resulting micro-plastics and chemical compounds continue to pollute.

Flax Fiber Triplex Stool by Studio Ryte helps tackle over-consumption of fast furniture. Studio Ryte designed this furniture piece for people who often move homes. Light and stackable, the stool's performance properties mimic those of carbon fiber, but it is entirely made of plants and is fully BIODEGRADABLE. The Triplex Stool pushes physical limits – from structure to weight, from assembly process to after-life – and came about as a result of hundreds of calculations, algorithms, and simulations.



02

BIODESIGN

Biodesign is the practice of designing with biology by incorporating living organisms or ecosystems as essential components, thus enhancing the function of the finished work. Biodesign replaces industrial or mechanical systems with biological processes. These processes tend to be more renewable while making fewer material and energy demands.

The Bacteria Lamp by designer Jan Klingler uses bacteria samples from people, places, or things to preserve memories. The designer explains that every living creature and place has a unique microbiological "fingerprint." Applying BIODESIGN, Jan Klingler collects a fingerprint, then lets the bacteria grow for 24 - 48 hours. He then seals the microorganisms within a resin to preserve the unique pattern for eternity. While bacteria is usually associated with disease, this collection shows that it can also carry a story of people or places dear to us.



Photo Courtesy of Jan Klingler

03

BIOLOGICAL NUTRIENTS

Biological Nutrients are both derived from natural resources and developed to re-enter the natural environment. Wood, rattan, and organic fibers – frequently used in furnishings – are bio-nutritive if not glued or finished with harmful chemicals. These organic materials can return safely to the biosphere, regenerating the earth’s natural richness through decomposition and anaerobic digestion. Biological nutrients are a frequent option for designers concerned with avoiding materials that could become toxic waste.

***Naturescast** by Nature’s Legacy is an organic material made from rescued agro-forest debris, held together by a proprietary water-based binder. This material – biodegradable, recyclable, and able to serve as a BIOLOGICAL NUTRIENT – can be employed in multiple surfaces, from furniture to furnishings, across applications from construction to architecture. Naturescast is the first material in the Philippines to achieve Cradle to Cradle (C2C) certification, attaining the gold level overall and the platinum level for material health.*



Photo Courtesy of Nature's Legacy

04

BIOMATERIALS

Biomaterials are derived from living organisms, including plants and animals. Examples include mushrooms, vegetable fibers, manure, algae, marine sediment, seashells, seaweed, micro-organisms, and blood. Bio-based materials such as these can be used to replace plastic and other synthetic materials.

***Ecovative** uses mushrooms to create a biomaterial that performs like plastic but is fully compostable. Ecovative gathers parts of plants that can't be used for food or feed, then injects them with mushroom tissue. This technique is adaptable to many different types of plants. Ecovative's BIOMATERIAL can be applied to packaging, interior design, and furniture, such as the mycelium Meditation Seat by Guilad Office of Design. The outer shell of the seat is comprised of 3D printed parts arranged to help mycelium grow inside, including holes throughout to help mycelium breath.*



Photo Courtesy of Guilad Office of Design

05

BIOMIMICRY

Biomimicry is the practice of learning from and mimicking nature's strategies to solve the challenges of our world – among them, climate change. Biomimicry values nature for what we can learn over what we can extract, harvest, or domesticate. This practice emulates natural processes and biological structures to foster innovation in technological and industrial design.

***25Lamp** by Kovac Family draws inspiration from mollusk shell structure to create a design that folds and unfolds, allowing for flat packaging. Through BIOMIMICRY – mimicking nature – the design of the 25Lamp greatly reduces the waste and pollution associated with packing and transporting. Flat packaging results in reduced CO2 emissions by both requiring less space in transport and reducing/eliminating the need for packing materials such as plastic and foam. The 25Lamp – handmade in Sweden from local FSC-certified and reclaimed wood – is shipped with a modest amount of 100% recycled packaging.*



Photo Courtesy of Kovac Family

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CARBON FOOTPRINT

Carbon Footprint describes the total amount of carbon dioxide (CO₂) released into the atmosphere by an individual, event, organization, service, or product. Carbon dioxide is released in almost every activity in modern life, including burning fossil fuels, clearing land, manufacturing, construction, and food production.

***TAKT** maps the carbon footprint of its furniture across its entire lifecycle – from material to production, from transport to use, and on through to what happens following its original owner or usage. TAKT regularly implements new strategies for reducing its CO₂ emissions. It then offsets any remaining CARBON FOOTPRINT by investing in activities that directly remove carbon from the atmosphere – a more direct process than engaging in carbon quotas or indirect emission reductions. TAKT customers can use product-specific webpages to track carbon footprint calculations on each TAKT furniture piece purchased.*



Photo Courtesy of TAKT

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CARBON NEUTRAL

Carbon Neutral refers to a state – achieved through a mix of production, operational, and environmental practices – that balances carbon emissions with carbon absorption. Companies use different strategies, such as renewable energy and locally sourced materials, to achieve carbon-neutrality. As it is not easy to genuinely achieve this state, companies often compensate for their CO2 footprint through offsetting initiatives – such as tree planting and forest preservation – that fund equivalent carbon dioxide absorption elsewhere.

Mehmoon by Kouros Maghsoudi is a furniture collection inspired by Persian traditions and playful postmodern design. In Farsi, Mehmoon translates to “gathering” or “party.” While promoting Persian gathering traditions, this collection is also designed to be CARBON NEUTRAL. To achieve carbon neutrality, Kouros Maghsoudi calculates CO2 emissions from fabrication and transportation to offset with the use of carbon credits. A key factor for this company in achieving neutrality is a commitment to making furniture from locally sourced organic materials – including corn-based plastic, sustainably-sourced FSC-certified lumber, and plant-based resin.



Photo Courtesy of Kouros Maghsoudi

CIRCULAR DESIGN

Circular Design prioritizes circular economy principles of designing out waste and pollution, keeping products and materials in use, and regenerating natural ecosystems. In this approach, designers start considering each future stage of a product from its earliest design phase. With the end in mind, products are reimaged to keep them in use as long as possible, through, for example, material choice, modular innovations, or ease of repair.

Dirk Vander Kooij Studio developed a process for applying low-resolution 3D printing to furniture production - with *CIRCULAR DESIGN* at the core of the Studio's principles. In their factory, for example, 96% - 100% of the chairs, tables, and light fixtures produced are made of plastic recycled from post-industrial and post-consumer waste. In a similar vein, waste from factory production is all but eliminated as all remaining parts, prototypes, and failures are melted into new products.



CLOSE THE LOOP

Close the Loop is an approach to design and operations that prioritizes redeploying a company's own would-be waste to further useful purpose – for example, through repair, reuse, or remanufacturing. In this way, what has traditionally been wasted remains safely in a company's technical or biological cycles, thus 'closing the loop.'

IKEA's efforts to become a fully circular business by 2030 incorporate a wide range of strategies including reuse, refurbishment, remanufacturing, and recycling. To keep products in use for as long as possible, the company's intent is to provide customer-centric, convenient solutions for updating and repairing its furniture. IKEA is further experimenting with CLOSING THE LOOP by collaborating with other industries, such as fashion, to give new life to sofas and post-consumer waste. In one example, IKEA offers a new sofa cover made out of worn jeans from Mud Jeans.



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COMPOSTABLE

Compostable products, packages, and materials can be broken down and turned into nutrient-rich fertilizer or soil. This process usually takes up to 90 days and leaves behind no toxic elements. Compostable materials only break down under certain conditions – such as those in industrial compost facilities – which marks the difference between compostable and biodegradable. While all compostable materials are biodegradable, not all biodegradable materials are compostable, as some biodegradable materials break down into pollutants.

The MushLume Lighting Collection by biodesigner Danielle Trofe comprises hanging pendants, tables, and floor lamps. This collection combines hemp with mycelium – the vegetative part of fungi – to “grow lampshades.” Within a few days, mycelium cultivates a thick network of hyphae – long filamentous branches found in fungi – which is then left to solidify within custom lampshade molds. When the mycelium matures, the molds are removed and the lampshades are then dried and heated. This creates a stable, 100% COMPOSTABLE product that can ultimately add nutrients back to the earth.



CRADLE TO CRADLE®

Cradle to Cradle® is an overarching design concept based on three nature-inspired principles: everything becomes a resource for something else; nothing is wasted; and everything is designed to be disassembled and returned to the soil or to industry. Architect William McDonough and chemist Michael Braungart first proposed this approach in *Cradle to Cradle: Remaking the Way We Make Things* (2002).

Loll Designs submits all of its outdoor furniture products – made partially from recycled plastics such as milk jugs and 100% recyclable at end-of-product-life – for third-party verification by the CRADLE TO CRADLE Products Innovation Institute. Verification involves analyzing compliance across five ‘cradle’ categories: material health, product circularity, clean air and climate protection, water and soil stewardship, and social fairness. Loll Designs has attained an overall Cradle to Cradle Certified SILVER™ rating for 84% of its product line.



DEMATERIALIZATION

Dematerialization is a strategy for creating products and services with the minimum possible usage of new physical material. Approaches include reducing use of extracted materials such as ores, minerals, and oil; increasing efficiency in the use of materials; improving recycling and use of residual materials; and shifting our focus from 'products' to 'services' – such as offering furniture for rent instead of purchase.

***A.I. Chair** was the first chair created by artificial intelligence, in collaboration with human beings. The team – French Designer Philippe Starck and 3D software company Autodesk for Kartell – employed an algorithm to create a chair that exemplified DEMATERIALIZATION in its minimal possible use of materials. They used A.I. in concert with 100% recycled materials while matching Kartell's demanding comfort and aesthetic standards. The A.I. Chair launched at Milan Design Week in 2019.*



Photo Courtesy of Kartell

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DESIGN FOR DISASSEMBLY

Design for Disassembly facilitates transportability and future changes in use by making it as easy for the end user to dismantle a product as it is to assemble it. Carefully designed products can be disassembled in part or completely for reconfiguration or ease in moving. Design for disassembly ensures material recovery, value retention, and meaningful next use.

***Loose Parts** rethinks furniture, conceiving of it as a system rather than as a stand-alone object. Alongside natural and single-origin materials – such as natural latex, horsehair, and cotton batting – Loose Parts furniture consists of a system of hardwood rails, steel fasteners, and metal panels. When DESIGNED FOR DISASSEMBLY, these elements are readily reconfigured to adapt to users' evolving furniture needs and room environments.*



ECOLOGICAL FOOTPRINT

Ecological Footprint compares, on one hand, the rate at which we consume natural resources and generate waste and greenhouse gasses (GHG) with, on the other hand, nature's speed in absorbing waste, sequestering GHG, and producing new natural resources. An ecological footprint calculation includes water and energy consumption, and as such is broader than a carbon footprint calculation.

Emeco is a chair manufacturer that assesses its materials, transportation, energy, and packaging impacts to calculate its ECOLOGICAL FOOTPRINT. Emeco reduces CO2 emissions and diverts waste from landfills by using 90% recycled rather than virgin materials. In addition, through changes in maintenance routines on factory equipment, Emeco has reduced its water consumption by 30%. And by warehousing everything on-site, the company has eliminated the need to transport products before shipping to consumers.



Photo Courtesy of Emeco

ELECTRONIC WASTE

Electronic Waste, also called e-waste, consists of discarded electronic and electrical products that contain hazardous materials. In furnishings, electronics occur in uses such as desks – with charging ports and other conveniences – and in motion furniture such as recliners. Electronics are one of the world’s fastest-growing waste streams, with only 30% of e-waste in western nations appropriately recycled. The remaining 70%, according to the United Nations, is frequently incinerated or shipped, often illegally, to landfills in developing countries. Recycling electronics also results in reduced need for mining of rare earth minerals.

The R.U.M. (ReUsedMaterials) chair, produced by Wehlers in collaboration with C.F. Møller Design Architects, combines maritime plastic waste with ELECTRONIC WASTE. The seat, back and pipe shoe of R.U.M. chairs are made from granulated recycled plastic and electronic waste, and are mounted on a steel frame. The R.U.M. chair can be repaired, reused, and recycled. All Wehlers materials are locally sourced and production is powered by renewable energy.



EMBEDDED IMPACTS

Embedded Impacts describe the cumulative consequences of making, distributing, using, and disposing of a product. These impacts can be positive or negative and reflect a wide range of environmental and social contributors. Some contributors are literal while others are less obvious but equally essential. Examples include the effects and consequences of resource extraction, production methods, product durability, employee health, and supply chain policies.

Formr is dedicated to providing a second chance to both formerly incarcerated people and discarded construction materials. In this way, Formr's furniture reflects positive EMBEDDED IMPACTS, both social and environmental. Formr employees - who often face great difficulty in finding employment when released from incarceration - produce sustainable, durable, high-quality furniture out of discarded wood, metal, and other construction waste.



Photo Courtesy of Formr

FAIR TRADE

Fair Trade practices – based on transparency, respect, and equity – are trade relationships that promote sustainable livelihoods and just working conditions. Pricing of a certified fair trade product aims to allow producers to cover the cost of their work alongside investing in their businesses and in healthcare, education, and other community needs. There are numerous fair trade certifications, including World Fair Trade Organization and Fairtrade International.

West Elm was the first home brand to join FAIR TRADE USA, a non-profit that sets standards for, certifies, and labels products that promote sustainable livelihoods, safe working conditions, protection of the environment, and strong, transparent supply chains. Today, all Williams-Sonoma, Inc. brands, including Pottery Barn and Rejuvenation, offer Fair Trade Certified™ products since West Elm initially started working with Fair Trade USA in 2014.



Photo Courtesy of West Elm

INCLUSIVE DESIGN

Inclusive Design prioritizes accessibility for varied human needs and different human bodies in the design of products, services, and systems. By emphasizing accessibility, inclusive design accommodates the diversity and evolution of people's bodies as they experience change through aging, injury, or illness. As inclusively-designed products are built to accommodate change, they are more likely to stay in use, and therefore less likely to become waste and end up in a landfill.

Lotte armchair by designer Sarah Hossli is designed to ensure that most people can use the chair – sit down and then get up – independently regardless of age or ability. Sarah Hossli's intensive design process included on-site research in care homes, prototype testing with residents, and evaluations by medical and care experts. The armchair features armrests as supports, which fosters INCLUSIVE DESIGN by allowing some users to put all their weight on their arms. Easily refreshable materials and small-batch production enables ready adaptation of the armchair to future customer needs.



Photo Courtesy of Severin Stark

JUST TRANSITION

Just Transition is a guiding principle that emphasizes fairness as the world's economy responds to climate change – seeking to minimize the burden of past, current, and transition-related health, environmental, employment, and economic costs to workers and communities. While shifting from an extractive to a regenerative economy, the principle of Just Transition implies that the people most affected by climate transition be compensated for losses and closely involved in developing policy solutions.

Vestre has incorporated the Global Reporting Initiative (GRI) framework into its corporate sustainability assessment. GRI helps businesses work towards a JUST TRANSITION by taking responsibility for their impact on society and the environment. Within this framework, Vestre has committed to setting Science-Based Targets aligned with emission-reduction goals that restrict global temperature rise to 1.5°C. Dedicated to a “polluter pays” model, Vestre has also identified a gold-standard offsetting program to compensate for the company's climate impacts through funding in communities in countries including Colombia and Papua New Guinea.



Photo Courtesy of Vestre

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LIFE CYCLE

Life Cycle of a product refers to the full range of stages in its lifetime – from raw material extraction and processing, to product manufacturing and transportation, and on to use, re-use, and the end of its functionality. Some products' useful life is considerably longer than others'. A longer lifespan lessens overall impact, making strategies such as repair and maintenance important to a healthy product life cycle. Life cycle stages apply to materials as well as to products.

Circuform extends the LIFE CYCLE of its products by minimizing use of raw materials while maximizing reuse. In 2021, Circuform launched REX, a circular version of Ineke Hans's award-winning 2011 chair design. REX is made of PA6 plastic recycled from fishing nets, carpets, office chair components, toothbrushes, and industrial waste. The retail price includes a €20 deposit, refunded upon return of the chair after use. Chairs in better condition are then readied for resale, while those in poor condition are shredded into raw material to give life to new chairs.



Photo Courtesy of Annegien van Doorn

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LIFE CYCLE ASSESSMENT

Life Cycle Assessment (LCA) – also known as Life Cycle Analysis – is used to evaluate the environmental impact of a material or a product from ‘A to Z’ – from raw material extraction through to material processing, product manufacturing, transportation, use, reuse and, ultimately, decomposition. The International Standards Organization standardized the LCA framework with 12 impact areas – including global warming, acidification, eutrophication, ozone depletion, and photochemical smog. Evaluating these 12 areas fosters understanding of the implications of a material or product on the health of humans and other life on Earth.

Fermob makes outdoor furniture out of recycled materials using processes that avoid chemical inputs that would impede further recycling. The company has conducted a LIFE CYCLE ASSESSMENT to inform further product development. The assessment compared their Dune and Luxembourg collections with alternatives made of teak and of plastic. The result showed in detail the ways in which simpler and more complex construction choices differ, as well as the ways in which plastic chairs are more harmful to the environment and human health.



Photo Courtesy of Fermob

MODULAR DESIGN

Modular Design calls for products to be manufactured in smaller, independent components, which then facilitates ease of assembly, reconfiguration, and replacement. Modular design simplifies everything – from assembly and disassembly, to repair, reuse, and recycling – by typically requiring only a few standard tools and avoiding glues and adhesives.

Costume MODULAR Sofa System, by designer Stefan Diez for Magis, consists of interlocking sofa units. This MODULAR DESIGN can be readily reconfigured – or extended with armrests or a pouf – which allows the sofa to respond to changing needs. All components, such as springs and covers, can be dismantled and replaced, further improving adaptability. The sofa's internal structure features embedded pocket springs that ensure comfort while reducing use of ecologically harmful synthetic foam. Finally, elastic loops allow the sofa to be readily 'undressed' for washing or replacement.



NON-TOXIC INPUTS

Non-Toxic Inputs are chemical substances that have been proven safe for the health of people and other life on our planet. MADE SAFE®, the Global Organic Textile Standard (GOTS), and other independent accreditations certify products made with non-toxics inputs. Among furnishings, for example, GOTS certifies products in categories such as upholstery fabric, bedding, mattresses, and mattress covers and toppers.

Two Sisters Ecotextiles sells only fabrics that are safe to use, requiring its suppliers to avoid chemicals known to cause cancer, congenital disabilities, genetic mutations, or endocrine disruption. Vendors must comply with five NON-TOXIC INPUT requirements – oxygen-only bleaching; enzymatic or oxidative desizing; use of biodegradable detergents, degreasers, and soaps; no petroleum-based surfactants; and non-reliance on company-prohibited chemicals. These prohibitions include any organic solvent containing benzene, chlorine containing compounds such as sodium hypochlorite, and dyestuffs containing heavy metals. In addition, *Two Sisters'* vendors must treat their wastewater.



PRODUCT AS SERVICE

Product as Service is a paradigm that challenges traditional models of consumption by differentiating between things that must be owned versus those to which a 'consumer' only requires access. The shift in focus from ownership to access invites rental, subscription, sharing, or leasing arrangements. With product as service, what matters is the opportunity to use the service that a product offers.

ZZ Driggs offers a wide range of thoughtfully sourced furniture and furnishings for rent or purchase, available on demand for both commercial and residential spaces. Alongside contemporary and collectible furniture, the company provides hospitality-grade service and waste-free delivery. Focusing its business strategy on PRODUCT AS SERVICE, ZZ Driggs offers rental terms from 1-12 months, with the option to later buy and deduct the accumulated rental cost. After each rental retrieval, ZZ Driggs conducts a thorough quality check and professional cleaning, then returns the piece to inventory ready for its next use.



Photo Courtesy of ZZ Driggs

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RECLAIMED MATERIALS

Reclaimed Materials are recovered from one use, such as a building or a skateboard, for use in another, such as furniture production. Brands and designers choose to work with reclaimed materials – such as wood, steel, aluminum, copper, brass, and glass – as these materials can be more environmentally friendly and cost effective, as well as add unique aesthetic, textural, and historic value to furniture and interiors. Wood salvaged from trees felled by storms or cleared for construction can also be considered reclaimed material.

Miles & May designs and produces furniture with reclaimed lumber, cold-rolled steel, and leather. The company's design process emphasizes staying true to the unique features and history of each RECLAIMED MATERIAL. To further limit its ecological footprint, Miles & May keeps production in-house, uses scrap wood to heat its studio, donates unusable leather to artists, and fabricates with recycled steel. All furniture is created by hand using both traditional and contemporary techniques.



Photo Courtesy of Miles & May

RECYCLING

Recycling transforms products or product parts into new raw materials by mechanical and chemical processes, which allows those materials to be remade into new products. Glass bottles, for example, can be melted for recycling into home decor. Plastic bottles can be melted to be spun into fiber for upholstery fabric. While recycling is vital to a circular economy – keeping materials out of landfills and extending material value – it is nonetheless less efficient than reuse, remanufacturing, and refurbishment due to recycling’s inherent energy and material loss.

Smart Ocean chair by Humanscale uses recycled ocean fishing nets and, in doing so, reduces ocean plastic pollution. Producing each chair requires approximately two pounds of discarded nets, which upon retrieval are shredded, then melted into plastic shells. Smart Ocean was the first task chair to be built with RECYCLED ocean plastic, and meets rigorous sustainable manufacturing criteria as certified by the International Living Future Institute.



Photo Courtesy of Humanscale

REDISTRIBUTION

Redistribution serves to divert a product – often at the end of the product’s usefulness to an original consumer – from its first market or customer to another. In this way, instead of becoming waste, the item is given new value as it enters a second useful life. More and more furniture retailers are adding a new dimension to their business model by offering a haul-away service for used furniture when delivering a new piece. The retailer then sells or donates the used products, often in cooperation with non-profits in their community.

rePurpose™ is a program created by Herman Miller to help companies extend the life of surplus assets, especially no-longer-needed furniture, equipment and supplies. In addition to relocating, reselling and recycling, rePurpose coordinates the donation of furniture and equipment to non-profits. In this way, by offering REDISTRIBUTION as an alternative to disposal, rePurpose ultimately significantly reduces carbon emissions. Research by the company has demonstrated that, in general, 67% of older office furniture ends up in landfills, while redistribution through donation of furniture from 100 offices can reduce carbon emissions by 37.5 tons.



REFURBISHMENT

Refurbishment is the process of repairing or fixing products to the extent possible without disassembly or replacement of key components. This includes refinishing, reupholstering, deep cleaning, and/or sanitizing – all of which help extend the useful life of the product.

Fyrn, a furniture design and manufacturing company – believes good design considers future circumstances. Products are designed using a proprietary parts-and-pieces system that emphasizes durability and allows for easy repair and REFURBISHMENT of individual parts over a lifetime of use. Fyrn commits to buying back their furniture pieces at any time for any reason. Quality, resilience and serviceability enables ease in getting their furniture back into circulation. Fyrn extends their products' life cycles through The Annex, their online shop for vintage finishes, seconds, restored items, and other unique Fyrn pieces.



REGENERATIVE DESIGN

Regenerative Design focuses on restoring, renewing, and revitalizing depleted ecosystems and communities. This approach seeks not only to lessen harm but rather to put design, materials, and products to work as positive forces with the capacity to repair natural and human systems. To operationalize regenerative design, companies must understand the impact of their products and processes on interconnected places and people.

Compostboard is a material and surface developed by circular designer Rik Makes. The designer uses waste from the nearby agricultural landscape in the Netherlands as feedstock to create REGENERATIVE DESIGN furniture. Once the furniture reaches the end of its life, it can be returned to the soil, giving back the nutrients and fibers, regenerating nature, helping farmers and, ultimately, local communities.



Photo Courtesy of Rik Makes

REMANUFACTURING

Remanufacturing restores value to a product by disassembling, then rebuilding it. Remanufacturers use a quality-controlled engineering process to return the product to as-new condition. This involves checking and refurbishing the durable elements of a furniture piece - such as the frame - then rebuilding the product around them. Remanufacturers maintain alignment with the precise technical specifications of the original furniture - with the results looking and performing as new, but with significant environmental and economic savings.

***Rype Office** sources and remanufactures most popular office furniture, including Herman Miller, Knoll, Vitra, Orangebox, and Steelcase. Rype Office will customize the furniture that it remanufactures - applying new colors and finishes and, if feasible, adjusting dimensions. When redecorating, offices can gain added flexibility by combining existing furniture with Rype's remanufactured pieces. Expert analysis of the benefits of REMANUFACTURING furniture - versus throwing it away - indicate an over 80% reduction in greenhouse gas emissions and production energy use. This is alongside an 80% - 90% savings in materials and water.*



RENEWABLE RESOURCES

Renewable Resources – including energy sources, water, and materials – can be replenished by nature within the human timescale. Solar, hydro, and geothermal are examples of renewable sources of energy, as contrasted with non-renewable fossil fuels such as coal, oil, and natural gas. Rainwater and treated wastewater are examples of renewable water. A subset of renewable resources are rapidly renewable resources – such as bamboo, cork, straw, flax, cotton, soy, wool, and some types of wood – that replenish themselves within ten years.

***Lenzing** develops sustainable fibers from the RENEWABLE RESOURCE of FSC-certified wood harvested from responsibly managed forests and tree plantations. The fibers – including TENCEL™ Lyocell and Modal, as well as Lenzing ECOVERO™ viscose (all in the rayon family) – are used in fashion and home textiles, and biodegrade safely at the end of their life cycle. The Lenzing biorefinery supplies not only fiber for textiles and renewable energy to power operations, but also by-products such as sugars used in the food, pharmaceutical, and cosmetics industries.*

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REPAIR

Repair addresses broken, worn, or defective products and components in order to return them to a usable state and their intended use. A growing 'right to repair' movement is advocating for manufacturers to design products emphasizing fasteners, materials, and other components that can be readily fixed while also providing access to clear repair instructions and affordable replacement parts.

***Repair Don't Replace** – a program by Sabai – allows customers to keep their furniture like new through ready access to essential replacement parts such as legs, cushions, pillows, and slipcovers. Sabai makes it easy for customers to address sofa repair issues that may arise by making its parts available for purchase through the company website. By committing to its customers' Right to REPAIR, Sabai holds itself accountable for the full lifecycle of its products while responsibly diversifying its revenue streams.*



Photo Courtesy of Sabai

REPURPOSING

Repurposing shifts the use of an item to extend its life cycle. Rather than disposal of materials and components, repurposing emphasizes adapting, reprocessing, and regenerating – or reusing items for an entirely different function altogether. Glass bottles and jars, for instance, can be repurposed into vases, candle holders, and desktop accessories. Old doors and street signs – among hundreds of examples – are often repurposed into tabletops.

Hamed Ouattara is a multidisciplinary artist and designer who creates playful, functional furniture pieces by REPURPOSING discarded metal barrels and oil drums. Based in Burkina Faso, Hamed Ouattara has reconceptualized his production process to optimize local realities of scarce power equipment, unreliable energy supply, and an abundance of talent and used metal barrels and drums. Over the past two decades, Studio Hamed Ouattara has participated in many initiatives to support and elevate designers on the African continent.



RESIDUAL MATERIALS

Residual Materials are left over from production or usage and are not recyclable, either because of toxicity or for technical reasons. This broad category includes scraps; post-industrial materials from a production stream; and post-consumer materials recovered or diverted from the solid waste stream after use.

***The Stone House Project**, by Dutch designer Stefan Scholten, uses stone waste from a quarry to create furniture. In collaboration with the Italian factory Morseletto, Scholten recovers broken chunks, saw residue, and marble grit, then turns these RESIDUAL MATERIALS into benches, coffee and dining tables, and chairs. As part of his process, Scholten explores century-old techniques for assembling and using stone such as Terrazzo, Palladiana, Mosaico, and Marmorino.*



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REUSE

Reuse refers to repeatedly using products and materials for their intended purpose, with modifications limited to steps such as cleaning and other minor adjustments. Reuse is a vital part of a product's life cycle and of a vibrant circular economy. It lessens the impact of manufacturing and consumption, and prevents harmful incineration or landfilling - which in turn helps to save energy while reducing extraction and greenhouse gas emissions.

***Kaiyo** is an online marketplace for buying and selling pre-owned furniture. The company picks up, inspects, cleans, and readies pieces for resale. In this way, Kaiyo extends the life of furniture by facilitating REUSE. The company helps customers save up to 90% on top furniture brands. Simultaneously, Kaiyo creates opportunities for people to sell furniture they no longer want and, in doing so, diverts tables, chairs, sofas, and more from landing in a landfill.*

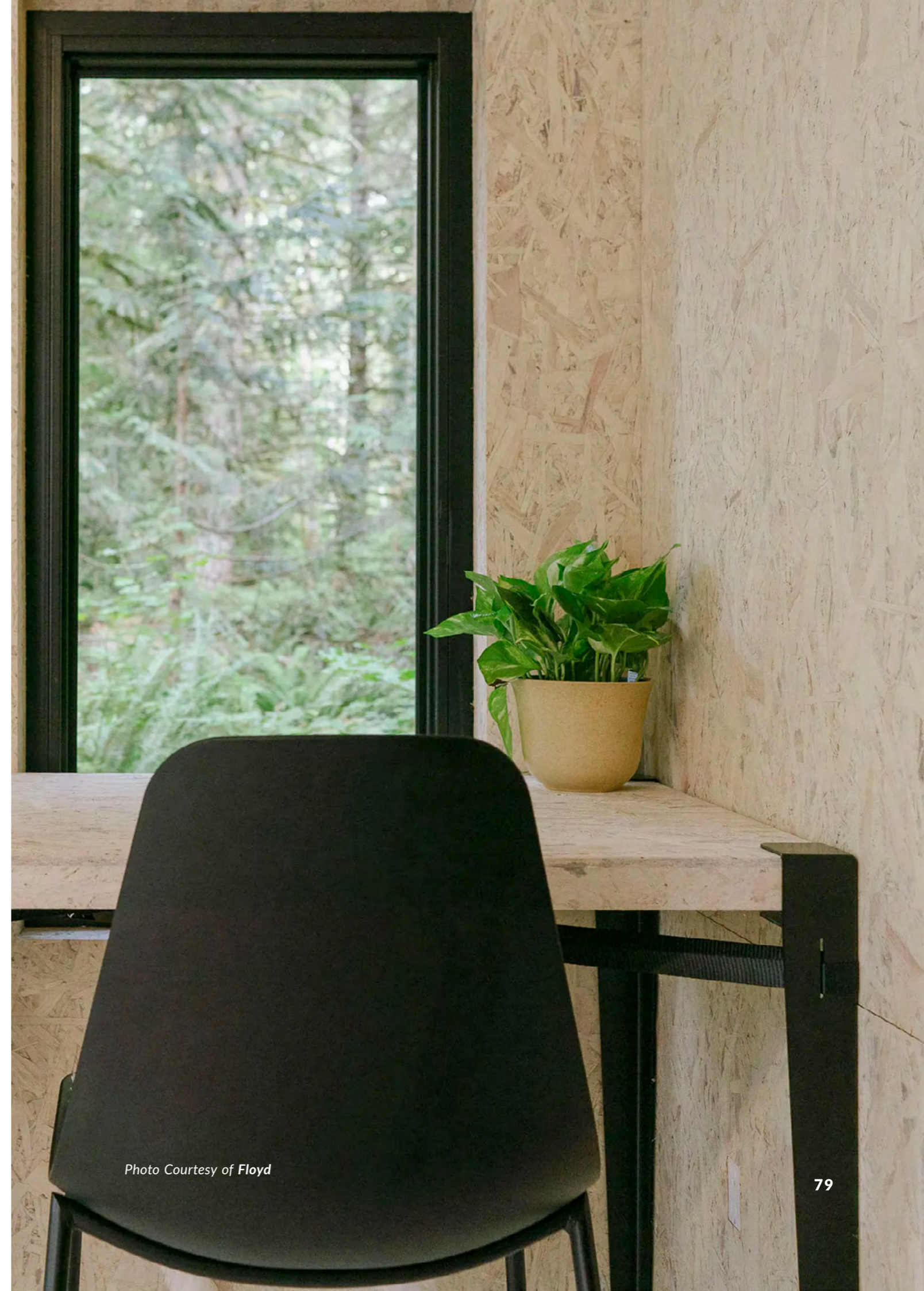


Photo Courtesy of Kaiyo

SOCIAL EQUITY

Social Equity, a key pillar of sustainability, is broadly concerned with ideals of fairness and justice. Policies and practices supporting social equity include fair wages and safe working conditions; diversity, equity, and inclusion; and engagement of local and community stakeholders through both job and leadership opportunities as well as in decision- and policy-making. Circular systems are fully effective when they strive to reduce inequality, improve health and well-being, and prioritize accessibility and affordability.

***Floyd** is a furniture company that addresses SOCIAL EQUITY on multiple fronts. Floyd's diversity, equity, and inclusion priorities focus in four areas: internal and external representation; systems, policies, and practices; education to remove bias at all internal levels; and community engagement. Floyd supports its team by offering healthcare coverage, 401k retirement options, paid parental leave, and educational stipends to all employees. In addition, Floyd supports and engages with its local community through mentorship programs, hosting events, and providing furniture to families and veterans transitioning from homelessness.*



SOCIAL RESPONSIBILITY

Social Responsibility encompasses a set of business practices through which companies hold themselves accountable for making a positive impact on society and the planet. These practices typically fall into four categories: 1) environment, such as transitioning to renewable energy; 2) ethical, such as implementing supplier and vendor codes of conduct; 3) philanthropic, such as donating a percentage of a company's annual earnings; and 4) economic, such as buying only from suppliers that use organic materials, even if they cost more.

Avocado is a Certified B Corporation®, and therefore legally required in decision-making to weigh its impact on workers, customers, suppliers, community, and the environment. With factories powered entirely by renewable energy, Avocado demonstrates SOCIAL RESPONSIBILITY as the world's only Climate Neutral Certified® mattress and bedding brand. Their products have earned multiple certifications including the Global Organic Latex Standard (GOLS). Community initiatives range from volunteer programs to employing women in Rampur, India who were once victims of domestic violence. Avocado also donates one percent of revenues to environmental non-profits.



Photo Courtesy of Avocado

TAKE BACK PROGRAMS

Take Back Programs are organized by manufacturers and retailers to assume responsibility for their products at the end of their original useful life. In such programs, companies make it convenient for their customers to return used products, after which the company refurbishes or remanufactures them for resale or for donation to need-based organizations. Currently, municipalities around the U.S. are beginning to introduce Extended Producer Responsibility (EPR) policies that require a manufacturer to bear the cost and manage the logistics for the repeat use of their products and material components.

57st.design is a brand that designs, manufactures, and retails its own furniture. In 2018, the company launched Design Circulation - a TAKE BACK PROGRAM that buys back, then restores 57st. furniture, regardless of wear. Newly restored furniture pieces are offered for sale, ready for further 'circulation' to the next home. Customers who sell back used furniture receive store credit without an expiration date. When someone buys a restored piece of furniture from 57st. design, the company again guarantees to repurchase it.



Photo Courtesy of 57st.design

TECHNICAL NUTRIENTS

Technical Nutrients are synthetic or inorganic materials manufactured through human activity. They derive from natural materials – plastic, for example, from cellulose, coal, and crude oil. Once transformed through industrial processing, synthetic and inorganic materials can not return safely to nature. At the same time, efficient circulation of technical nutrients such as plastic limits the need to extract new raw materials, which further damages or strains the natural environment.

***Polywood** transforms plastic trash into outdoor furniture in its plants in Indiana and North Carolina. HDPE plastic – used to make milk jugs and other plastic bottles – is a TECHNICAL NUTRIENT used in manufacturing 'lumber' for Polywood's durable weatherproof furniture. The company's recycling process incorporates local, regional, and globally-sourced post-consumer plastic as well as their own industrial scrap. They melt the material to form boards and other components for furniture production, and in doing so fulfill a mission of waste reduction.*



Photo Courtesy of Polywood

TRACEABILITY

Traceability allows a company or consumer to track the movement of a material along the supply chain from its origin through to its sale – providing a window of accountability into environmental sustainability practices, labor conditions, manufacturing facilities, and other factors. While it is more challenging to track globalized supply chains, recent advances in track-and-trace technologies support companies by facilitating supply chain transparency. This makes it possible for producers to track the whereabouts of sold products in support of take-back programs, Extended Producer Responsibility, and other circular practices.

***Gat Creek** manufactures furniture in the heart of the Appalachian region of the U.S., where Ash, Cherry, and Maple are plentiful. All the wood they use is harvested within a 250-mile radius of the manufacturing plant. Regionally sourced materials allow Gat Creek to monitor its supply chain with greater efficiency and TRACEABILITY, while avoiding deforestation, pollution, and fossil fuel-intensive shipping often associated with overseas harvesting and production. Gat Creek appears on the Origin App, an online database that consumers can use to trace the derivation of the wood in products.*



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UPCYCLING

Upcycling is a recycling process that transforms materials or products into new materials or products of better quality and environmental value – such as using deadstock, or leftover fabric, to create a new shirt. By contrast, downcycling converts materials or products into something of lower quality, like polystyrene waste used to produce loose-fill material for thermal insulation. Upcycling extends the life cycle of products and materials, making it more sustainable and efficient than downcycling. Used clothes and other textiles can be upcycled into rugs and sofa cushions.

REDU builds furniture and renovates commercial and residential interiors using materials that are 99% upcycled. The company's mission is to divert materials – such as scrap wood and discarded foam – from entry into the waste stream, then transform these materials into creative furniture and decor. The company's commitment to UPCYCLING is reflected in its motto – "Making obsolescence obsolete."



Photo Courtesy of REDU

URBAN WOOD

Urban Wood comes from trees that have fallen or been removed as municipalities deal with construction, weather damage, disease, or insects. Historically, managing trees has been an expensive waste problem for cities. Today, the Urban Wood movement realizes the value of the whole tree. While some downed urban and community trees are best converted to firewood or wood chips, many can be processed into lumber for furniture, flooring, and interior finishes, adding greater value to the resource.

Room & Board's Urban Wood Project creates sustainable furniture and decor out of reclaimed URBAN WOOD from U.S. cities. Launched in Baltimore in 2017 in collaboration with the USDA Forest Service, the project salvages wood in a variety of ways, including from homes and structures slated for demolition and trees removed for disease, maintenance, or storm damage. As of 2022, it has expanded to Detroit, Minneapolis, New York City, Sacramento, and Southern California with more cities on the horizon.



Photo Courtesy of Room & Board

VEGAN DESIGN

Vegan Design is an approach to developing products free of animal-based materials such as hides, wool, silk, fur, and animal-based resin and glue. These materials are often replaced with vegetable-based ingredients such as hemp, cotton, bamboo, linen, cork, kapok, buckwheat, and vegan glues and resins.

***Biosofa** offers a fully vegan version of its 100% natural and plastic- and toxin-free furniture pieces. From cover to padding, each component is free of animal-based materials. Biosofa's VEGAN DESIGN uses latex based-glues, linen and cotton covers, and padding made from jute belts, steel springs, layers of cotton, linen, and kapok.*



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mebl | Transforming Furniture

New York-based mebl | Transforming Furniture champions a future of furniture that is sustainable and circular. To accelerate this transformation, we're teaming up with industry, design, media and advocacy networks to help demystify and make the case for circularity. We're envisioning a future that rethinks the design, use, and business of furniture altogether.

Sustainable Furnishings Council

The Sustainable Furnishings Council is a coalition of manufacturers, retailers and designers dedicated to raising awareness and expanding the adoption of environmentally sustainable practices across the home furnishings industry. We help companies reduce their environmental footprint while helping consumers find healthier products and design services.

SOMA_studiomilano

SOMA_studiomilano is a Milan-based consultancy studio working towards a transition from a linear to a circular economy. We strive to raise awareness and provide valuable information and strategies on the circular economy and design. Our goal is to empower professionals and companies to take action and shift towards a circular economy and ultimately build a more sustainable world.



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