LIVING PRODUCT CHALLENGE®
1.0

A Visionary Path to a Regenerative Future
NOW IS THE RIGHT TIME TO CREATE A WORLD OF LIVING PRODUCTS
IMAGINE if all the products we used were designed and constructed to function as elegantly and efficiently as anything found in the natural world. Imagine if these products were made up of materials that were informed by biomimicry¹ and biophilia² and manufactured by processes that generated more energy and water than they consumed, in facilities powered by renewable resources. Imagine products that improve our quality of life and bring joy through their beauty and functionality, products that give more than they take over their total life cycles, improving human health, the world’s ecosystems and the climate.

IMAGINE true sustainability in the goods we use in our homes, workplaces, neighborhoods, villages, towns and cities—products that are Socially Just, Culturally Rich and Ecologically Restorative³⁴.

IMAGINE Living Products, whose very existence is beneficial, creating habitat, building soil, nourishing the human spirit and providing inspiration for personal, political and economic change.

¹ Biomimicry is a biological term for the mimicking of life using imitation biological systems. Biomimicry Institute, www.biomimicry.org

² The biophilia hypothesis suggests that there is an instinctive bond between human beings and other living systems. Edward O. Wilson introduced and popularized the hypothesis in his book Biophilia (1984). He defines biophilia as “the urge to affiliate with other forms of life.”
The International Living Future Institute issues a challenge:

TO ALL MANUFACTURERS, PRODUCT DESIGNERS, DESIGN PROFESSIONALS, RETAILERS AND CONSUMERS to create the foundation for a sustainable future in the fabric of our communities.

TO POLITICIANS AND GOVERNMENT OFFICIALS, to remove barriers to systemic change and realign incentives and market signals that truly protect the health, safety and welfare of people and all beings.

TO ALL OF HUMANITY, to reconcile the manufactured environment with the natural environment into a civilization that creates greater biodiversity, resilience and opportunities for life with each adaptation and innovation.

INSTEAD OF A WORLD THAT IS MERELY A LESS BAD VERSION OF THE ONE WE CURRENTLY HAVE, WE ASK A SIMPLE AND PROFOUND QUESTION—WHAT DOES GOOD LOOK LIKE? IMAGINE IF EVERYTHING YOU BOUGHT AND USED MADE THE WORLD A BETTER PLACE!
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IN THE WORDS OF BUCKMINSTER FULLER, OUR GOAL IS SIMPLE—“TO MAKE THE WORLD WORK FOR 100% OF HUMANITY IN THE SHORTEST POSSIBLE TIME THROUGH SPONTANEOUS COOPERATION WITHOUT ECOLOGICAL OFFENSE OR THE DISADVANTAGE OF ANYONE.”

The Living Product Challenge is an attempt to dramatically raise the bar from a paradigm where simply doing less harm is laudable to one in which we seek to be restorative, giving more than we take. The Challenge defines the most advanced measure of sustainability for the creation of all products possible today and acts to rapidly diminish the gap between current limitations and the positive endgame solutions we seek. It aims to transform how we think about every single act of product design and production as an opportunity to positively impact the greater community of life and the cultural fabric of our human communities.

Imagine if everything we used in our daily lives, regardless of how small, helped to create a better world. Clothing, tools, electronics, building materials, transportation devices, toys—nothing should escape consideration as a potential contributor to a healthier future. Imagine if even the packaging that our products come in—normally discarded without consideration—was designed to create value and abundance through time? Why should we accept environmental and social degradation as a consequence of all the trappings of modern society? As Paul Hawken has said, “Doing the right thing should be as easy as falling off a log.” The average person shouldn’t have to be a toxicologist or a life cycle expert to understand if the purchases they make support their values.

The Living Product Challenge is a philosophy first, an advocacy tool second and a certification program third. It is intended as a beacon to guide the manufacturing of all the thousands of things we surround ourselves with on a daily basis, and to give direction and support to those who make the goods we use. Within the larger Living Future Challenge framework that covers the creation of Living Buildings, Communities and Food Systems, the Living Product Challenge focuses on humanity’s most ubiquitous creations—its manufactured goods. It is in essence a unified tool for transformative thought, allowing us to envision a future that is Socially Just, Culturally Rich and Ecologically Restorative.

Regardless of the size or quantity of the product or the location of its manufacturing facility, the Living Product Challenge provides a framework for design and production that achieves symbiosis between people and our planet. Indeed, “Living Product Challenge” is not merely a noun that defines a particular solution for manufacturing, but is more relevant if characterized as a series of verbs—calls to action...
that describe not only the “production” of all of humanity’s artifacts, but also the relationships and broader sense of community and connectivity they engender. It is a challenge to immerse oneself in such a pursuit—and many refer to the ability to do so as a paradigm shift. Products that achieve this level of performance can claim to be the greenest and most socially responsible of all, and will serve as models for others that follow. Whether the product’s manufacturing processes are restorative, regenerative or operate with a net positive impact, the item has a home in the construct of the Living Product Challenge. Understanding the Standard and documenting compliance is inherently easy: there are never more than twenty simple yet profound Imperatives that must be met for any type of product, of any size, for any use, manufactured in any location around the world.

This Standard is decidedly not a checklist of best practices—the facets of the Living Product Challenge are performance-based and position the ideal outcome as an indicator of success. The specific methodology used to meet the expectations of the Living Product Challenge is not up to the Institute, but rather to the genius of the manufacturing teams, their designers and consumers, who are expected to make informed decisions appropriate to the product and its manufacturing facility’s relationship to place, community and bioregion.

The Living Product Challenge is a holistic standard, pulling together the most progressive thinking from the worlds of consumer and industrial product design, manufacturing and policy. It challenges us to ask: What if every single act of design and manufacturing made the world a better place? What if every intervention resulted in greater biodiversity; increased soil health; additional outlets for beauty and personal expression; a deeper understanding of climate, culture and place; a realignment of our transportation systems; and a more profound sense of what it means to be a citizen of a planet where resources and opportunities are provided fairly and equitably? A tall order to be sure.

Truly restorative Living Products are manufactured in an ecologically sound and socially just manner. They give more to the planet over their entire life cycle than they take, which may seem impossible at first, but it is indeed possible. Pioneering Living Products that demonstrate the reality of this potential will be inspirations to the world.

The scale of change we seek is immense. But without recording these utmost visions and clarity of purpose, we as a society will never experience the type of future that is possible and necessary for our long-term survival. It is our belief that only a few decades remain to completely reshape humanity’s relationship with nature and realign our ecological footprint to be within the planet’s carrying capacity.

Incremental change is no longer a viable option. Over the last 20 years, awareness of “green” manufacturing has grown alongside that of “green” building. Just as there have been
huge steps forward in the design, construction and operation of buildings, progress has been made in the manufacturing realm. Still, when compared with the rate of change that is required to avoid the worst effects of climate change and other global environmental challenges, our progress has been minute and barely recordable. We are entering a world of peak oil, peak water and peak phosphorus, a world that is globally interconnected yet ecologically impoverished, a world inhabited by seven billion people and counting.

Every major ecological system is in decline, and the rate of that decline is increasing. Global temperature increases mean shifting rainfall distributions, acidified oceans and potentially catastrophic sea-level rise. Nothing less than a sea change in manufacturing is required. Indeed, this focus must be the great work of our generation. We must remake our cities, towns, neighborhoods, homes, offices and all the goods we use within them as part of the necessary process of reinventing our relationship with the natural world—reestablishing ourselves as not separate from, but part and parcel with creation.

Since it was launched in 2006, the Living Building Challenge has inspired and motivated rapid and significant change. Projects have sprouted up all over North America and beyond: currently, there are nearly ten million square feet of Living Building Challenge projects underway in more than a dozen countries, each project a beacon in the dark showing what is possible. The regulatory environment has responded by embracing a series of reforms. Perhaps most importantly, a new sense of what is possible has permeated design communities as a result of the successful certification of the first Living Buildings. The Living Product Challenge seeks to reinvent product manufacturing in an equally revolutionary fashion. The materials used to build our buildings must be held to the same high standard as the buildings themselves. The things we place within them shouldn’t undermine our health and well-being.

This Standard is an act of optimism and belief that with the right tools in the hands of passionate, literate and sensitive individuals, a revolutionary transformation is possible. It is a program that asks us to think holistically and to engage both our left and right brains, our heads and our hearts. We invite you to join us, so that together we can continue to forge ahead on our path toward restoration and a Living Future.

3 Like oil, human extraction of water and phosphorus are depleting geological fossil reserves critical to the functioning of our current social and economic paradigm that are not replenishable on human timescales.

4 To paraphrase Edward O. Wilson, one of the world’s most distinguished scientists, and a professor and honorary curator in entomology at Harvard.
The Living Product Challenge calls on manufacturers to walk the talk of restorative sustainability by making their own operations Net Positive with respect to impact categories such as water, energy, climate, waste and ecological impacts. While this goal is lofty in its own right, we also know it falls far short of what humans are capable of achieving and what the planet needs. The footprint of an organization or even a person is the sum total of negative impacts caused by the processes that sustain the organization or person. The footprint of producing a product is likewise the sum total of negative impacts caused by the processes necessary to produce the product. The scope of the processes whose negative impacts are accounted-for in a production footprint is called “cradle to gate”: it includes both the manufacturer’s operations, and all of the processes in the supply chains of all the inputs of energy, materials, equipment and even services needed by the manufacturer in producing the product. Most of this footprint occurs upstream of the product manufacturer, through supply chains of energy and raw materials. Additionally, for products that require or influence the consumption of energy or materials during use, the majority of the total life cycle negative impacts will occur during use. For both of these reasons, the Living Product Challenge calls on manufacturers to build on the inspiration of making their own operations Net Positive, striving to make their product supply chains and life cycles Net Positive as well. Achieving life cycle Net Positive requires the creation of handprints.

continued >>
HANDPRINTING – A NEW PARADIGM

Smaller footprints are still footprints. Designers of Living Products must go further, using human creativity and ecological inspiration to design products that create positive handprints along with shrinking their negative footprints. Handprints measure the positive that a product causes across its life cycle, such as harvesting more water and generating more energy than was required to make it. While a product can never have a zero footprint, it can still be Net Positive if its handprint is bigger than its footprint.

Handprints can also result from a product manufacturer sharing sustainable innovations within its supply chains and potentially even to actors outside the supply chain. Handprints can also result from engaging consumers to use products in ecologically restorative ways, creating real and demonstrable ripple effects that may even spread beyond the boundaries of the life cycle of the Living Product.

One way that a company can create a product-related handprint is by innovating the product in ways that reduce its cradle-to-gate footprint. This can start by reducing the on-site impacts of product manufacturing. The handprint can grow by using greener or lower-impact materials and/or energy source inputs to make the product, and/or by using these inputs more efficiently. Reducing product packaging and materially streamlining the product are good examples of ways to use inputs more efficiently.
UPSTREAM HOTSPOTS AS HANDPRINTING OPPORTUNITIES

When a company assesses the cradle-to-gate footprint of its product, it will identify the key “hot spots”—the processes that make major contributions to one or more impact categories—in the supply chain. For example, some upstream processes may be responsible for the bulk of the product’s cradle-to-gate water footprint, and other processes may be responsible for the bulk of the product’s energy or carbon footprints. These upstream processes are the best places to look for improvement opportunities, such as more efficient use of water or energy. If the innovation implementation would not have happened without the impetus of the manufacturer, then the improvements are part of the manufacturer’s handprint. And handprints are all about ripple effects; if a manufacturer spreads an innovation beyond the boundaries of its own supply chain by enabling or encouraging widespread implementation of the innovation, the full scope of the resulting benefits is part of the manufacturer’s handprint.

DOWNSTREAM HANDPRINTS

After looking on site and upstream, it’s time to look downstream, at the portions of the product life cycle that occur once the product leaves the factory. Downstream life cycle phases include distribution (transportation, wholesaling and retailing), the use phase and end-of-use management. For products that consume energy during use, making them more efficient is a major handprint opportunity. For products that affect energy use (e.g., detergents that enable cold-water washing), making them more effective is a major handprint opportunity. And for products whose use phases require other materials (e.g., printers using paper) or influence the use of materials (e.g., surfaces needing cleaning), use-phase innovations present handprint opportunities.

While product innovation is one way to address the use phase, another potent way to do so is through customer engagement. If a company can engage with its users to encourage them to use its products more sustainably—e.g., washing clothes less frequently, washing them in cold water, line-drying them when possible—the resulting benefits are all handprints. The impacts of users’ behavior change need to be tracked, of course, and this can be done with tools like Handprinter.org, which the Institute is working to expand and improve. An exciting aspect of customer engagement is that it too can create massive ripple effects as customers spread the behavior changes to their friends, and as customers’ engagement with handprinting grows from one action to many.

It is important to not accidentally skip over the distribution phase. For some products, such as furniture and food, the distribution phase can make a surprisingly large contribution to total life cycle burdens—and thus offers a key place to look for handprint opportunities. Finally, there is end-of-use management. Can a company increase recycling of its product, and perhaps of similar products manufactured by others? The benefits of doing so will contribute to its handprint.
HOW THE LIVING PRODUCT CHALLENGE WORKS

PROVEN PERFORMANCE RATHER THAN ANTICIPATED OUTCOMES

The Living Product Challenge is comprised of seven performance categories, or “Petals”: Place, Water, Energy, Health and Happiness, Materials, Equity and Beauty. Petals are subdivided into a total of 20 Imperatives, each of which focuses on a specific sphere of influence. This compilation of Imperatives can be applied to almost every conceivable product, of any size, manufactured in any location—be it a new innovation or a reinvention of an existing item.

THERE ARE TWO RULES TO CERTIFYING A LIVING PRODUCT:

• Though all Imperatives are mandatory for full Living Product compliance, we will recognize and certify products on a Petal or Imperative-by-Imperative basis provided that a few fundamental Imperatives are achieved.

Many of the Imperatives will have temporary exceptions to acknowledge current market limitations. Temporary exceptions will be modified or removed as the market changes. With this Standard, the Institute requires advocacy for essential improvements to the manufacturing and supply chain industries.

• Living Product Challenge Certification is based on actual, rather than modeled or anticipated, performance.

Manufacturers must provide proof of compliance, the process for which is detailed in our documentation requirements. Some Imperatives may be verified after market release, but for most Imperatives, products must be on the market for at least 12 consecutive months prior to evaluation. Consult our website for more information on this process: living-future.org/lpc

5 Project teams should directly contact the Living Product Challenge Team (LPcertification@living-future.org) or engage the Institute for Strategic Guidance: living-future.org/lpc
HANDPRINTING SCOPE:
SCOPE OF LIFECYCLE ANALYSIS

CRADLE TO GRAVE
DOWNSTREAM
USER IMPACT

MANUFACTURING SITE

CRADLE TO GATE SCOPE OF LIFE CYCLE ANALYSIS
UPSTREAM SUPPLY CHAIN

HANPRINTING SCOPE

PRODUCTION SCOPE
THE LIVING PRODUCT CHALLENGE IS A PHILOSOPHY, CERTIFICATION AND ADVOCACY TOOL THAT WILL REVOLUTIONIZE PRODUCTS TO BECOME TRULY RESTORATIVE AND CONTRIBUTE TO A MATERIALS REVOLUTION

SETTING THE IDEAL AS THE INDICATOR OF SUCCESS
THERE ARE THREE PATHWAYS TO LIVING PRODUCT CERTIFICATION:

Though all Imperatives are mandatory for full Living Product compliance, we will recognize and certify products on a Petal or Imperative basis provided that a minimum set of four Core Imperatives are achieved. These Core Imperatives are Imperative 05: Net Positive Material Health, Imperative 07: Red List, Imperative 09: Responsible Industry, Imperative 20: Inspiration and Education.

**LIVING PRODUCT CERTIFICATION**
A product achieves Living Product Certification by achieving all Imperatives.

**LIVING PRODUCT PETAL CERTIFICATION**
While achieving Living Certification is the ultimate goal, meeting the Imperatives of multiple Petals deserves recognition in and of itself.

Petal Certification requires the achievement of at least three of the seven Petals, one of which must be the Water, Energy or Materials Petal. In addition, each of the four Core Imperatives must be achieved.

**LIVING PRODUCT IMPERATIVE CERTIFICATION**
We encourage all manufacturers to strive for one Imperative at a time and to obtain a Living Product label that can celebrate their success. Living Product Imperative Certification requires that at least seven of the twenty Imperatives be achieved, including the four Core Imperatives.
## THE 20 IMPERATIVES OF THE LIVING PRODUCT CHALLENGE

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*Petal Certification requires the achievement of at least three of the seven Petals, one of which must be Water, Energy or Materials and the four Core Imperatives.

*Imperative Certification requires the achievement of at least seven of the twenty Imperatives, including the four Core Imperatives.
PLACE

RESTORING A HEALTHY COEXISTENCE WITH NATURE

PETAL INTENT
The intent of the Place Petal is to influence in positive ways how people relate to the natural environment that sustains us. It is essential for modern individuals to reconnect with the deep “story” of place and the unique characteristics found in every community so that it can be honored, protected and enhanced. The Place Petal clearly articulates where it is acceptable for people to manufacture goods and extract raw materials, how to protect and restore a place once it has been developed for manufacturing purposes, and why it is important to respect all living species that are native to these places.

The continued spread of sprawl development and the vastly increasing number of global megalopolises threaten the few wild places that remain. The decentralized nature of our residential communities and industrial zones impedes our capacity to connect not just with one another but also with the products we make, sell and use—all while increasing transportation impacts and pollution. The manufacturing industries often impose significant point-source impacts that threaten water, air and soil quality. The overly dense urban centers in turn crowd out healthy natural systems, isolating culture from a sense of place. As prime land diminishes, more residential and commercial development tends to occur in sensitive areas that are easily harmed or destroyed. Invasive species threaten ecosystems, which are already weakened by the constant pressure of human encroachment.

IDEAL CONDITIONS + CURRENT LIMITATIONS
The Living Product Challenge envisions a moratorium on the insensitive placement of factories and other manufacturing facilities, and on the extraction of raw material inputs in ways that threaten sensitive ecosystems, watersheds and species. Instead, we envision a manufacturing sector that conserves the natural resources that support human health and are the basis for all the products that we use. As previously disturbed areas are restored, the trend is reversed and nature’s functions are invited back into a healthy interface with the built environment.

Human behavior and attitudes are the most significant barriers to transforming the making of all things. There is a frontier mentality that seems to encourage the ideas that all natural resources are up for grabs for any use and in any quantity and that all natural resources and ecosystems are inherently of low or no value unless exploited.
The manufacturing of the product must not diminish habitat quality and the capacity for life to regenerate. Manufacturing facilities and all material inputs cannot be located in or extracted from:

- Habitats where there are endangered species, unless there is an appropriate provision for the protection of the species.

- Sensitive ecological habitats, such as:
  - wetlands
  - primary dunes
  - old-growth forest
  - virgin prairie

In addition, the product may not contain materials derived from endangered species.

For purposes of the Living Product Challenge, an endangered species is a species that has been categorized by the International Union for Conservation of Nature (IUCN) as endangered (EN) or critically endangered (CR) as defined by the IUCN Red List of Threatened Species, www.iucnredlist.org.

The manufacturer must demonstrate, through a comprehensive conservation program such as the Forest Stewardship Council, that the location of the facility or the material extraction does not impact the health of the endangered species.
For every dollar of gross revenue generated by the sale of the certified product in the year of certification, the manufacturer must donate half a cent to an approved conservation or Land Trust organization or to the Institute’s Habitat Exchange Program, which directs money to highest-value habitat restoration and offset programs.

ILFI now operates a Habitat Exchange Program in corporation with conservation organizations. For more information, visit www.living-future.org/exchange.
WATER
PETAL INTENT
The intent of the Water Petal is to realign how manufacturers use water and to redefine “waste” in the manufacturing environment so that water is respected as a precious resource. Scarcity of potable water is quickly becoming a serious issue as many countries around the world face severe shortages and compromised water quality. Even regions that have thus far avoided the majority of these problems due to a historical presence of abundant fresh water are at risk: the impacts of climate change, highly unsustainable water-use patterns, and the continued drawdown of major aquifers portend significant problems ahead.

IDEAL CONDITIONS + CURRENT LIMITATIONS
The Living Product Challenge envisions a future whereby all manufacturing processes are configured based on the carrying capacity and water balance of the facility’s site and do not impact water quality through any resource extraction methods required for material inputs. We envision a future where water used to make any product respects the natural hydrology of the land, the water needs of the ecosystem it inhabits, and those of its neighbors without diminishing the ability to meet those needs in the future. Water need not be used as a throughput; rather, it can be used, purified, and then used again cyclically—just as nature intended.

Currently, many industries are often able to skirt regulations and avoid ethical water use, or deliberately situate factories in places where impacts to water and watersheds are not regulated. Frequently, goods are made that use water excessively when it is scarce, contributing to the undemocratic and unjust ownership of a resource that should be a basic human right. Therefore, reaching the ideal for water use means challenging outdated attitudes and technology with an approach that treats water as the essential resource it is for all life on this planet.
Water use and release from manufacturing the product must work in harmony with the natural water flows of the site and its surroundings. 100% of the product’s manufacturing water needs must be supplied by captured precipitation or other natural closed loop water systems and/or by recycling industrial water. Furthermore, all water used must be purified as needed without the use of chemicals.

All stormwater and water discharge at the manufacturing facility where the product is made must be treated on-site and managed either through reuse, a closed loop system or infiltration. Excess stormwater can be released onto adjacent sites under certain conditions.9

The manufacturer must use the Institute Footprint Calculator to assess and document the water footprint and identify the five processes (key drivers) that make the largest contributions to the product’s cradle-to-gate10 water footprint. The footprint assessment can be based on a Life Cycle Analysis (LCA) for the product, performed by or for the manufacturer, or use the Institute Footprint Calculator. If a prior LCA is used, the LCA should follow the ISO 14044 standard for a Life Cycle Assessment11 being used in a third-party communication.

The manufacturer must develop and publicly share a three-year plan to reduce the product’s water footprint and create a water handprint greater than the footprint through one or more of the following strategies:

- Innovate to conserve or recapture more water across the life cycle of the product, compared with the base case.
- Innovate within supply chains to conserve or capture water.
- Engage with users to achieve water conservation and/or restoration

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9 Refer to the Living Building Challenge 3.0 Water Petal Handbook for clarifications and exceptions.
10 A manufacturer’s “gate-to-gate” impacts are those of its own operations. The first “gate” is the in-gate, while the second gate is the out-gate. The “upstream” impacts are those of the entire supply chains of all the inputs the manufacturer needs to use to make a product. “Cradle-to-gate” is the sum of the upstream and gate-to-gate impacts.
11 ISO 14044:2006 covers life cycle assessment (LCA) studies and life cycle inventory (LCI) studies. The ISO 14044:2006 specifies requirements and provides guidelines for life cycle assessment (LCA) including: definition of the goal and scope of the LCA; the life cycle inventory analysis (LCI) phase; the life cycle impact assessment (LCIA) phase; the life cycle interpretation phase; reporting and critical review of the LCA; limitations of the LCA; relationship between the LCA phases; and conditions for use of value choices and optional elements.
ENERGY

RELYING ONLY ON CURRENT SOLAR INCOME

through improved use of the product.

PETAL INTENT
The intent of the Energy Petal is to signal a new age of product design and manufacturing, wherein facilities of all types rely solely on renewable forms of energy and operate year-round in a safe, pollution-free manner, ultimately giving back more than they take. In addition, this Petal engages manufacturers to consider the full life cycle energy footprint of their products and to look for ways that product or process innovation can conserve energy.

Living Products will be manufactured in ways that produce more energy than is required to make the product on-site. Further, Living Products will be designed and distributed in ways that enable them to generate or conserve more energy over their entire life cycle than is required to produce them.

The Energy Petal aims to prioritize reductions and optimization before technological solutions are applied to eliminate wasteful spending—of energy, resources and dollars. The majority of energy generated today is from highly polluting and often politically destabilizing sources, including coal, gas, oil and nuclear power. Large-scale hydro, while inherently cleaner, results in widespread damage to ecosystems. Burning wood, trash or pellets releases particulates and carbon dioxide (CO2) into the atmosphere and often strains local supplies of sustainably harvested biomass while robbing the soil of much-needed nutrient recycling. The effects of these energy sources on regional and planetary health are becoming increasingly evident through climate change, the most worrisome major global trend attributed to human activity.

IDEAL CONDITIONS + CURRENT LIMITATIONS
The Living Product Challenge envisions a safe, reliable and decentralized power grid, powered entirely by renewable energy, supplied to incredibly efficient buildings and infrastructure without the negative externalities associated with combustion or fission. Although considerable progress has been made to advance renewable energy technologies, there is still a need for a greater efficiency from these systems and for new, cleaner ways to store the energy they generate. These realities together with the current cost of the systems available, is the major limitations to reaching our goals.
105% of the energy used to produce the product in its final form must be generated from on-site renewable energy on a net annual basis.

The manufacturer must use the Institute Footprint Calculator to assess and document the energy footprint of producing the product, and identify the five processes (key drivers) that make the largest contributions to the product’s cradle-to-gate energy footprint. The footprint assessment can be based on a Life Cycle Analysis (LCA) for the product, performed by or for the manufacturer, or use the Institute Footprint Calculator. If a prior LCA is used, the LCA should follow the ISO 14044 standard for a Life Cycle Assessment being used in a third-party communication.

The manufacturer must develop and publicly share a three-year plan to reduce the product’s energy footprint and create an energy handprint greater than the footprint through one or more of the following strategies:

- Innovate to conserve energy or generate renewable energy across the life cycle of the product.
- Innovate within supply chains to conserve energy or generate renewable energy in the supply chain.
- Engage with users to achieve energy conservation through improved use of the product.

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12 A manufacturer’s “gate-to-gate” impacts are those of its own operations. The first “gate” is the in-gate, while the second gate is the out-gate. The “upstream” impacts are those of the entire supply chains of all the inputs the manufacturer needs to use to make a product. “Cradle-to-gate” is the sum of the upstream and gate-to-gate impacts.

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HEALTH & HAPPINESS
CREATING ENVIRONMENTS THAT OPTIMIZE PHYSICAL AND PSYCHOLOGICAL HEALTH AND WELL BEING

PETAL INTENT
The intent of the Health and Happiness Petal is to focus on the most important conditions that must be present to create products and materials that truly benefit consumers. The Petal is not designed to address all of the potential ways that goods can compromise society. Instead, it aims to encourage the creation of items whose purpose is to holistically enhance the physical and emotional wellness of the people who use them.

Many manufacturing facilities provide substandard conditions for the health and productivity of factory workers and the typically poor communities that surround them. Persistent bio-accumulative toxic chemicals from product manufacturers, use and disposal are building up in our environment with significant impact to human and ecosystem health. Many of the goods we use in our daily lives are on the whole harmful to our health and well-being, and some goods greatly diminish human potential. By focusing attention on the major pathways of health through the spaces where we make our products and the ways in which we put our products to use, we create a consumer society designed to optimize the human condition.

IDEAL CONDITIONS AND CURRENT LIMITATIONS
The Living Product Challenge envisions a nourishing, highly productive and healthy modern world with consumer products that enrich our daily lives. However, even the most restorative products require acceptance by their users and engagement from their makers. It is difficult to ensure that goods will continue to optimally enhance health and happiness over time since available technologies and consumer preferences change quickly. It can also be complicated to ensure optimal use of products over their complete life cycles due to the unpredictable ways in which people use and maintain them. Finally, it will always be challenging to predict the unintended consequences from the use of any product, as almost anything created can be used in unforeseen ways, the impacts of which can be unclear for many decades.
The product must be safe for human exposure during manufacturing, use and end-of-use.

There have been no reported deaths or serious injuries related to the final manufacturing of the product within the last 12 months.

The manufacturer must identify the total mass of chemical substances contained in the product and used during final manufacturing in each of five hazard categories in order to determine the Material Health Footprint. The manufacturer must develop and publicly share a three-year plan to reduce the product’s Material Health Footprint, and create a Material Health Handprint greater than the reduced footprint through one or more of the following strategies:

- Innovate to reduce the amount of toxic chemicals in the product or used in its manufacture.
- Reduce the amount of toxic chemicals used in a company’s operations through preferential purchase of Red List Free materials.
- Publish the results of a hazard assessment of a chemical that was not already publicly available, or publicly share a green chemistry innovation.

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14 The product is manufactured in a facility that has had, during the past year: No fatal injuries, and No injuries with greater than 0.5 Disability Adjusted Life Years (DALYs) http://www.who.int/healthinfo/global_burden_disease/metrics_daly/en/ over the expected duration of the injury. If expected duration is permanent, use life expectancy in your country.

15 Process chemicals include only those chemicals used in manufacturing the product as inputs to processes within the manufacturing facility controlled by the company, and whose mass input is greater than 1g per kg of product manufactured.

16 The Living Product Challenge defines five categories or “Bins” of materials based on health hazards harmonized with the GreenScreen List Translator, the Cradle to Cradle Certified Standard and the ILFI Red List. They are color-coded, where Red is worst and Green is best. The total mass of chemical substances in the product including process chemicals per hazard category per kg of product is defined as the Material Health Inventory.

17 The Material Health Inventory for the highest hazard category or “Red Bin” (not to be confused with our Red List which is a smaller list of banned chemicals) is considered the product’s Material Health Footprint. It can only be altered by a reduction in the quantity of one or more Red Bin Chemicals, which are not accompanied by an addition or increase in the quantity of any other Red Bin Chemicals. This restrictive approach is intended expressly to avoid incentivizing regrettable substitutions as companies move away from Red List materials to other materials while not on the Red List, yet are still among Red Bin chemicals, and rather to incentivize shifts to reliable, lower hazard chemicals that are clearly marked improvements in material health.
The product must contribute to an active, healthy lifestyle and be designed to nurture the innate human/nature connection.

The manufacturer must do the following:

- Demonstrate how the product has the potential to transform people’s relationship to the natural world through the manufacturing process, design or use of the product.

- Document whether the product was informed by the natural world and if nature was used as model, mentor or measure, and/or biomimicry was used as an inspiration.

- Demonstrate that the product’s primary use will not further disconnect people from nature.

- Provide sufficient and frequent human-nature interactions for the employees who are manufacturing the product to connect them with nature directly and encourage an active, healthy lifestyle.
PETAL INTENT

The intent of the Materials Petal is to help create a materials economy that is healthy, ecologically restorative, transparent and socially equitable. Throughout their life cycles, supplies and materials are responsible for many adverse environmental issues, including personal illness, habitat and species loss, pollution, and resource depletion. The Imperatives found in this section aim to remove the worst known offending materials and practices from manufacturing processes and to drive product designers, makers and users toward a truly responsible materials economy. When impacts can be reduced but not eliminated, there is an obligation not only to offset the damaging consequences associated with innovating and creating goods, but also to strive for corrections in industry itself. At the present time, it is impossible to gauge the true environmental impact and toxicity of the materials economy due to a lack of product-level information, although the Living Product Challenge continues to shine a light on the need for transformative industrial practices.

IDEAL CONDITIONS + CURRENT LIMITATIONS

The Living Product Challenge envisions a future where all goods and materials in a consumer society are regenerative and have no negative impact on human and ecosystem health. The precautionary principle\(^{18}\) guides all materials decisions when impacts are unclear. There are significant limitations to achieving the ideal for the materials realm. Product specification and purchase have far-reaching impacts, and although consumers are starting to weigh these in parallel with other more conventional attributes, such as aesthetics, function and cost, the biggest shortcoming is due to the market itself. While there are a huge number of “green” products for sale, there is also a shortage of good, publicly available data that backs up manufacturer claims and provides consumers with the ability to make conscious, informed choices. Transparency is vital; as a global community, the only way we can transform into a truly sustainable society is through open communication and honest information sharing. However, many manufacturers are wary of sharing trade secrets that they believe afford them a competitive advantage, and instead make proprietary claims about specific product contents.

\(^{18}\) The precautionary principle or precautionary approach to risk management states that if an action or policy has a suspected risk of causing harm to the public or to the environment, in the absence of scientific consensus that the action or policy is not harmful, the burden of proof that it is not harmful falls on those taking an action.
Declare™19 the Institute’s “ingredients label for products,” is a publicly accessible label and online database with a direct connection to the Materials Petal. While manufacturers often resist disclosure at first, most major building manufacturers are now recognizing the benefit to toxic-chemical avoidance and transparency through Declare. This movement in the building industry needs to be shared among new industries, such as consumer goods, electronics and apparel, to ensure that manufacturers are transparent with their customers.

MATERIALS

ENDORsing PRODUCTS THAT ARE SAFE FOR ALL SPECIES THROUGH TIME

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The product cannot contain any of the following Red List materials or chemicals:

- Alkylphenols
- Asbestos
- Bisphenol A (BPA)
- Cadmium
- Chlorinated polyethylene and chlorosulfonated polyethylene
- Chlorobenzenes
- Chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs)
- Chloroprene (Neoprene)
- Chromium IV
- Chromium VI
- Chlorinated Polyvinyl Chloride (CPVC)
- Formaldehyde (added)
- Halogenated flame retardants (HFRs)
- Lead (added)
- Mercury
- Polychlorinated biphenyls (PCBs)
- Polyvinylidene Chloride (PVDC)
- Perfluorinated compounds (PFCs)
- Phthalates
- Polyvinyl chloride (PVC)
- Volatile Organic Compounds (VOCs) in wet applied products
- Wood treatments containing creosote, arsenic or pentachlorophenol

A list of Chemical Abstracts Service (CAS) Registry Numbers that correspond with each Red List item is available on living-future.org/lcc CAS is a division of the American Chemical Society: www.cas.org.

Wet applied products (coatings, adhesives and sealants) must have VOC levels below the South Coast Air Quality Management District (SCAQMD) Rule 1168 for Adhesives or California Air Resource Board 2007 Suggested Control Measure (SCM) for Architectural Coating as applicable. Containers of sealants and adhesives with capacity of 16 ounces or less must comply with applicable category limits in the CARB Regulations for Reducing Emissions from Consumer Products.
The product must incorporate place-based solutions and contribute to the expansion of a regional economy rooted in sustainable practices, products and services. Source locations for materials\(^{22}\) must adhere to the following restrictions:

- 10% or more of the purchased inputs budget must come from within 1000 km of the manufacturing site.
- An additional 40% of the purchased inputs budget must come from within 2000 km of the manufacturing site.\(^{23}\)
- An additional 25% of the purchased inputs budget must come from within 5000 km of the manufacturing site.
- 25% of the product’s purchased budget can be sourced from any location.

\(^{22}\) Globally sourced commodities such as minerals, steel or plastic feed stocks are excluded from this requirement.

\(^{23}\) For the purposes of the Living Product Challenge, “purchased inputs” denotes all materials or components purchased for the creation of a product.
The product manufacturer must advocate for the creation and adoption of third-party certified standards for sustainable resource extraction and fair labor practices within its industry.

In products that use wood-based materials or timber (including for all packaging uses), these materials must be certified to Forest Stewardship Council (FSC) 100% labeling standards or from salvaged sources. In products that use agricultural inputs, these must be certified organic.\(^\text{24}\) Products that use potential conflict minerals\(^\text{25}\) must ensure that their source complies with the Conflict-Free Smelter Program assessment protocols.\(^\text{26}\)

The product must not contain ingredients that are derived solely or in part from any animal that is classified as near-threatened, vulnerable, endangered, or critically endangered.\(^\text{27}\)

The product must have a Declare label.\(^\text{28}\)

24 Under USDA or international equivalent.
25 Conflict Minerals include titanium, tin, gold or tungsten, as defined in the 2010 Dodd-Frank Act. www.sec.gov/spotlight/dodd-frank.shtml
26 The Conflict-Free Smelter Program www.conflictfreesourcing.org assessment protocols were created by the Conflict-Free Sourcing Initiative as a resource for companies from a range of industries to address conflict mineral issues in their supply chain.
27 For purposes of the Living Product Challenge, near-threatened, vulnerable, endangered, or critically endangered are categorized by the International Union for Conservation of Nature (IUCN). www.iucnredlist.org
28 www.declareproducts.com
Manufacturers must demonstrate that they have a three-year plan to achieve handprints that will be bigger than the full greenhouse gas (GHG) footprint of producing the product.

The manufacturer must use the Institute Footprint Calculator to assess and document the carbon footprint of producing the product, identifying the five unit processes that make the largest contributions to the product’s cradle-to-gate\(^29\) carbon footprint. The footprint assessment can be based on a Life Cycle Analysis (LCA) for the product, performed by or for the manufacturer, or use the Institute Footprint Calculator. If a prior LCA is used, the LCA, should follow the ISO 14044 standard for a Life Cycle Assessment\(^30\) being used in a third-party communication.

The manufacturer must develop and publicly share a plan to reduce the product’s cradle-to-gate climate footprint and then create a climate handprint greater than the footprint through one or more of the following strategies:

- Innovate within the supply chain of the product to reduce GHG emissions.
- Innovate within the manufacturing process of the product to generate fewer GHG emissions.\(^31\)
- Engage with users to reduce GHG emissions through improved use of the product.
- Purchase a carbon offset\(^32\) equivalent to the cradle-to-gate GHG footprint of the product\(^33\) after other options have been depleted.

\(^{29}\) A manufacturer’s “gate-to-gate” impacts are those of its own operations. The first “gate” is the in-gate, while the second gate is the out-gate. The “upstream” impacts are those of the entire supply chains of all the inputs the manufacturer needs to use to make a product. “Cradle-to-gate” is the sum of the upstream and gate-to-gate impacts.

\(^{30}\) ISO 14044:2006 covers life cycle assessment (LCA) studies and life cycle inventory (LCI) studies. The ISO 14044:2006 specifies requirements and provides guidelines for life cycle assessment (LCA) including: definition of the goal and scope of the LCA; the life cycle inventory analysis (LCI) phase; the life cycle impact assessment (LCIA) phase; the life cycle interpretation phase; reporting and critical review of the LCA; limitations of the LCA; relationship between the LCA phases; and conditions for use of value choices and optional elements.

\(^{31}\) For example, by reducing the energy use throughout the product’s life cycle.

\(^{32}\) Carbon offsets must be CERs or VERs and be certified through an approved carbon offset program.

\(^{33}\) Calculated from the prior year sales, less the Positive Handprint Impacts.
The manufacturer must strive to reduce or eliminate the production of waste during the manufacturing process, and final product packaging, in order to conserve natural resources and to find ways to use waste in a closed loop cycle. Manufacturers must analyze the waste through the full life cycle of the product.

**Manufacturing Process:**
The manufacturer must meet the following targets for waste diversion during the production of the product:

<table>
<thead>
<tr>
<th>Material</th>
<th>Min. Diverted /Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals</td>
<td>99%</td>
</tr>
<tr>
<td>Paper and Cardboard</td>
<td>99%</td>
</tr>
<tr>
<td>Soil and Biomass</td>
<td>100%</td>
</tr>
<tr>
<td>All others — combined weighted average</td>
<td>90%</td>
</tr>
</tbody>
</table>

The manufacturing process may not produce any byproducts or emissions considered toxic\(^34\) or included on the Red List.

**Packaging:**
100% of the product’s packaging must be either:

- Completely biodegradable
- Completely recyclable without being commingled with non-recyclable materials
- Completely reusable through a manufacturer’s take-back and reuse program

Additionally, 100% of the product’s packaging must be:

- Free of Red List chemicals and materials
- Free of packaging that could pose a hazard to marine, bird or animal life\(^35\)

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\(^34\) “Toxic” is defined by the US EPA Toxics Release Inventory (TRI) Program. [www2.epa.gov/toxics-release-inventory-tri-program/tri-listed-chemicals](http://www2.epa.gov/toxics-release-inventory-tri-program/tri-listed-chemicals).

\(^35\) While there are many advocates for this issue, there is no existing standard. The Living Product Challenge will support the development of a standard for packaging that will not harm wildlife.
The product must be designed so that its durability, warranty and useful lifespan have a direct relationship to its environmental impact and embodied energy.

The product must:

• Be designed and tested to last as a useful, functioning product for at least the average lifetime for its product category, as documented in the Institute’s online Product Life Database.36

Disposable or single-use products do not qualify unless 100% of the product contents are biodegradable within five years or are made from a material that is compostable or readily recycled within the country of intended use.

36 The online Product Life Database is available on the Living Product Challenge website: living-future.org/lpc.
The product must be designed to consider its impacts at the end of its useful life as a functioning product. The product must either be:

- Free of any Red List chemicals and be completely compostable within five years.
- Able to be 100% recycled.
- Have a manufacturer take-back program available in the market where the products are sold.
EQUITY
PETAL INTENT

The intent of the Equity Petal is to transform the material and product economies to foster a true, inclusive sense of community that is just and equitable regardless of an individual’s background, age, class, race, gender or sexual orientation. A society—especially a modern-day, affluent consumer society—that embraces all sectors of humanity and allows the dignity of equal access and fair treatment is a society in the best position to make decisions that protect and restore the natural environment that sustains us all. This Petal goes well beyond the notion of corporate responsibility; it gives companies the opportunity to be leaders in creating a world that is better for all people, all over the world.

There is a disturbing trend toward “us” vs. “them” that gives disproportionate control to those of a certain economic or cultural background. Only by realizing that we are all in this together can the greatest environmental and social problems be addressed. We need to aggressively challenge the notion that factory ownership somehow implies that owners can do whatever they like, including externalize the negative environmental and health impacts of their actions thereby imposing it onto others.

For example, consider these situations: when a polluting factory is placed next to a residential community, the environmental burdens of its operation are placed on the individuals who live in the nearby houses. The factory is diminishing its neighbors’ rights to clean air, water and soil, yet solely profiting from this diminishment. Similarly, when a company does business with another enterprise whose business practices are unfair, unsafe and/or unsustainable, all positive effects of the former operation are diminished by the negative effects of the latter.

We need to prioritize the concept of “citizen” above that of “consumer.” The Equity Petal requires the creation of goods via fair manufacturing and business practices as well as true socially responsible corporate oversight. It is essential that we recognize the business practices and welfare of the people that we support as we design and build our products. JUST™, the Institute’s social justice label, provides a publicly accessible online database with an official connection to the Equity Petal.37 JUST provides a powerful forum for helping product innovators and manufacturers share the values of a responsible, equitable Living Future.

37 www.justorganizations.com
IDEAL CONDITIONS AND CURRENT LIMITATIONS

The Living Product Challenge envisions consumer and industrial goods that allow equitable access and treatment to all people regardless of physical abilities, race, gender, sexual orientation, age or socioeconomic status.

Current limitations stem from ingrained cultural resistance to profitable enterprises sharing their wealth, as well as companies doing the right thing for their employees, their communities and the environment. The idea that the rights of corporations are equal to or greater than the rights of people needs to be replaced with an ethic that corporations are here to serve all people and not merely their shareholders—that the common good must be safeguarded in the pursuit of the private good.

It is necessary to change corporate standards in order to protect the rights of individuals who work for, live near or do business with manufacturing operations. At the same time, companies fortunate enough to realize profits must factor charitable giving into their normal expense budgets as recognition of the public benefits they enjoy. A healthy, diverse community is one that is supported by local enterprise, and is organized in a way that protects the health of people and the environment. Ultimately, we champion a future in which product manufacturers are highly profitable and successful, but not at the expense of the environment or any particular population.
Products sold to consumers must be affordable to the people who manufacture them, and products used in buildings must not unduly impair the affordability of those buildings.

Products can be grouped into three broad categories:  
- Consumer products
- Building products
- Other (largely products used by manufacturers)

This Imperative currently applies to consumer products and building products only.

**Consumer Products**
The Annualized Purchase Price (APP) should not exceed the relevant Product Category Share (PCS) of the income of the manufacturer’s lowest paid employee.

The manufacturer must actively sell or promote the product within the community where its employees reside and make low-interest financing available to ensure wide and equitable access to high-efficiency and/or renewable-energy products that bring their users TCO benefits.

**Building Products**
The product must be offered to affordable housing projects at price parity with similar products.

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38 Data from the US Department of Commerce is used to group products into these categories.

39 Some products bring users economic savings over their useful lives, by having a lower total cost of ownership (TCO) compared with competing ways to achieve the product function. Examples include high-efficiency appliances, innovative vehicles, advanced building components like high-efficiency windows, and renewable energy systems that must have better-than-average efficiency as characterized within the Institute’s Product Life Database.

40 The annualized purchase price (APP) of a consumer product is defined as its purchase price divided by the number of years it is expected to last. The “product category share” is the fraction of annual spending that households at median income spend on all goods or services in the product’s category, as summarized in the Institute’s online Product Life Database.

41 Total Cost of Ownership
The manufacturer of the product must demonstrate consistent responsibility across its entire operations. The manufacturer cannot directly:

- Make weapons or armaments\(^{42}\) of any kind
- Produce tobacco products, pornography, violent video games, or illicit\(^{43}\) drugs
- Engage in fossil fuel extraction
- Engage in nuclear energy production or nuclear weapons manufacturing
- Engage in or facilitate prostitution, payday lending\(^{44}\) gambling or the patenting of life
- Charge interest rates significantly in excess of market peers for comparable offerings\(^{45}\)

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42 Armaments are weapons designed for killing people, not for hunting.
43 Illicit means forbidden by law, rules, or custom in the location where they are produced.
45 The National Consumer Law Center: www.nclc.org/ advances fairness in the marketplace for all. Huge Costs Small Loans describe predatory small loans. Annual interest rates of 300% to 1,000% or even higher are often disguised by the structure of the loan. These loans take various forms, including payday loans, overdraft loans, auto title loans, tax refund anticipation loans, and rent-to-own transactions. What they have in common is high costs for those least able to afford them and the propensity to trap consumers in terrible cycles of debt. the Consumer Financial Protection Bureau: www.consumerfinance.gov/the-bureau/ goal is to make markets for consumer financial products and services work for Americans—whether they are applying for a mortgage, choosing among credit cards, or using any number of other consumer financial products.
For every dollar of gross revenue generated by the sale of the product through the 12-month performance period, the manufacturer must donate one-quarter of one cent to a charity\textsuperscript{46} of its choosing or contribute to the Institute’s Living Future Exchange program, which directly funds renewable infrastructure for charitable enterprises.\textsuperscript{47}

\textsuperscript{46} The charity must be located in the country of the project and be a registered charity or 501(c)3.

\textsuperscript{47} Manufacturers may choose to split the offset as desired between multiple charities and/or the Institute’s Exchange program.
The product must help create a more just, equitable society through the transparent disclosure of the business practices of the company that manufacturers it. Product manufacturers are required to obtain a JUST label and to send JUST program information\(^{48}\) to at least five of their major suppliers as part of an ongoing advocacy effort.

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### JUST ORGANIZATIONS

<table>
<thead>
<tr>
<th>Organization Name:</th>
<th>Organization Type:</th>
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### Social Justice and Equity Indicators:

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<td>Pay-Scale Equity</td>
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### Worker Benefit

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### Local Benefit

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### Stewardship

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### Safety

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### JUST classification number.

JUST label is valid for two years, starting with the date of issue.

\(^{48}\) justorganizations.org
The intent of the Beauty Petal is to recognize the need for beauty to enrich our lives and to honor the impacts of the things we make. As a society, we are often surrounded by ugly and inhumane material things that are manufactured and consumed with little thought to the short- or long-term environmental impacts of their life cycles. If we do not care for the things we utilize every day, then why should we extend care outward to our communities and the natural world?

**IDEAL CONDITIONS AND CURRENT LIMITATIONS**

The Living Product Challenge envisions product design and packaging that elevates our spirits and inspires us to be better than we currently are. Mandating beauty is, by definition, an impossible task. And yet, the level of discussion and, ultimately, the results are elevated through attempting difficult but critical tasks. In this Petal, the Imperatives are based on genuine efforts, thoughtfully applied. We do not begin to assume we can judge beauty and project our own aesthetic values on others. But we do want to understand people’s objectives and know that an effort was made to enrich people’s lives with each physical thing that we contributed to the world, whatever its size or intended use. This intentionality of good design and graceful execution must carry forth into a program for educating the public about the environmental qualities of each Living Product they create.

There are no current limitations to this Petal other than our imaginations and what we as a society choose to value.
The manufacturer must demonstrate that the product gives more than it takes over its entire life cycle, meaning that its handprint is larger than its footprint in relation to one or more sustainability impact categories: human health, climate, energy, water, waste or ecological impacts.50

The Positive Handprinting Imperative is achieved when the manufacturer demonstrates that it is achieving handprints that actually exceed the cradle-to-gate footprint of its product for at least one impact category.

49 In meeting the Imperatives devoted to Net Positive Energy, Water and Climate, the manufacturer will have already used the Institute Footprint /Handprint Calculator to assess and document the top five processes contributing to its cradle-to-gate footprints for energy, water and climate. The Institute Calculators also provide this information in relation to human health and ecological impacts. The key drivers of a product’s footprint often provide clues or inspiration for the most powerful innovations that will create positive impacts. living-future.org/lpc

50 Refer to Tools and Resources at living-future.org/lpc
The product must contain design features intended solely for human delight and the celebration of culture and spirit appropriate to its function. The product must be artfully designed and pleasing to use.
For all registered products, educational materials about the design, manufacturing, use and disposal of the product must be provided to the public so that they understand how the product achieved the Living Product Challenge, including:

- A Living Product feature on the manufacturer’s website for as long as the product is manufactured and sold.
- Interpretive signage explaining the Living Product manufacturing process at the manufacturing facility.
- An ongoing training program to educate workers at the manufacturing facility about the Living Product Imperatives.
- At least one day per year open to the public of non-sensitive/secure areas of the manufacturing facility.
- Completion of a Living Product case study for inclusion on the Institute’s website.

51 living-future.org/lpc
THE NEW LIVING PRODUCT CHALLENGE LABEL ALLOWS MANUFACTURERS TO PROUDLY DISPLAY THE RESULTS OF THEIR CERTIFICATION EFFORTS WITH THE LIVING FUTURE INSTITUTE IN THE LIVING PRODUCT CHALLENGE.

The Label integrates the requirements of both JUST and Declare into a single overarching format alongside new information that demonstrates a host of metrics linked to the standard. Please note that the example shown here illustrates our current thinking on the label—and the final version will be developed and released as we work with the first manufacturers through the program. It may be different in final execution. Please check our website for current updates on Label development.
**IDENTIFICATION**
Identifies company name, product name and functional unit (e.g. gallons or square feet—a full listing of functional units to be provided)

**ATTRIBUTES**
Identifies key product attributes typically of interest to consumers in green building programs including expected product life span, warranty period, material composition and end of life solutions. Do we measure and show Handprinting and progress over time?

**IMPERATIVES**
Identifies which imperatives of the LPC has been successfully completed for the product.

**DECLARE**
Identifies the ingredients found within the product per Declare guidelines.

**ORIGINS**
Identifies where the final point of assembly for the product is geographically as well as the location of major constituent components.

**DIALS**
Identifies the embodied characteristics of the product for energy, water and waste per functional unit of the product—as well as the type and magnitude of emissions relative to the functional unit.

**JUST**
Identifies the JUST levels achieved by the manufacturer for the product.

**EXPIRY**
Identifies the date of expiry for the Label related to product re-certification.
THE LIVING PRODUCT CHALLENGE SETS AN ASPIRATIONAL TARGET FOR TRUE PRODUCT SUSTAINABILITY. THE METAMORPHOSIS OF A PRODUCT TO A TRULY LIVING PRODUCT IS IMPORTANT. COMPANIES PURSUING SUSTAINABLE PRODUCT PORTFOLIOS CONSISTENTLY REPORT HIGHER PROFITABILITY FOR THOSE PRODUCTS, INNOVATION SPILLOVER TO THE REST OF THE COMPANY AND SUPREME LEVELS OF ENGAGEMENT.\(^5\) THE INSTITUTE WORKS COLLABORATIVELY WITH COMPANIES, AND WITH A NETWORK OF LEADING SUSTAINABILITY SPECIALISTS, TO HELP EACH MANUFACTURER HARNESS THE POWER OF THIS ASPIRATIONAL STANDARD AND THE LEADERSHIP RECOGNITION THAT IT CAN PROVIDE.

Because the Living Product Challenge defines priorities on both a technical level and as a set of core values, it requires an approach to product design, manufacturing and fulfillment that is fundamentally different than the current conventional structure. The Institute supports a company’s transformative process of adopting the principles of the Challenge by offering optional services that shift the mindset and provide practical knowledge and skills.

In addition to the specific services noted below, the Institute will also fashion customized opportunities to match a company’s needs during product development. Companies may inquire about or schedule Living Product Challenge strategic guidance by emailing lpcertification@living-future.org.

IN-HOUSE WORKSHOPS

The Institute offers optional, customized training as a service for organizations to ensure that everyone has a shared fundamental understanding of the Living Product Challenge or particular Petal area. Whether there is a specific area of interest or a desire for a private presentation of an established curriculum, the Institute can deliver customized educational sessions. The most commonly requested workshop is a one-day, in-depth introduction to the Living Product Challenge that addresses each Imperative, the certification pathways and how to use the supporting tools for footprinting and handprinting. This service can be delivered in-person or on-line.

Additional workshops are offered to help companies understand the context of manufacturing trends, and regulatory, financial, behavioral and technological barriers and incentives to manufacturing your Living Product.

\(^5\) There is a substantial and growing body of evidence demonstrating the financial and organizational benefits of sustainable product innovation, including the following case study from an LCA perspective: From Burdens To Benefits: Quantifying The Avoided Climate Impact Of Solutions In The SKF BeyondZero Portfolio by J. Davis, B. Löfgren, M. Sjölin, J-A Nilsson, M. Rosén.
CHARRETTE FACILITATION

To steer manufacturers towards innovative, yet feasible solutions for their products to meet the Living Product Challenge, the Institute offers an optional service to lead the kick-off meeting, or “charrette,” and help define fundamental, strategic goals to guide the company through transformation of a product to Living Product Certification. The Institute can review your product at critical points during the product development cycle such as during beta testing, manufacture retooling, supply chain innovation or wherever there is an opportunity to rethink the direction of a product and how it is made. A charrette should take place soon after registration has been completed, when the potential to explore a Living Product concept is at its fullest. A one-day meeting focuses on fostering an interactive dialogue that allows employees of the company to engage with the Institute and outside experts to consider each area of impact. A two- or three-day format allows time for a deeper examination of promising ideas. The Institute designs the agenda, facilitates the session and provides a follow-up document.

CUSTOM ENGAGEMENT AREAS OF FOCUS INCLUDE:

• Meeting the four Core Imperatives that are required for base Certification.

• Conducting Life Cycle Analysis using the Institute Footprint Calculator.

• Handprint creation in supply chains to reduce environmental impact through supply chain innovation.

• Handprint creation in the use phase, including customer engagement, to extend lifespan or improve product use or performance through innovation.

• Achieving NetPositive production, relative to water, energy, climate and/or waste.

• Living Building Challenge design and retrofit guidance for manufacturing facilities.

• Conducting a toxic chemical inventory and safe chemical use in production and supply chains.

• Exploration of specific Petals in pursuit of Petal certification.

• In-depth training on the Declare and/or JUST program.

PRODUCT DESIGN GUIDANCE

This optional service is intended to improve a product’s potential to comply with the Living Product Challenge. The Institute performs a private review with the manufacturer’s design or product development team to learn how the product accounts for each Imperative of the Living Product Challenge. Following a review, the Institute will issue a report outlining our guidance to confirm the company is on the correct path and improve their ability to succeed. It is possible to receive feedback on the Imperatives within a single Petal, select Petals, or all seven Petals of the Living Product Challenge.
THE INSTITUTE WORKS CONTINUALLY TO CREATE RESOURCES THAT ADVANCE THE UNDERSTANDING AND IMPLEMENTATION OF THE PRINCIPLES OF THE LIVING FUTURE INSTITUTE, AND WE WANT TO ENSURE THAT ALL ENTHUSIASTS ARE AWARE OF THE VARIOUS WAYS TO LEARN MORE ABOUT AND PARTICIPATE IN THE EVOLUTION OF THE PROGRAM. THIS SECTION LISTS SEVERAL OFFERINGS CREATED BY THE INSTITUTE THAT EXPAND THE ROLE OF THE LIVING PRODUCT CHALLENGE BEYOND A FRAMEWORK FOR DEVELOPMENT, TO AN OVERLAY FOR EDUCATION, OUTREACH AND ADVOCACY.

THE LIVING PRODUCT CHALLENGE WEBSITE
The online resource for manufacturers, product designers and others provides the Living Product Challenge Standard document and resources that support the certification process—including educational resources, detailed case studies and fee schedules for certification. In-depth Living Product Challenge resources are available to International Living Future Institute members.

living-future.org/lpc

INTERNATIONAL LIVING FUTURE INSTITUTE MEMBERSHIP
Living Product ChallengeSM 1.0
A group of 50 leading manufacturers collaborating to transform the materials economy through transparency, green chemistry and supply chain innovation. Members of the LP50 commit to meeting in person at least three times a year to collaborate, share lessons learned and find ways to cross-pollinate ideas between industries and disciplines in order to create and market the world’s first Living Products. LP50 members will be invited to exclusive education events about the program and have an opportunity to shape and provide input on the Living Product unExpo and feature Declare and Living Products on the Living Marketplace website.

living-future.org/ilfi/about/membership

LIVING PRODUCT 50
living-future.org/lpc/lp50
LIVING PRODUCT CHRYSALIS
The Chrysalis are companies committed to devoting time and resources to developing and launching a Living Product in the next three years. The Chrysalis will also serve as the first pilot companies to attempt the Challenge and provide feedback from their practical experience implementing the program that will inform future versions and ongoing development of the Standard. The Institute will provide members of the Chrysalis custom strategic guidance on the regenerative design principles within the Living Product Challenge, including a Living Product charrette facilitated by the Institute and including outside experts as needed. Companies participating in the Chrysalis will be able to showcase their work-in-progress towards the creation of the world’s first Living Products through media outlets or in-house publications, the Living Product website and future Living Marketplace website.

living-future.org/lpc/lp-chrysalis

LIVING PRODUCT UNEXPO
The Living Product unExpo is a groundbreaking new event curated by the International Living Future Institute to inspire a revolution in the way materials are designed, manufactured and delivered. Leading manufacturers and sustainability consultants, as well as sustainability directors from the world’s leading design firms, will gather to learn about game-changing innovations in product design and to gain the tools, knowledge and network needed to effect positive change in their organizations and supply chains. The conference will assemble a diverse group of people, industries and disciplines to engage in a transparent, transdisciplinary and transformative experience to inspire, create and build markets for the world’s first Living Products.

The Living Product unExpo will be open to the public for a limited time to educate, inspire and solicit crowdsourcing votes on the “People’s Choice” award for the Living Product Prize.

living-future.org/unexpo15
STEPS TO CERTIFYING A LIVING PRODUCT

REGISTER A PRODUCT
Registration is the first step toward Living Product Challenge Certification and is accessible to ILFI members. Information about registration fees can be found on the Living Product Challenge website. The registration form contains prompts or basic information about the product, primary contact, and company. Most of the information provided at the time of registration can be updated, if necessary, by logging in to your membership page.

living-future.org/lpc/lp-registration

CERTIFYING A PRODUCT
Companies will need to complete both a preliminary and final review of their product to achieve certification. A preliminary review will evaluate and provide rulings on the prescriptive requirements of the Challenge, as well as guidance on the performance based requirements as outlined in the table below. A ruling on prescriptive Imperatives will be carried forward to the final review. For the performance based Imperatives the review does not constitute a ruling, but is intended to give the manufacturer assurance that the Imperatives reviewed are in compliance with the requirements and anticipated for certification. A final review will be performed 12 months after a product is released and will include a manufacturing facility site visit. Imperatives that require a LCA and the creation of a Handprint will need to be reviewed during both the preliminary and final review.

Certifications will need to be reviewed once every two years or when there are significant changes to the product or its supply chain.

SUBMITTING FOR CERTIFICATION
After submitting the Certification fee, product teams will be given access to an online portal to submit product documentation. Certification documentation is outlined in the Living Product Challenge Documentation Requirements. Current certification fees and Documentation Requirements are available on the Living Product Challenge website.

When a company is ready to submit their product for Certification they should visit the living future websites or contact the Institute at lpcertification@living-future.org.

living-future.org/lpc/certification

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HANDPRINTING IMPERATIVES REQUIRE BOTH A PRELIMINARY AND FINAL REVIEW

PRELIMINARY OR FINAL REVIEW
TOOLS AND METHODS FOR ACHIEVING IMPERATIVE METRICS

DECLARE
Declare, the ingredient label for building products, allows manufacturers of ecologically sound products to demonstrate market leadership in the growing movement toward product transparency and toxic chemical avoidance. While Declare initially focused on building products, it can be used by any manufacturer interested in transparency and open and honest communication with their customers and stakeholders.

Declare also offers manufacturers an expanded point of entry into projects pursuing the Living Building Challenge. Teams pursuing the Living Building Challenge use the Declare database to select products that meet the program’s Materials requirements. The Declaration on the label aligns with the Living Building Challenge Materials and Health & Happiness Petals, simplifying the process of both materials specification and project certification. Both Red List–free and Living Building Challenge–compliant materials meet the requirements of Imperative 10, Red List. Location of final assembly and raw materials extraction as well as the Living Building Challenge zone designation help project teams determine if a material meets meets the Living Product Challenge Imperative 14, Appropriate Sourcing. Declare is also a requirement of Imperative 9, Responsible Industry, within the Living Product Challenge.

declareproducts.com

INSTITUTE FOOTPRINT CALCULATOR
The Institute Footprint Calculator enables companies to generate rapid yet comprehensive assessments of the footprints that their products’ life cycles generate. The calculator is driven by a transparent and open input/output life cycle assessment database, and it harnesses the power of the openLCA open-source software. It enables users to address a comprehensive set of impact categories, including climate change, water consumption, human health impacts, ecosystem impacts and more.

With a very simple set of inputs to get started, the footprint calculator gives users a quantitative “first look” at a product’s footprint, highlighting the hot spots (key processes in the supply chain and life cycle) that make major contributions to total impacts.

It also enables users to not only consider the upstream footprint of their product manufacturing and supply chains, but to also look downstream at the distribution and use phases of the life cycle, and to consider the impacts of closing loops in product end-of-use management as well.

living-future.org/lpc/footprint-calculator

continued >>
INSTITUTE HANDPRINT CALCULATOR
The Institute Handprint Calculator is a tool that enables manufacturers to begin to estimate the handprints which they can generate by improving the life cycle environmental performance of their products. As with the footprint calculator, users can consider a comprehensive set of impact categories including climate change, water consumption, human health impacts, ecosystem impacts, and more.

living-future.org/lpc

ILFI HABITAT EXCHANGE PROGRAM

living-future.org/exchange

INSTITUTE PRODUCT LIFE DATABASE
The product life database is a transparent compendium of data on the use phase of hundreds of detailed product categories. The database includes the energy input requirements of products, their expected lifetimes and their costs. This data is needed in order to address use-phase impacts of products in the footprint calculator, and they are also used elsewhere in the Living Product Challenge.

living-future.org/lpc

JUST
JUST is a program of the International Living Future Institute designed to offer a consumer-oriented window into how any organization treats their employees, how they impact their local community and where they invest their profits. By providing participating companies with a clear, elegant and informative equity “nutrition-label,” JUST aims to transform the marketplace through transparency and open communication. It aligns with the Institute's Declare materials label to provide a holistic picture of both the products a company produces and the human story behind those products.

justorganizations.org
EDUCATION

The Institute is dedicated to transforming theory and practice in all sectors of manufacturing and offers several ways to broaden one’s knowledge of principles and strengthen one’s ability to transform their business practices to achieve Living Product Certification, including the following:

Public Workshops + Seminars

The Institute offers in-person and online workshops taught by expert faculty about the Living Product Challenge and other Materials Petal certification programs. Workshops are continually developed throughout the year and are announced on the website. The Institute welcomes suggestions for future workshop content. Contact Institute staff to discuss options for hosting a workshop locally by emailing education@livingproductchallenge.org.

Trim Tab

*Trim Tab* is the Institute’s quarterly magazine. Each issue features provocative articles, interviews and news on the issues, designs and people that are truly transforming the built environment. Subscriptions are free, and a complete archive of past issues is available on the Institute’s website: living-future.org/trimtab.

INTERNATIONAL LIVING FUTURE INSTITUTE MEMBERSHIP

Access to the Living Product Challenge Guide and the Living Building Challenge Petal Handbooks is available to anyone with an International Living Future Institute membership for an additional cost. A current fee schedule is published on the Institute’s website. living-future.org/membership

continued >>
There is likely to be both perceived and real limitations to success with the Living Product Challenge that are technical, regulatory, behavioral or financial—or a combination of these influencing factors. In collaboration with partners in the product design and manufacturing field, local and state governments, and other forward-thinking nonprofits, the Institute is spearheading efforts to carry out cutting-edge research and creating practical tools to remove these barriers. The Institute is available to partner with industry or non-profits to create new tools or to advance existing ones, such as footprinting or handprinting calculators to assist companies in measuring their products' negative and positive impacts.

living-future.org/research

The Ambassador Network is a global initiative to encourage the rapid and widespread adoption of restorative principles guided by the Living Future Challenge, including the Living Building Challenge, the Living Community Challenge and the Living Product Challenge. Professionals from all walks of life are encouraged to sign up for the Ambassador Network and help us spread the word about a Living Future. The power of the network allows best practices and ideas to be shared globally, harnessing the best of social media and communication tools for rapid interchange. The Network has been designed to support the continued flow of ideas and solutions among participants and the Institute. It presents numerous options for engagement, and the Institute has created a wealth of related training materials and resources. Living Product Challenge Ambassadors will have access to specialized tools, resources and networks in order to effect positive change within their organizations and educate the public about the urgent need for change in our materials economy.

living-future.org/ambassador
Biodiversity

Biodiversity is the degree of variation of life. It is a measure of the variety of organisms present in different ecosystems. This can refer to genetic variation, ecosystem variation or species variation (number of species) within an area, biome or planet.

Biological Material

A naturally occurring material containing genetic information and capable of reproducing itself or being produced within a biological system. (e.g. beech wood, cotton)  footnote credit: Health Product Declaration Open Standard

Biomimicry

(Biology) the mimicking of life using imitation biological systems.

Biophilia

The term “biophilia” literally means “love of life or living systems.” It was first used by Erich Fromm to describe a psychological orientation of being attracted to all that is alive and vital.

Bioregion

An area bounded by natural rather than artificial borders that has characteristic flora and fauna and includes one or more ecosystems.

Chemical Abstract Services Registration Number (aka CAS RN, CAS Number)

A unique numerical identifier assigned by the Chemical Abstracts Service (www.cas.org) to every chemical described in the open scientific literature of elements, chemicals compounds, polymers and other substances.  footnote credit: Health Product Declaration Open Standard.

Closed Loop Water Systems

Systems in which all water used on a project is captured, treated, used/reused, and/or released within the boundaries of the project area.

Cradle-to-gate

Cradle-to-gate refers to the scope (or boundaries) of an assessment. A cradle-to-gate assessment addresses a partial product life cycle from resource extraction (cradle) to the factory gate (i.e., before it is transported to the consumer). The use phase and disposal phase of the product are omitted in this case. Cradle-to-gate assessments are sometimes the basis for environmental product declarations

Downstream

Downstream is a relative orientation, like the terms “above” or “below.” When assessing the sustainability impacts of products and their life cycles, downstream refers to the whole chain of interconnected processes that occur later in the life cycle of the product. So, the processes downstream of a paper mill will include the transport, wholesaling, retailing, use, and disposal of the paper product. Interestingly, (and perhaps a bit confusingly!), these downstream processes in the life cycle of the paper product all have their own upstream supply chains too. For example, transport of the paper from the paper mill to a distribution center occurs “downstream” of the paper mill; but the impacts of that transport include the impacts of producing the train or truck, and extracting and refining the fossil fuels used to power the train or truck, etc.

53 Definitions contained in the glossary use information from Wikipedia, unless noted otherwise, licensed under these terms: creativecommons.org/licenses/by-sa/3.0/

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Energy Needs
All electricity, heating and cooling requirements of either grid-tied or off-the-grid systems, excluding back-up generators.

Footprint
A measure of negative impacts, generally those caused by either the operations and supply chain of an organization, or the production and supply chain for a product.

Forest Stewardship Council (FSC)
An independent, non-profit, membership-led organization that protects forests for future generations and sets standards under which forests and companies are certified. Membership consists of three equally weighted chambers—environmental, economic, and social—to ensure their balance and the highest level of integrity.

Green Chemistry
The design of chemical products and processes that reduce or eliminate the use or generation of hazardous substances.

Greenhouse Gas (GHG)
A greenhouse gas (sometimes abbreviated GHG) is a gas in the atmosphere that traps heat, by absorbing and re-emitting energy in the thermal infrared range. The primary greenhouse gases in the Earth’s atmosphere are water vapor, carbon dioxide, methane, nitrous oxide, and ozone.

Handprints
Handprints measure the positive impacts that an actor causes, relative to business as usual (e.g. relative to what would have happened without the actor's efforts to bring about these positive impacts). In the case of a product, handprints can refer to reductions in the footprints of the product across its life cycle, such as harvesting more water and generating more energy than was required to make it.

Hot Spots
The life cycles of products contain literally thousands of processes whose output is needed in order for the entire life cycle to take place. And each of these processes create impacts on people and/or the planet, by doing things like consuming natural resources such as water, and emitting pollution to air, water, and land. However, a small subset of these thousands of processes frequently account for a large portion of the total impacts of concern across the entire product life cycle. These processes which make a major contribution to total life cycle impacts for one or more impact categories are called hot spots.
Industrial Water
Refers to water-based industrial processes that are used in manufacturing, such as heating, cooling, processing, cleaning and rinsing.

Input\(^{63}\)
Each discrete chemical, polymer, metal, bio-based material or other substance added to the product by the manufacturer or material supplier that exists in the product as delivered for end use. Includes additives from polymers, whether the product manufacturer or an upstream supplier adds them.

Land Trust
A non-profit organization that, as all or part of its mission, actively works to conserve land by undertaking or assisting in land or conservation easement acquisition, or by its stewardship of such land or easements.

Life Cycle Analysis/Life Cycle Assessment (LCA)\(^{64}\)
Environmental LCA is a technique to assess the potential environmental impacts associated with a product, process, or service, by: (a) Compiling an inventory of relevant energy and material inputs and environmental releases associated with each process in the product’s life cycle, and (b) Evaluating the potential environmental impacts associated with the identified inputs and releases.

Manufacturer Location\(^{65}\)
The final point of fabrication or manufacture of an assembly or building material.

Material Health Inventory
The total mass of chemical substances in the product including process chemicals per hazard category per kg of product.

Native Prairies
Diverse ecosystems dominated by grasses and other flowering plants called forbs.

Nutrient Cycling
A nutrient cycle (or ecological recycling) is the movement and exchange of organic and inorganic matter back into the production of living matter. The process is regulated by food web pathways that decompose matter into mineral nutrients. Nutrient cycles occur within ecosystems.

Old-Growth Forest
Natural forests that have developed over a long period of time, generally at least 120 years, without experiencing severe, stand-replacing disturbance such as a fire, windstorm or logging. These ecosystems are distinguished by old trees and related structural attributes that may include tree size, accumulations of large dead woody material, number of canopy layers, species composition and ecosystem function.

Primary Dune
A continuous or nearly continuous mound or ridge of sand with relatively steep seaward and landward slopes immediately landward and adjacent to the beach and subject to erosion and overtopping from high tides and wave during major coastal storms. The inland limit of the primary frontal dune occurs at the point where there is a distinct change from a relatively steep slope to a relatively mild slope.

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63 Health Product Declaration Open Standard
64 Greg Norris
65 Greg Norris

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Product Life Cycle
The concept of a product life cycle begins by noting that the product is produced, then distributed, then used in some fashion, and finally has an end of life fate that may be disposal or recovery for recycling or reuse. Production, distribution, use, and end-of-use are called life cycle phases or stages. When assessing the impacts of a product life cycle, we take into account not only the processes directly responsible for each of these phases, but also the upstream supply chains providing all of the inputs necessary for each directly responsible process. Thus, truck transport may be a directly responsible process in the distribution phase of a product’s life cycle, and the product’s full life cycle impacts include those of the truck transport, plus those of the extraction and refining of fossil fuel to power the truck, and so-on.

Reaction Product
A substance that is formed during a chemical reaction.

Red Hazard Bin
The Red Chemical Hazard Inventory or “Bin” includes chemicals found on the ILFI Red List, GreenScreen List Translator LT1 or Benchmark 1, Cradle to Cradle Certified Banned Substances and X-Assessed Substances.

Red List
A list of the worst in classes chemicals and substances that should be completely phased out of production due to life cycle health and toxicity concerns.

Renewable Energy
Energy generated through passive solar, photovoltaics, solar thermal, wind turbines, water-powered microturbines, direct geothermal, or fuel cells powered by hydrogen generated from renewably powered electrolysis. Nuclear energy is not an acceptable option.

Renewable Resources
A renewable resource is an organic natural resource that can replenish in due time compared to the usage, either through biological reproduction or other naturally recurring processes. Renewable resources are a part of Earth’s natural environment and the largest components of its ecosphere.

Residual
A substance from the manufacturing process, either an input to the process or the result of secondary or incomplete reaction which is present in the final substance but was not intentionally added.

Resilience
Resilience is a property exhibited by healthy living systems, from the level of organisms to ecosystems, it is also a property of healthy human systems from the level of individuals to families and communities and whole cultures. Resilience refers to the ability of such systems to maintain their integrity (e.g., their health or structure) over time in response to disturbances. As examples, a healthy immune system helps to convey health resilience to an individual; and a community exhibits resilience if its members take collaborative and effective action to preserve the wellbeing of one another in the face of a national disaster.

Stormwater
Precipitation that falls on the ground surfaces of the property.

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Substance (aka Chemical Substance)\textsuperscript{70}
Matter of constant composition best characterized by the entities (molecules, formula units, atoms) it is composed of and its physical properties such as density, refractive index, electric conductivity, melting point, etc. (i.e. intentional inputs, reaction products, impurities).

Throughput
The amount of material or items passing through a system or process.

Uncompensated Reductions
Reductions in the quantity of one or more chemicals in the Red Bin, which are not accompanied by an addition of or increase in the quantity of any other Red Bin chemicals.

Upstream\textsuperscript{71}
Upstream is a relative orientation, like the terms “above” or “below.” When assessing the sustainability impacts of products and their life cycles, upstream refers to the whole tree of interconnected processes that provide the inputs to a given process. So, for a paper mill, its upstream will include the supply chains that produce and refine the chemicals and energy that it consumes, along with the forests and logging and transport of virgin wood fiber and/or the collection and transport of recycled paper. And for a logging operation, its upstream will include the supply chains that produced the equipment and fuels used in logging.

Water Balance
In hydrology, a water balance equation can be used to describe the flow of water in and out of a system. A system can be one of several hydrological domains, such as a column of soil or a drainage basin.

Wetland
Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas.