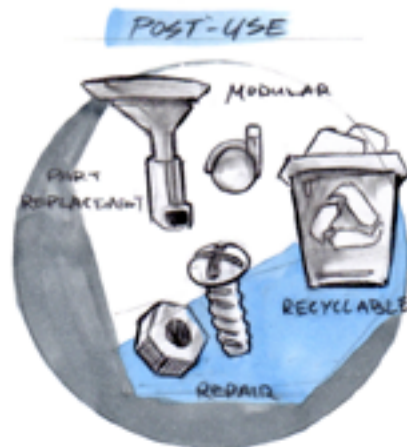
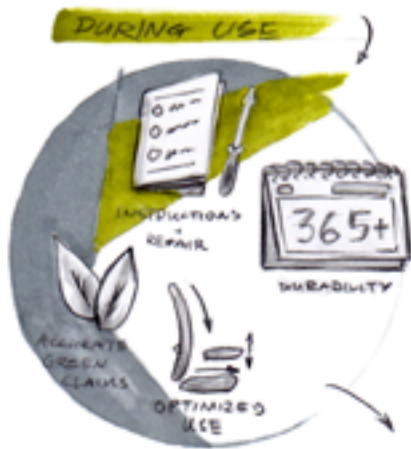
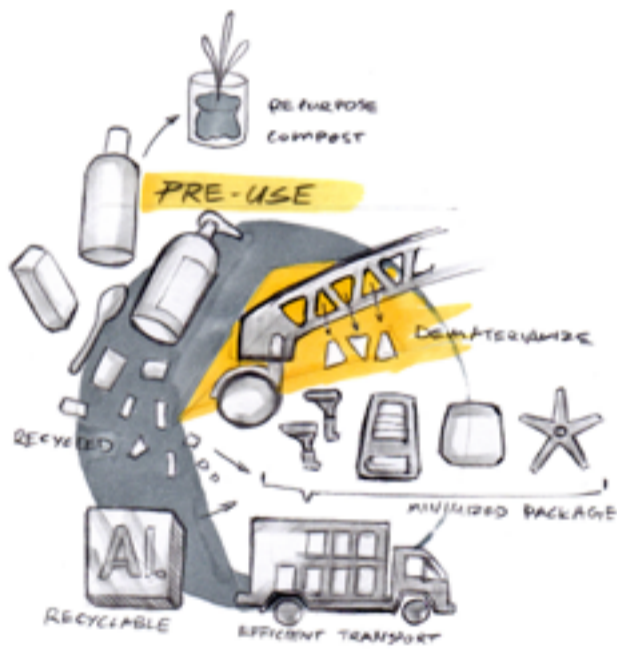


DESIGN PORTFOLIO 2018





About the National Zero Waste Council

The National Zero Waste Council, an initiative of Metro Vancouver, is a leadership initiative bringing together governments, businesses and non-government organizations to advance waste prevention in Canada.

Acknowledgements

This catalogue was completed by the National Zero Waste Council's Product Design and Packaging Working Group and contractor Emily McGill. The Council would like to thank the following Working Group members for their strategic advice, guidance and review: Alan Blake, PAC Next (Co-chair); Susanna Carson, BSIBio; Allen Jensen, Metro Vancouver; Laurie Lewis, Halifax Regional Municipality; Colin Isaacs, CIAL Group; Julian Radlein, SymbiAudit; Isaul Lopez, BASF.

Introduction

Canadian innovators can be a quiet group, offering tremendous leadership without fanfare. However, when it comes to waste prevention and best practices around upstream design and innovation, the Council believes that such Canadians deserve recognition and indeed celebration. Only by recognizing great design and all the thinking that goes into it, can we inspire and even teach others to follow suit. This has been the *raison-d'être* behind our Design Portfolio – Celebrating Canadian Design for Waste Prevention and Systems Thinking. This portfolio was intended to feature products and packaging that exemplify great design, explain the principles that we think make them great, and celebrate the companies that are leading the way toward systems-thinking for circularity and zero waste. We had help along with way from many exceptional people. While we consulted with experts in design, environmental science, and market development to establish good design principles, we also worked with experts to review products and packaging, finding items that best exemplified waste prevention by design.

By sharing knowledge and celebrating those innovators that have dared to deliver on waste prevention, we hope to encourage others – designers, distributors, consumers – to think, do and purchase differently, helping us secure a more circular Canada more quickly.







We hope you enjoy the products and packaging featured here, and find ways to incorporate some of the design principles discussed into your own work.

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

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



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


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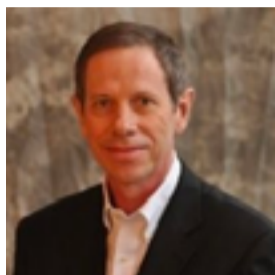


External Review

Panel

When the Design Portfolio was founded in 2015, the National Zero Waste Council established a distinguished, independent panel of experts to review submitted products and packaging that demonstrate the power of design to prevent and reduce waste. The Portfolio's 2018-19 External Review Panel includes:

Alan Blake, previous Executive Director, PAC NEXT

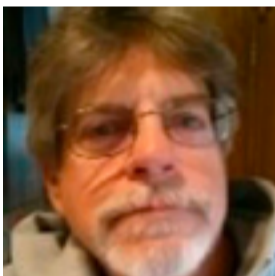


Alan Blake is a Retired Executive & Consultant in sustainability, packaging and food waste. Previously, he was the Executive Director, PACNEXT sharing their vision of A World without Packaging Waste with a focus on engaging industry partners to find better end-of-life solutions for all packaging materials. Prior to PACNEXT, Alan worked for Procter & Gamble, based in Cincinnati, where he had 30 years experience in the consumer goods industry, including 20 years of global packaging design and development expertise. He led P&G's global packaging sustainability program with a focus on their 2020 goals and long-term packaging sustainability vision.

Alan was formerly co-chair of the National Zero Waste Council (NZWC) Product & Packaging working group and served on the NZWC board. He was as a member of the board of The Packaging Association (PAC) where he is now currently a member. He also served on the Sustainable Packaging Coalition Executive Committee and the board of GreenBlue.

Alan is a Fellow of the Institute of Chemical Engineers (FIChemE), is a Distinguished Toastmaster (DTM) and a happy grandfather of Everett and Margaret.

William F. Hoffman II, Manager, Environmental Science Team, UL Environment



William F. Hoffman III (Bill), Ph.D works on the technical basis for the development of standards and guidance for standards including the green chemistry and circular economy aspects of product environmental performance, validation of claims and product certification. The goal of this work is to provide a strong technical basis to product environmental performance by using a deep scientific analysis of the environmental impact of a product while also assuring companies producing the product are using environmentally progressive manufacturing methods. Recent standards have focused on the Zero Waste, Circular Economy, energy efficiency of plastics molding, medical equipment and advanced power strips. In 2014 Bill was elected a member of the William Henry Merrill Society, a UL Corporate Fellow.

Formerly Bill was the Director of Sustainability Services for a non-for-profit consulting firm Chicago Manufacturing Center where he was responsible for strategy and deployment of sustainability services. He also managed the Chicago Waste to Profit Network which was responsible for the diversion of 40,000 tons of material from local landfills and 30,000 tons of CO2 saved as a result of those diversions. He also performed a Product Carbon Footprint assessment of craft beer brewery.

While at Motorola Bill worked on the development of several internal specifications including standards governing the chemical content of products and was heavily involved in external standardization efforts for environmental issues in electronics. These standards often included consideration of chemical risk, trends in regulation, business need, product design requirements and environmental management trends. Bill also developed the core design of an electronics industry component database that was used to manage RoHS compliance of product components and provide analysis of material content for reporting to automotive industry customers. Bill also led the semiconductor packaging team for an early Life Cycle Assessment of an electronics product performed by an industry consortium.

Bill spent 2 years at Argonne National Laboratory as a Post Doctoral Appointee. While at Argonne he studied the chemistry and formation of transition metal clusters. The reactions of Nickel and Iron with hydrogen and ammonia were the main topics of the research.

BS Chemistry from Southern Illinois University

Ph.D. Physical Chemistry from Illinois Institute of Technology



Louise St. Pierre, Associate Professor at Vancouver's Emily Carr University of Art and Design (ECUAD)

Louise St. Pierre, researches and teaches in sustainable design and medical design at Vancouver's Emily Carr University of Art and Design. Co-author of the internationally recognized Okala Ecological Design curriculum, she initiated Emily Carr University's participation in the international Partnership for Academic Leadership in Sustainability (PALS), and established Canada's first DESIS Lab (Design for Social Innovation and Sustainability). St. Pierre was co-chair of the 2014 International Design Principles and Practices Conference. She has received awards for Industrial Design, Exhibit Design and Ecological Design work from organizations such as the IDSA and The American Center for Design, and has been published in ID Magazine, Print Magazine, Innovation, and Communication Arts. Her work has also been supported by a range of sustainable and ecological design initiatives, including awards from the U.S. Environmental Protection Agency. Prior to coming to Emily Carr, St. Pierre was Chair of the University of Washington Industrial Design Program. She continues to lecture internationally on sustainable and ecological design.



Joe Chiodo, Designer and Inventor

Dr. Joseph Chiodo, Designer and Inventor, Active Disassembly, conducts R&D in eco-design, designing for circular economy systems, product disassembly and dematerialization. He will soon be Head of Product Innovation, Corporate and Social Responsibility at a therapeutic and pharmaceutical company and is writing a series of illustrated reference guidelines for circular economy and eco-design manuals. Throughout his career, he has led cross-continental R&D consortia, and advised numerous academics institutions, companies, and governments including Motorola, Nokia, Sony, Mitsubishi, the EU Commission, the UK Department of Trade and Industry. His work includes numerous patents, technology, and applied science and product inventions. Dr. Joseph Chiodo invented 'Active Disassembly' (AD), which employs conventional and smart materials in the design of releasable fasteners and actuators to aid the non-destructive dismantling and selective disassembly of component and product reuse. This process retains the added value of products and their products, fostering upcycling. His work has been published widely, and Dr. Chiodo continues to be the recipient of numerous awards for these achievements. Through his website, he has authored some of the world's most downloaded 'Design for' strategy documents.



Dr. Getachew Assefa Wondimagegnehu, Associate Professor, School of Architecture, Planning and Landscape (formerly EVDS), University of Calgary

Dr. Getachew Assefa Wondimagegnehu is an Associate Professor of Environmental Design, Athena Chair in Life Cycle Assessment, and Fellow of Institute for Sustainable Energy, Environment and Economy at the University of Calgary. He has a B.Sc. degree in Chemical Engineering, M.Sc. in Environmental Engineering and Sustainable Infrastructure, a Licentiate Degree in Industrial Ecology and a PhD in Industrial Ecology. His Ph.D. research looked at Sustainability Assessment of Technical Systems from the Royal Institute of Technology (KTH) in Stockholm, where he later taught and did further research. He has more than 10 years' experience in teaching and research related to life cycle assessment and industrial ecology in Europe, China and Africa.

Key Design Principles for Waste Prevention & Systems-Thinking



These key design principles highlight crucial techniques to prevent and reduce waste at each stage of design and development. Waste is designed out of the system while making decisions on material sourcing, production and sale, envisioning and optimizing use, and finding post-use solutions that promote resource recovery.

Planning for waste reduction and prevention looks at the entire cycle of use for a product or package.

The challenges of designing out waste extend beyond the design table, across sectors and supply chains. These principles can be applied to new products ideas and redesigns, discussed in the boardroom and in the lab. In the following pages, a printable graphic of the principles as well as a checklist are provided - both are perfect for sharing in the lab, studio, purchasing office, and more. Details and definitions on each design principle follow. .

To see these principles in action, explore deeper into the Design Portfolio The portfolio features Canadian products and packaging that prioritize any number of these principles while also showing what a successful market solution looks like.

These design principles are key to reducing solid waste throughout the lifecycle. The principles can be categorized into three stages of a complete product lifecycle:

Pre-use: involves all the steps from cradle (the origin of the materials) to the customers door; manufacturing/production, distribution and sale.

During Use: the goal of creating a product or package is to fill a need. Effective design will minimize waste during use.

Post Use: the new paradigm of resource recovery prevents and reduces waste by encouraging all materials to re-enter useful life after their first run of production and use.

Design Principles and the Design Process

- Design to source rapidly renewable, re-used, reclaimed, or recycled materials using low-waste extraction
- Choose materials wisely, considering post-use pathways
- Dematerialize; use less to make as much
- Add value to byproducts for use in other industries
- Use energy efficient and low waste manufacturing and transport
- Lightweight the products and packaging while preserving recyclability
- Minimize packaging relative to product size

What can we redesign?

What waste is created at each stage upstream?

PRE-USE

DURING USE



- Plan a repair program
- Use requires low or no energy
- Ensure accurate 'green' proper marketing claims
- Provide clear instructions for use
- Design for durability and repair
- Optimize performance for the application
- Design for what the user needs, without excess

Can we enhance performance amount of waste created?

How can we prevent or reduce the during use?

Will using this create waste?

POST-USE

- Design for modularity; ease of repair, parts replacement or disassembly for recycling
- Reuse by user or by another industry
- Recyclable or Compostable
- Include instructions for disposal

How will the user know what to do once they're done using the item?

Communicate with waste handlers to understand and design for the post use reality of your products and packaging.

Design Principles for Waste Prevention and Systems-Thinking: **Checklist**

WASTE PREVENTION STARTS WHERE DESIGN BEGINS

The National Zero Waste Council promotes waste prevention through design innovation – by taking a systems perspective, designers become an important lever in wiping out waste at every stage of the supply chain, from pre-use, during use, through to post-use stages of the product or package life cycle.

Use this checklist to help design waste out.

PRE-USE DESIGN PRINCIPLES

- ❑ Prioritize re-used, reclaimed, recycled, or rapidly renewable source materials.
- ❑ Minimize energy used during manufacturing, and prioritize renewable sources of energy.
- ❑ Prioritize low waste manufacturing techniques and add value to byproducts.
- ❑ Dematerialize to reduce the total amount of material used during manufacture, and also reduce the amount discarded.
- ❑ Maximize product density and minimize packaging required. This means providing enough packaging to protect the product, inform and appeal to the consumer, without excess.
- ❑ Plan for efficient transportation.

DURING USE DESIGN PRINCIPLES

- ❑ Design to meet a need, and explain clearly how to use and dispose. Why? A product which clearly meets a need is less likely to be disposed of prematurely. Additionally, clear instructions for use and disposal reduce the chance of breakage, under-use, early disposal, or deposit in the wrong waste stream.
- ❑ Extend the products useful life through repair and return programs; and, eliminate the need for other products in the consumer's life through repurposing or integrating multiple functions.

POST-USE DESIGN PRINCIPLES

- ❑ Divert materials from landfill and promote a circular economy using methods such as repair, easy disassembly and design for re-use, use by another industry, composting and recycling.
- ❑ Accurate environmental claims support and promote sustainable design methods

For more detail on these Design Principles, visit nzwc.ca/focus/design/principles-and-reviewers

Design Principles Defined

Pre-Use Principles

Raw materials are rapidly renewable

Pre-use involves all the steps from cradle (the origin of the materials) to the customer's door; manufacturing/production, distribution and sale.

Raw materials are compostable

It's important to consider compostability from the beginning. Material chemistry, processing additives, and trace elements (e.g. inks) can affect how well a product or package exceeds standards for compostable certification. These will also affect whether the materials are suitable for another industry's use (e.g. methane extraction).

Value added to byproducts

Byproducts are the materials created during manufacture that are not used in the final item. Planning the next use of these byproducts by another industry, or internally, can contribute significantly to waste reduction.

Lightweight

Reducing weight of a product and its package can considerably reduce energy use during transportation and manufacture; however, reducing the weight should not jeopardize product life span through reduced performance.

Low-waste manufacture techniques

Some manufacturing techniques produce less waste than others. Low waste manufacturing processes consider effluent and byproduct control to limit the spread of waste, minimize materials used (e.g. additive manufacturing) or find uses for by-products (e.g. cascading subtractive).

Raw materials are re-used, reclaimed, or recycled

Sourcing resources that are rapidly renewed through natural cycles can reduce dependence on non-renewable materials. This promotes natural production systems that can continue indefinitely (in theory).

Dematerialize; use less to produce as much as before

Minimize the environmental impact of a product or packaging by reducing the volume and/or weight of materials used. This "dematerialization" can happen both by making the item itself out of less material, and by optimizing the raw material extraction and manufacturing processes to reduce the amount of material used.

Energy efficient extraction and manufacturing

Reduce energy use wherever possible. Renewable energy to power extraction and manufacturing reduces reliance on non-renewable sources. Using energy efficient machinery further cuts resource and energy costs.

Good product to package ratio

A package should protect its contents, and inform and appeal to the consumer without using excess material. Together, the product and package should be strong enough to reach the consumer without damage. The more efficiently it is designed for transport, storage and display, the better it is at reducing waste.

Efficient transportation

Transport happens at all stages of the life cycle. Considering relative greenhouse gas emissions from different modes of transportation - rail, ocean, air, road - can be an important step, and an easy one to optimize in the production chain.

Design Principles Defined

During Use Principles

Low energy cost during use

Optimizing energy efficiency and encouraging eco-efficient appliances influence how much energy is used once a product or package is in the consumer's hands.

Clear instructions for use

Instructions are an opportunity to communicate value to the consumer. If a customer doesn't fully understand how a product or package works or needs to be maintained, it opens the way for breakage, under-use, and early disposal.

Clear instructions for disposal

The more prominent, catchy, and clear disposal instructions are, the more likely the consumer will be able to reach the goal of reducing waste after use. Better designs will accommodate regional infrastructure capacity for waste disposal.

Needs meets ends

Consumer preference analysis can determine whether a product or package is actually meeting its intended use; a well-designed product reduces the chance of premature disposal.

Durable or robust

Design to increase product longevity reduces the number and frequency of replacements.

Easy repair and parts replacement

Easy repair and parts replacement.

Design Principles Defined

Post-Use Principles

Easy disassembly

If taking the product or package apart is complex, it can limit or prohibit disassembly post-use. Designing with fewer parts and design for intentional disassembly increases re-use, reclamation, and recycling.

Use by another industry

Byproducts, effluent, and even post-use products and packaging can supply another industry's production line. This is called industrial ecology, or industrial symbiosis, and is arranged apart from consumer/municipal recycling systems.

Recyclables

Designing for recycling is a basic and accessible way to reduce waste after use. The recycling industry collects commonly used materials, processes and sells them into a new system of production. This can be an energy and transport-intensive process, and usually results in downgrading of materials over multiple recycling cycles. Designing for optimal recyclability and up-cycling (recycling to a product of equal or higher value) is a next-level way to approach this principle.

Design for reuse

Design for direct reuse is more efficient than disassembly or recycling. This means creating a product that can be directly reused at the end of life, without extra processing.

Collaboration with waste handlers

Designing a product for a specific waste stream (e.g. recycling, composting, methane extraction) is first-stage systems thinking; collaborating with the waste handling industry is the next. Ensuring there is an end market for the product and packaging post use, and that this market is available wherever the item is sold, is integral to optimizing end-of-life.

Compostable

Composting is the recycling of organic materials - biological nutrients to feed rapidly renewable resources. Not all products or packages can or should be designed to be compostable, but some industries are especially suitable for it, such as foodware and food packaging. Designing a compostable product requires careful consideration of materials, certification, and that the conditions required to compost are met in the market area.



PRODUCT

Custom Cardboard Furniture and Installations



Our Paper Life uses simple, recyclable cardboard to construct high impact displays and furniture. Their products are reusable and fully recyclable throughout Canada.

HIGHLIGHTS

- Made from cardboard with 95% recycled materials and 5% fibre certified through the Forest Stewardship Council
- Local manufacturing
- Assembles in 5 minutes; durable and reusable
- 100% recyclable



PRE-USE PRINCIPLES

Raw materials are rapidly renewable
Energy efficient extraction and manufacturing

DURING USE PRINCIPLES

Low energy cost during use
Needs meets ends
Clear instructions for use
Durable or robust

POST-USE PRINCIPLES

Easy disassembly
Design for reuse
Recyclable
Compostable



Above: the Our Paper Life team having fun with one of their creations

Our Paper Life's company goal is providing reliable furniture that is also sustainable. They use from 70-100% recycled material in all of their products, and with no extra fasteners or adhesives, these are 100% recyclable after use. Their virgin fibre is approved by the Forest Stewardship Council.

One of their flagship products is a "Room in a Box"; a suite of furniture including a bed with storage, chair, desk and dresser - perfect for students, and despite what you may think about how long cardboard furniture can last, they are built to be durable and reusable. In the market since 2012 they have been in use for over three years without replacement.

Most temporary furniture uses a combination of plastic and metal materials. Our Paper Life answers the need for clients who need impactful, engaging installations for semi-permanent or temporary events and want a 100% recyclable, easy to assemble and disassemble option. Most products take 5 minutes to set up, and can be disassembled and packed away as quickly.

The company uses local manufacturing partners and regionally recycled materials. All cardboard off-cuts are recycled and designers throughout the manufacturing chain work to optimize material use to minimize off-cuts, resulting in the company using upwards of 90% of their incoming materials. Their furniture requires minimal exterior packaging to transport, and are flat-packed - a best practice for assemblable furniture.



PRODUCT

Modular carpet tiles

Interface

Interface is a global company creating modular carpet tiles made using upcycled nylon. Their carpet tiles are easily replaceable and feature an innovative lock system that allows them to be moved between locations.

HIGHLIGHTS

- Made from recycled nylon and micro-additives
- Innovative low-waste manufacturing
- Movable during use
- Designed for durability and recyclability



PRE-USE PRINCIPLES

- Raw materials are re-used, reclaimed, or recycled
- Raw materials are compostable
- Dematerialize; use less to produce as much as before
- Value added to byproducts
- Energy efficient extraction and manufacturing
- Good product to package ratio
- Low-waste manufacture techniques
- Efficient transportation

DURING USE PRINCIPLES

- Low energy cost during use
- Needs meets ends
- Clear instructions for use
- Durable or robust
- Easy repair and parts replacement

POST-USE PRINCIPLES

- Easy disassembly
- Design for reuse
- Collaboration with waste handlers
- Recyclable





Above: Interface's modular upcycled carpet tiles

Designed to solve the problem of excess nylon floating on our oceans, Interface carpets are typically made from 78-82% post-consumer and post-industrial waste. In 2016, they shifted another 12-15% of the products weight from virgin minerals to recycled powder, further increasing the recycled content to over 90% on average.

They have reduced energy consumption to make a carpet tile by 30% since 1996, and 96% of the energy used in manufacturing is purchased renewable energy. They reuse byproducts and materials internally, share usable byproducts with other industries, and their manufacturing technique is designed to minimize and prevent waste. With all this effort, they use up to 96% of their incoming raw materials.

Their patented nature-inspired designs deliberately hide stains to extend usability, and using their recommended TacTiles Connectors, their carpet tiles can be picked up and moved with you. Their packaging is minimal and recyclable where possible. Interface takes back 100% of the product weight for recycling after use using a network of local drop-off depots across Canada.



PRODUCT

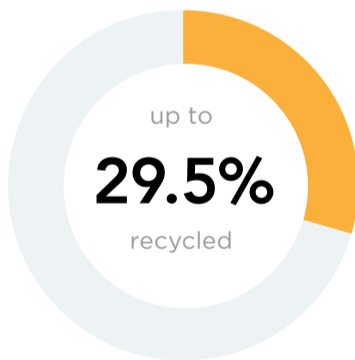
Felt Furniture

KEILHAUER

Leather, felt, and steel make Keilhauer's Felt lounge collection. The company aims for closed loop manufacturing, with minimal waste manufacturing techniques, adding value to their by-products, and easy instructions for disassembly.

HIGHLIGHTS

- Made from felt, leather and steel
- Built for durability, reuse and long-term enjoyment
- Easy to disassemble



PRE-USE PRINCIPLES

Raw materials are compostable
Value added to byproducts
Efficient transportation

DURING USE PRINCIPLES

Low energy cost during use
Durable or robust

POST-USE PRINCIPLES

Easy disassembly
Collaboration with waste handlers
Recyclable





Above: the hyper modern Felt Lounge Chair

Assembled with simplicity and sustainability in mind, Keilhauer uses only layered felt, steel, and leather for their Felt lounge furniture, with up to 12% recycled content in the steel.

Keilhauer uses zero water in their manufacturing plant for this product and 100% of their leather scraps are recycled into small goods such as purses by an industry partner.

In an effort to reduce the environmental impact of transporting products Keilhauer prioritizes and promotes reusable blanket wrapping of final products to its customers. It does so by providing a financial disincentive. It also allows them to put 25-50% more product on each truck, since blanket wrapped shipments can be decked to fit two layers of product. This greatly reduces greenhouse gas emissions and the resulting air pollution. In fiscal year 2013 Keilhauer blanket wrapped on average 82% of orders.

Felt succeeded in obtaining 3rd Party Certification including “level Certification” achieving “level 2” and “Indoor Air Quality Certification” achieving “SCS Indoor Advantage Gold”.

As for after-use; because of their natural and simple materials, most of this furniture is biodegradable and recyclable. Keilhauer provides disassembly instructions, and their customer service extends to helping you find a local recycling provider for your Felt furniture.



PRODUCT

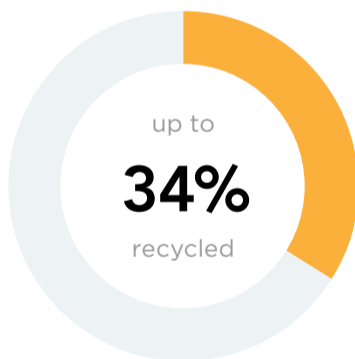
EcoWorks® PVC-free Carpet Tile

ShawContract®

Since 1995, Shaw Industries has provided PVC-free modular carpet tiles which cut down on traditional carpet waste, and save resources by using recycled materials.

HIGHLIGHTS

- Made from recycled materials and PVC-free
- Continually improved manufacturing
- Company provides take-back program
- Highly durable and recyclable



PRE-USE PRINCIPLES

Raw materials are re-used, reclaimed, or recycled
 Dematerialize; use less to produce as much as before
 Value added to byproducts
 Good product to package ratio
 Low-waste manufacture techniques
 Efficient transportation

DURING USE PRINCIPLES

Low energy cost during use
 Needs meets ends
 Clear instructions for use
 Durable or robust
 Easy repair and parts replacement

POST-USE PRINCIPLES

Easy disassembly
 Design for reuse
 Collaboration with waste handlers
 Recyclable





Above: a rendering of an EcoWorx product

Shaw's durable EcoWorx tiles are easy to install and replace, and are Cradle to Cradle Certified™ Silver. In manufacturing, Shaw's EcoWorx facility is partially powered by solar and hydro-electric energy, and they own and operate dedicated boilers, which gives them more control to continually optimize their manufacturing process as part of their company's goal to reduce energy consumption 40% by 2030.

They re-use byproducts internally, and work with industry recycling partners to prevent by-products from entering landfill. Since launching this product, they have reduced their carpet tile packaging by 98% and prioritized using recyclable packaging materials. They've cut down on carbon emissions in transportation by consolidating their distribution processes, investing in route optimization software, and new fuel efficient vehicles in their production line.

Their innovative design is significantly stronger than traditional PVC-backed carpet tile. During use, Shaw provides detailed maintenance guides and phone support to prolong the useful life of their EcoWorx tiles, and their limited lifetime warranty encourages customers to keep their products longer. After use, Shaw provides a take-back program for their tiles, partnering with 50 trusted materials collectors across North America to recycle when possible, and otherwise operates two carpet-to-energy facilities.

Shaw carpet tiles are available through Canadian Shaw carpet stores and dedicated brokers.



PRODUCT

Think Chair

Steelcase

By sourcing simple recycled materials, crafting a light, 15kg product (including packaging!), shipping in reusable totes, offering replacement parts, designing for easy disassembly and 99% recyclability by weight, Steelcase plans the entire lifecycle of their high performance New Think chairs.

HIGHLIGHTS

- Made from plastic, fabric and steel
- Lightweight and certified for indoor air quality
- Optimized ergonomic adjustability and replaceable parts
- Easy to disassemble



PRE-USE PRINCIPLES

Raw materials are re-used, reclaimed, or recycled
Lightweight
Low-waste manufacture techniques

DURING USE PRINCIPLES

Clear instructions for use
Durable or robust

POST-USE PRINCIPLES

Easy disassembly
Recyclable





Pre-use, Steelcase produces Think with minimal waste and energy consumption. Made from up to 29% recycled materials in ISO 14001 certified plants, it is certified for indoor air quality. This chair is the next generation of their Think line.

Getting from the factory to the customer can be a large source of a product's waste. To keep waste at a minimum during transportation, Steelcase manufactures close to the customer base, ships in reusable totes that return to the sender, prioritizes blanket wrapping over recyclable cardboard boxes and provides optional flat-packing for home assembly.

Once bought, Think's active use is extended by replacing heavy-use parts as needs change and parts wear. You can even try it out to make sure it's the right fit - with a 30 day money back guarantee.

Designing for durability doesn't stop Steelcase from considering Think after-use. Download the disassembly instructions from their website, and take the chair apart using common household tools in less than 5 minutes. Then recycle up to 99% of Think's parts.

The cherry on top: using third party certifiers confirms Steelcase is on the right track throughout the design process.

Above: colour options, Think Chair



PRODUCT

Reclaimed Nylon Apparel



sans soucie

Sans Soucie shines in the textile industry by exclusively sourcing 'waste' hosiery from manufacturers and transforming them into wearable zero waste garments.

HIGHLIGHTS

- Made from reclaimed, pre-consumer nylon
- Offcut fabric incorporated into new pieces and accessories
- Artisanal manufacturing process



PRE-USE PRINCIPLES

Raw materials are re-used, reclaimed, or recycled
 Value added to byproducts
 Energy efficient extraction and manufacturing
 Lightweight
 Low-waste manufacture techniques
 Efficient transportation

DURING USE PRINCIPLES

Durable or robust
 Easy repair and parts replacement

POST-USE PRINCIPLES

Design for reuse





Above: Sans Soucie's INHERITED collection is a self reflexive statement on ancestry, heritage and alchemy.

Sans Soucie uses pre-consumer waste hosiery from textile mills in North America. It's 100% nylon hosiery manufactured on site which has not been used or worn. These discards in the manufacture of pantyhose are the result of flaws in manufacturing, and cannot be sold at retail so is often discarded.

Using eco friendly, metal-free dyeing and printing processes, Sans Soucie transforms these materials into attractive apparel. All offcuts are kept from the cloth reconstruction and garment production, transformed into other textiles, accessories, and sculptural installations. Sans Soucie partners with Canadian artists to create hand-made goods with any residual material.

Restructuring of the material takes place by hand using artisanal processes combined with obsolete textile and sewing machinery in combination with digital technology. These pieces are shipped in recyclable packaging maximizing packaging efficiency and once at home, are best for air-drying by the nature of the material. Sans Soucie is working with customers to re-imagine and re-use their garments after use.

In a textile industry which is one of the country's largest waste generators, Sans Soucie shines for being mindful throughout their process from design to delivery.



PRODUCT

Recycled PET Apparel



Hydrate, wear, return. Boardroom EcoApparel takes recycling to heart, using PET water bottles to make their line of 100% recycled polyester apparel. Their verified supply chain doesn't stop when it gets to you, Boardroom will take your used 100% polyester items right back into their manufacturing stream.

HIGHLIGHTS

- Made from up to 100% recycled polyester
- Designed for durability and low-energy washing
- Return to the company to recycle after use!



PRE-USE PRINCIPLES

Raw materials are re-used, reclaimed, or recycled
Value added to byproducts
Low-waste manufacture techniques

DURING USE PRINCIPLES

Low energy cost during use
Needs meets ends

POST-USE PRINCIPLES

Recyclable





At Boardroom, clothing design meets lifecycle thinking. Beginning with ethical sourcing and rigorous supply chain partnerships, the company provides an array of eco-materials assembled in Vancouver, BC. In the spotlight here is their recycled PET clothing lines.

Using recycled PET water bottles as a base material is just the start, with 85% less energy, 65% less SO₂ emissions, and 90% less water usage than virgin polyester. Their process goes beyond material choice to take the whole manufacturing footprint into account with optimized dye and wash processes.

Once made, testing their fabric shows their EcoApparel lasts in the wash, can hang to dry, and cleans at lower wash temperatures than comparable natural materials.

And after you're done - in 2001, Boardroom launched their closed-loop apparel recycling to bring their rPET full circle, taking back your used apparel to pioneer extended producer responsibility in the Canadian apparel industry.

Above: athletic wear range



PRODUCT

Clear PET Bottles



LUSH cosmetics creates fresh, handmade personal care products from soap to face masks and everything in between. Their clear PET bottles are made from 100% recycled resins with waste prevented throughout the supply chain.

HIGHLIGHTS

- Made from 100% post-consumer recycled PET
- Minimized wall thickness in 2012
- 100% recyclable



PRE-USE PRINCIPLES

Raw materials are re-used, reclaimed, or recycled
Dematerialize; use less to produce as much as before
Low-waste manufacture techniques
Efficient transportation

DURING USE PRINCIPLES

Needs meets ends
Durable or robust

POST-USE PRINCIPLES

Design for reuse
Recyclable





Above: clear bottles designed to reduce waste and bring focus to the product within

A defining value of LUSH cosmetics is that when it comes to packaging, less is more. Throughout their product lines they aim for 'naked' products which can be purchased without packaging, and for their liquid products, one of their primary packaging forms is clear PET bottles made from 100% post-consumer recycled PET - #1 plastic, the most widely recyclable across North America.

Produced in Toronto, Ontario, the use of 100% recycled plastic means their bottles have about half of the energy used to create them compared to virgin PET bottles. They reduced the thickness of their bottles in 2012, enabling more bottles to be made with the same amount of material. Using additive manufacturing reduces excess byproducts throughout the supply chain.

LUSH minimizes waste throughout manufacturing and retail, from using reusable packaging where possible for internal inventory transfers, to monitoring and controlling their waste in a dynamic software system. Each production section has a green team, and they have an overall sustainability team who educates staff to ensure any defective plastic bottles enter recycling - garbage bins are regularly inspected to make sure no bottles are slipping through.

These bottles are transported in bulk and distributed through stores across North America. Although the PET bottle is the spotlight in this feature, LUSH also uses 100% post-consumer recycled PP (polypropylene) for their black pots, and 100% post-consumer recycled HDPE for their black bottles.



PRODUCT

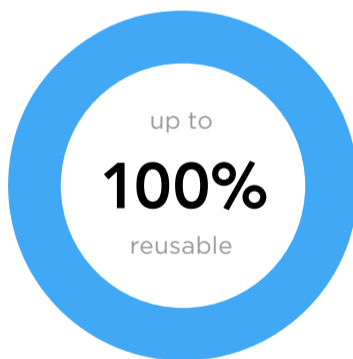
Durable Bulk Detergent Bottles



Reduce, reuse, recycle - Live for Tomorrow hits them all with their highly concentrated natural and biodegradable laundry detergent that comes in a refillable bottle that you can recycle after use. With 4 pumps per load, this little bottle gives you 50 loads of eco-friendly performance. Replacement pumps are available to sustain the life of the packaging.

HIGHLIGHTS

- Made to last and refill
- Pump head is easily and inexpensively replaceable
- High concentration allows many loads from a little bottle



PRE-USE PRINCIPLES

Efficient transportation

DURING USE PRINCIPLES

Low energy cost during use
 Clear instructions for use
 Easy repair and parts replacement

POST-USE PRINCIPLES

Design for reuse
 Recyclable





Right from the start, Live for Tomorrow (LFT) thinks about the future. Before the product is made, LFT sources all natural plant-and mineral-based materials with 3rd party certification for ethical standards: no animal testing and the product is EcoLogo verified.

Once you get it home, this easy-push bottle is designed to make your wash day even easier with no messy cap to fill. Four pumps are all it takes. This detergent is suitable for cool wash (at 30C); front and top load washers. The company encourages you to use energy efficient washing machines to reduce the energy of using their products.

It gets better; although the bottle is designed to be 100% recyclable, Live for Tomorrow wants you to reuse it. Through select retailers you can purchase bulk detergent refill, and buy a replacement pump right from their website.

Above: reusable and designed for bulk use



PRODUCT

Injection Molded Recyclable Polypropylene Tube



Viva Healthcare is innovating in the personal care aisle by introducing a polypropylene (plastic #5) tube for your lotions and gels. Cutting waste throughout their production, they're pushing the next generation of healthcare products designed for zero waste.

HIGHLIGHTS

- Made from recyclable polypropylene
- 25-33% less energy used in production, compared to conventional tubes
- Vertically integrated manufacturing



PRE-USE PRINCIPLES

- Value added to byproducts
- Lightweight
- Good product to package ratio
- Low-waste manufacture techniques
- Efficient transportation

DURING USE PRINCIPLES

- Low energy cost during use
- Needs meets ends
- Clear instructions for use

POST-USE PRINCIPLES

- Collaboration with waste handlers
- Recyclable





Above: PPE tube shown in the product lineup

Designed, manufactured, and sold in Canada, Viva Healthcare is breaking the mould on your typical lotion tube. Using additive manufacturing allows Viva to minimize excess material in the production line, and any offcut materials are incorporated into moulding new products.

Every component in this product is manufactured and printed under the same roof, and once complete, Viva Healthcare uses reusable and recyclable packaging to ship their products and packs for optimal space efficiency.

Whereas most healthcare product packaging falls under an unclassified or unrecyclable material category, Viva designs for recyclability by making this tube exclusively out of polypropylene. Polypropylene is one of the most readily recyclable plastics in North America today, and Viva innovates in their production with their tubes requiring 25-35% less energy to produce compared to typical industry tubes.

Viva takes a full-circle view to designing their packaging. Look for their recyclable tubes in a store near you!



PRODUCT

Natural Bar Soaps



Crafting using simple natural ingredients, Mountain Sky produces a biodegradable, river friendly soap packaged in a recyclable box. By creating a destiny for their soap ends and sticking to reused packaging materials, Mountain Sky minimizes the waste footprint of these long lasting bars.

HIGHLIGHTS

- Made from natural and readily biodegradable materials
- No soap goes to waste: odd shapes and sizes combined in a new composite 'Rebar'
- Minimal packaging with optimal reuse and recycling from locally available packing materials



PRE-USE PRINCIPLES

Value added to byproducts
 Good product to package ratio
 Efficient transportation

DURING USE PRINCIPLES

Needs meets ends

POST-USE PRINCIPLES

Compostable



Simple, natural, renewable ingredients that you could count on your fingers go into Mountain Sky's soap bars. By hand cutting soaps to size, Mountain Sky creates well-cured, long lasting bars that can be packaged in simple, recyclable paperboard boxes - no plastic necessary.

The main by-product of their soap production is the soap ends - odd shapes and sizes that don't make it to a retail shelf. By incorporating these into their 'Anise Rebar' line and selling via their website, or shipping to communities in need, Mountain Sky adds value, preventing castoffs from going to waste. Other compostable product waste breaks down in their on-site bear proof composter.

To get the bars to their customer, from the reused cardboard boxes and loose filling with shredded paper from their community, to using empty oil buckets to ship soap ends abroad, packaging waste reduction is integrated into operations.

In-house, they reuse paper and printer cartridges, and recently installed a heat pump to reduce their carbon footprint.

As for after-use; because of their natural makeup, these soaps are biodegradable and river friendly.

Above: a variety of natural ingredient soap products—plastic free!



PRODUCT

Composting Kit



The Bokashi composting kit is an at-home composting solution that eliminates odours. The company aims to make home composting of all food waste feasible and fun.

HIGHLIGHTS

- Buckets made from recyclable HDPE and bags from recyclable LDPE
- Composting bran available for bulk purchase
- Durable and reusable
- Packaging and shipping optimized



PRE-USE PRINCIPLES

Raw materials are rapidly renewable
 Good product to package ratio
 Efficient transportation

DURING USE PRINCIPLES

Low energy cost during use
 Needs meets ends
 Clear instructions for use
 Durable or robust
 Easy repair and parts replacement

POST-USE PRINCIPLES

Easy disassembly
 Design for reuse
 Recyclable
 Compostable





Above: composting in action and the complete starter kit

The Bokashi composting kit comes with a durable composting bin and bran to bulk and reduce odours when composting food scraps. Bokashi's bucket is made from recyclable HDPE using a mould to reduce manufacturing byproducts, and the company has worked with the manufacturer to increase shipping density. The bags containing Bokashi bran are LDPE and recyclable where facilities exist.

The Bokashi bran which reduces odour and contains active microbes to augment home composting is produced from locally available materials purchased in bulk. Energy use has been minimized in manufacturing the bran with a carefully timed heating system, and production is maximized in the summer months when warmer temperatures reduce energy demand. The bran is made available in bulk to reduce packaging.

Packaging and shipping is optimized without extra labels or tape, and nested storage, to reduce bulk and packaging. All packaging materials are recyclable.

The materials chosen are reusable and durable, and can last for decades. The company has designed the system for easy disassembly and provides replacement parts in case of breakage. After use, disposal instructions are provided on the Bokashi website.



PRODUCT

Optimized Granola Packaging



Careful paperboard design, space and weight optimization helped Nature's Path reduce their paperboard consumption for their granola by 10% over a single year in 2011. Nature's Path prioritizes recyclable materials in their packaging.

HIGHLIGHTS

- Made from 100% recycled paperboard and BPA free recyclable plastic
- Optimizing the product to packaging ratio for packaged cereal
- Pushing the supply chain: team-based waste reduction strategy created a more lightweight package in 1 year



PRE-USE PRINCIPLES

Dematerialize; use less to produce as much as before
Lightweight
Good product to package ratio
Low-waste manufacture techniques

DURING USE PRINCIPLES

Low energy cost during use
Clear instructions for use

POST-USE PRINCIPLES

Easy disassembly
Recyclable



Above: Nature Valley's range of optimized packaging

Although Nature's Path (NP) is known for their sustainably sourced cereal ingredients, the focus here is on their packaging commitments. Nature's Path actively reduces waste of manufacture and use through research, design, and product innovations.

Across their manufacturing locations, NP diverts 92% of their waste from landfill. This is echoed throughout their operations, where teams of employees are tasked on reducing waste in the production line – at one time, resulting in a 7% overall waste reduction in a single year.

They use intermodal shipping, consolidation and load optimization, on-time delivery and data tracking to produce, pack and distribute products in the most efficient way possible.

Preparing for the end of the life cycle, NP researches and selects readily recyclable materials to make disposal easy for the consumer.



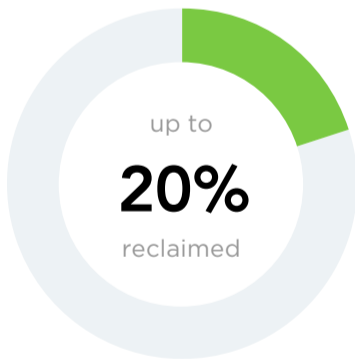
PRODUCT
PurPod100™



High-profile coffee brands are switching to Club Coffee's PurPod100™, the world's first certified 100% compostable pod for the North American single serve market of coffee, tea and other hot beverages. Club Coffee is following up with more innovations to help its many partner brands meet consumer demand for sustainable packaging and zero waste.

HIGHLIGHTS

- Made of 89% renewable materials, with 20% reclaimed
- Local, under-one-roof manufacturing
- Certified 100% compostable



PRE-USE PRINCIPLES

- Raw materials are rapidly renewable
- Raw materials are re-used, reclaimed, or recycled
- Raw materials are compostable
- Value added to byproducts
- Low-waste manufacture techniques

DURING USE PRINCIPLES

- Needs meets ends
- Clear instructions for use

POST-USE PRINCIPLES

- Easy disassembly
- Compostable



Above: the components of a Purpod100™

Invented and manufactured in Canada, Club Coffee brought the first certified 100% compostable single serve beverage pod to the market with their PurPod100™. The pods are made out of 89% renewable materials and designed to be composted after use, certified by the Biodegradable Products Institute for large scale municipal and industrial composting facilities. Compared to a traditional single serve pod, the PurPod100™ and residual coffee or tea leaves is designed to be composted altogether.

Although the single serve format and materials are not accepted in compost facilities everywhere and will take a long time to break down in a backyard compost, the company has tested the pods extensively in composting facilities across North America. Club Coffee continues to meet with municipalities to increase the PurPod100™'s acceptance in compost facilities.

Club Coffee's PurPod100™ has three component; a filter made of PLA (poly-lactic acid), a lid made from paper lined with PLA, and a ring of a proprietary compostable bio-polymer designed in collaboration with the University of Guelph, which contains 20% coffee chaff reclaimed from their coffee roasting process.

By using a mixture of subtractive (for filters and lids) and additive (for the bio-polymer rings) manufacturing for their pods, Club Coffee minimizes the amount of extra material they generate during production. Any trimmings from the lids and filters are composted near their factory in Toronto.

The PurPod100™ focuses on using recyclable packaging for the pods that maintain odour and freshness, and the company is working on significantly reducing environmental impacts from their current packaging.

This Canadian innovation can offset the tonnes of landfill-bound single serve pods, and Club Coffee continues to pursue innovations and partnerships which will enable it to be composted in industrial facilities.



PRODUCT

Reusable beeswax wrap

abeego®

KEEP FOOD ALIVE

Abeego uses an old world recipe of all-natural materials to create a reusable replacement for your plastic cling wrap. The materials include a proprietary combination of hemp, organic cotton, organic jojoba oil and beeswax.

HIGHLIGHTS

- Made from hemp, organic cotton, organic jojoba oil, tree resin and beeswax
- Minimal packaging for transportation
- Designed for multiple reuses
- Can be repurposed or will slowly biodegrade after use



PRE-USE PRINCIPLES

Raw materials are rapidly renewable
Raw materials are compostable
Dematerialize; use less to produce as much as before
Value added to byproducts
Lightweight
Good product to package ratio
Low-waste manufacture techniques
Efficient transportation

DURING USE PRINCIPLES

Low energy cost during use
Needs meets ends
Durable or robust

POST-USE PRINCIPLES

Design for reuse
Compostable



Above: beeswax wrap hard at work

Using a proprietary combination of hemp, organic cotton, organic jojoba oil, tree resin and beeswax, Abeego hand makes a line of reusable food wraps which can cling like your typical transparent plastic wrap. They've mathematically optimized their wrap sizes to suit their raw materials to minimize offcutting, and they give whatever off-cut strips they do create to local florists to wrap bouquets. They've iterated their designs to have the bare minimum of materials used. Through redesigning their packaging, they've reduced their packaging and optimized transportation efficiency.

Most importantly, this product saves food. In the company's words, Abeego behaves like the peel of a lemon or the rind of cheese - it's breathable, and fresh fruits and vegetables need storage environments which allow breathing.

Studies have shown that breathable materials such as this can make food last longer than the typical synthetics. After use, the abeego can be repurposed for any use that requires grip, like opening jars, and will slowly biodegrade.



PRODUCT

Reusable Straws



GlassSipper reusable glass straws, available both decorative and plain, are made from 100% borosilicate glass and the company offers a lifetime replacement and repair warranty.

HIGHLIGHTS

- Made from borosilicate glass
- No manufacturing byproducts
- Durable and reusable
- Discount provided to minimize packaging for wholesale



PRE-USE PRINCIPLES

Value added to byproducts
Good product to package ratio
Low-waste manufacture techniques
Efficient transportation

DURING USE PRINCIPLES

Needs meets ends
Durable or robust
Clear instructions for disposal
Easy repair and parts replacement

POST-USE PRINCIPLES

Design for reuse





The GlassSipper straw replaces the need for disposable plastic straws for a lifetime. Formed with 100% borosilicate glass, all incoming materials are used in manufacturing, eliminating byproducts. Imperfect product are sold at bulk or gifted to non-profits.

GlassSipper provides a 5% discount to wholesale customers who order their straws without packaging, and encourages local customer pick-up to prevent packing and transport.

The packaging that is used is 100% recyclable, and the product information card is designed to be used as a bookmark.

The lifetime warranty provided by GlassSipper provides replacement straws in the case of accidental breakage, and the company offers to repair if possible.

Above: offering both colourful characters and classic plain varieties



PRODUCT

Cargo Carousel Systems

The Cargo Carousel System is innovating the pallet-and-shrink wrap delivery system with a sturdy shipping module that can be used for supply and return product cycles. The company is helping people ship product, not air with condensed and reusable packing systems.

HIGHLIGHTS

- Made from durable aluminum
- Reduces the need for disposable packaging
- Designed for reuse and repair



PRE-USE PRINCIPLES

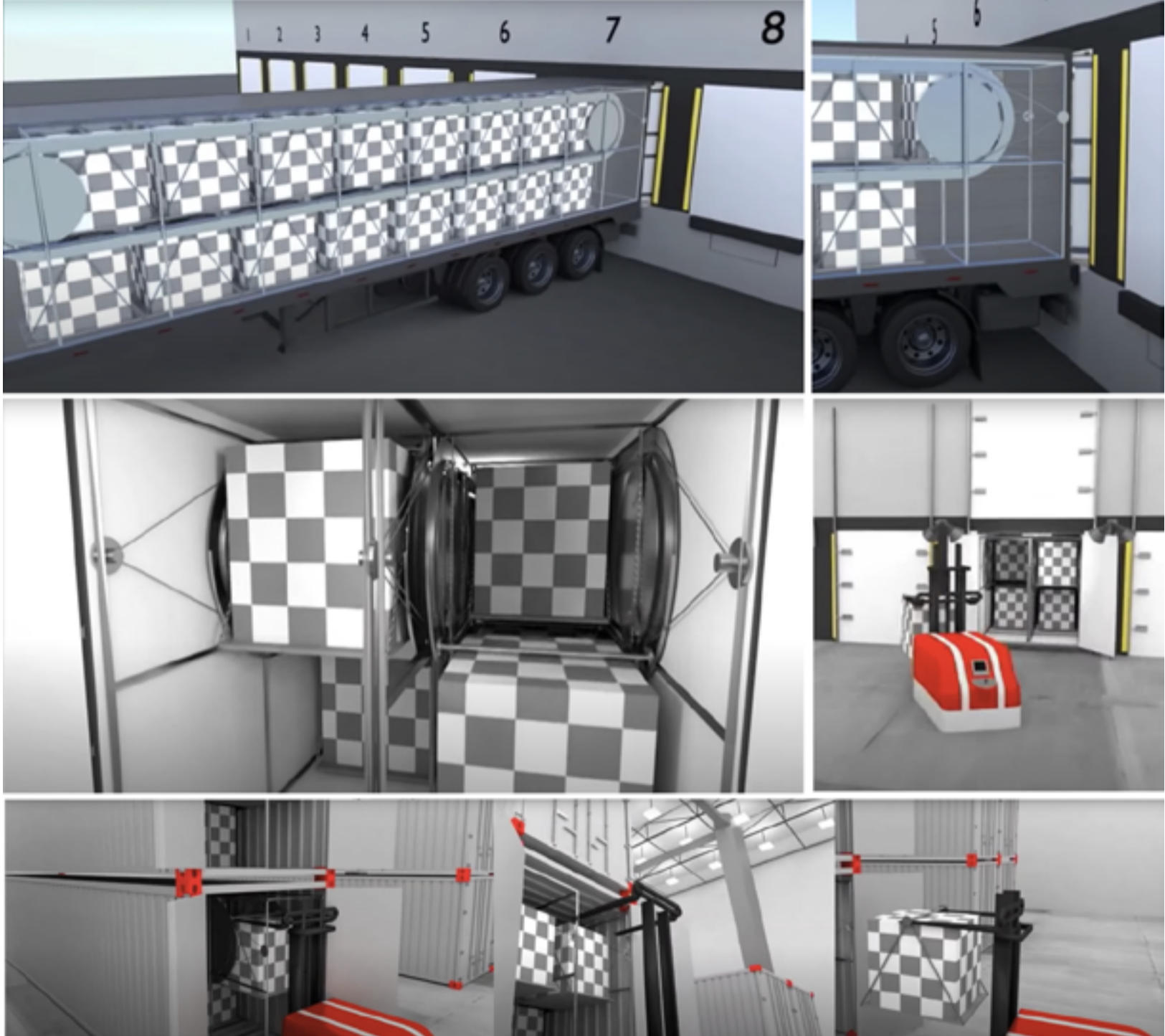
Good product to package ratio
Low-waste manufacture techniques
Efficient transportation

DURING USE PRINCIPLES

Low energy cost during use
Needs meets ends
Clear instructions for use
Durable or robust
Easy repair and parts replacement

POST-USE PRINCIPLES

Easy disassembly
Design for reuse
Recyclable



Above: a rendering of an automated shipping and storage carousel system

The innovation of Cargo Carousel System is what it replaces – the pallet-and-wrap transport system which has been the norm for decades, producing tonnes of unrecyclable shrink wrap along with wooden pallets which are typically reused only several times before being disposed. Instead, the Cargo Carousel System provides delivery and pick up in standardized reusable containers at any stage of the supply or return chain. By using an enclosed cargo container, the Cargo Carousel protects contents without disposable packaging.

Container modules in the Cargo Carousel System can be opaque, lockable and sealable for protective shipping. Recycled and recyclable aluminum is used to make the Cargo Carousel System, and manufacturing byproducts are recycled. Their system increases space utilization for user's warehouse storage. The company sells parts for repair and replacement and the design enables easy repair.

Energy is used to power the system only when necessary, and customers are invoiced on a per-use basis providing feedback to correct potential overuse.

Clear instructions for use and disposal reduce the chance of breakage, under-use, early disposal or depositing in the wrong waste stream. These instructions are available both in print online and over the phone.

This product is being produced for sale in 2019.



PRODUCT

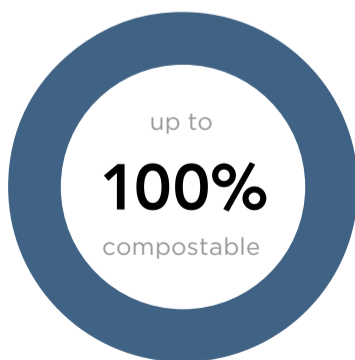
Green Recognition Awards



Premium, bespoke recognition awards handcrafted from locally salvaged and recycled materials. Eclipse is the world's first carbon-neutral awards company and operates in a living building in Vancouver, BC

HIGHLIGHTS

- Made from one or a combination of reclaimed wood, reclaimed or recycled glass, and steel
- Premium awards designed for long-term durability and appreciation
- Packaged and sent in the same box they display in



PRE-USE PRINCIPLES

Raw materials are re-used, reclaimed, or recycled
 Dematerialize; use less to produce as much as before
 Good product to package ratio
 Low-waste manufacture techniques
 Efficient transportation

DURING USE PRINCIPLES

Low energy cost during use
 Needs meets ends
 Durable or robust

POST-USE PRINCIPLES

Recyclable
 Compostable





Above: different versions and techniques

When celebrating the human spirit, beautifully handcrafted awards can emphasize and amplify the message of appreciation, strengthening the social element of sustainability.

These high quality, unique awards are sourced from locally reclaimed materials that are both sustainable and plentiful - primarily, salvaged wind-fallen trees and recycled glass.

At their production facility they've reduced energy consumption with a green roof and ample natural lighting, a solar water heating system, and a turbine electricity system; beyond that, Eclipse has also been 100% bullfrog powered since 2009 so that the energy that is used to make these awards, is both clean and renewable.

Using production techniques like sandblasting and laser engraving allow for a minimum of processing agents. Natural by-products such as sawdust and wood scraps are composted.

These awards come shipped in their multi-purpose presentation boxes that are built strong enough for both transport and display, eliminating the need for one extra layer of packaging.

Custom design for both beauty and durability, the awards are intended to accelerate the shift towards sustainability by recognizing excellence and empowering emerging leaders.



PRODUCT

Greenomics the Game

greenomics

Greenomics the Game engages teams and families in sustainability as entertainment and team building. The game board and box are made from post-consumer recycled paper and the design eliminates the need for glue. The game pieces are made from recyclable HDPE.

HIGHLIGHTS

- Made from post-consumer recycled paper
- Box and board require no glue
- Hand assembled, durable and reusable
- Recyclable or compostable parts after use



PRE-USE PRINCIPLES

Raw materials are rapidly renewable
Raw materials are re-used, reclaimed, or recycled
Raw materials are compostable
Energy efficient extraction and manufacturing
Good product to package ratio
Low-waste manufacture techniques
Efficient transportation

DURING USE PRINCIPLES

Low energy cost during use
Needs meets ends
Clear instructions for use
Durable or robust
Easy repair and parts replacement

POST-USE PRINCIPLES

Easy disassembly
Design for reuse
Use by another industry
Recyclable
Compostable



Above: greenomics game and inside pieces

Aiming to use renewable resources, non-toxic and biodegradable materials wherever possible, Greenomics Corp. transformed content from corporate team sustainability workshops into an entertaining board game which is now available for professionals and families alike.

The game box and board are made from post-consumer recycled paper. They were designed to not require glue, and be hand-assembled. By basing the design on standard sizes of paper, paper off-cut waste from manufacturing was minimized to approximately 1% of the overall material used, and the off-cuts are recycled.

Materials for the bulk of the game are sourced and manufactured locally, reducing shipping upstream. In case of breakage or loss, Greenomics ships replacement pieces for a nominal shipping fee.

After use, since non-toxic soy and water based inks have been used in the game board and box, they can be both recycled and composted. The plastic play-pieces are recyclable HDPE. Disposal considerations are explained in the game's instructions. The Greenomics team continues to look for alternatives to their dice and resealable plastic bag used to contain the game pieces.

