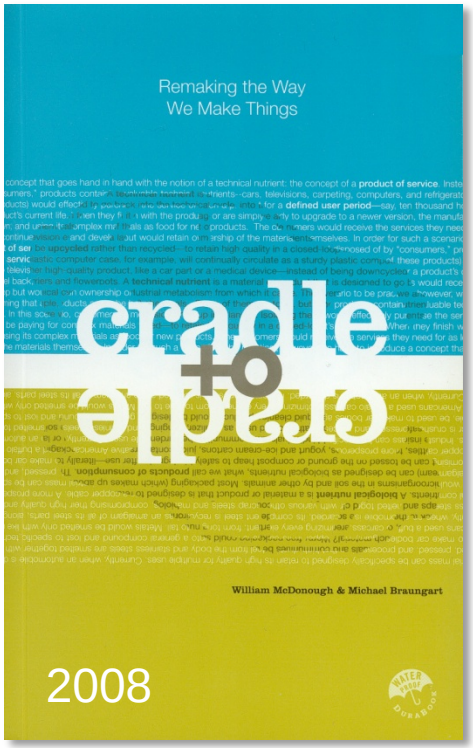
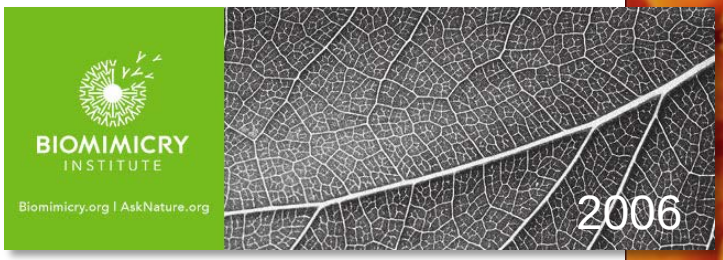
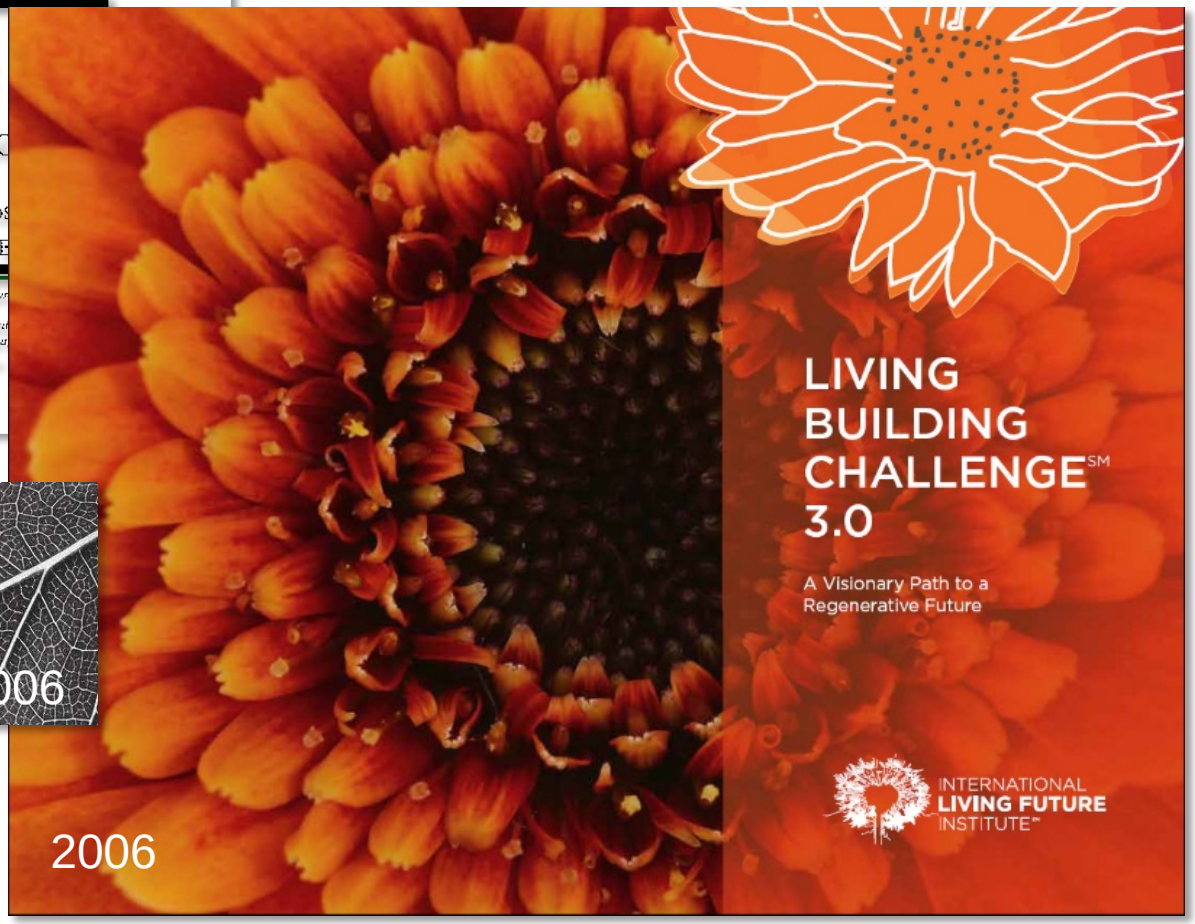
Philosophies of Sustainable Design







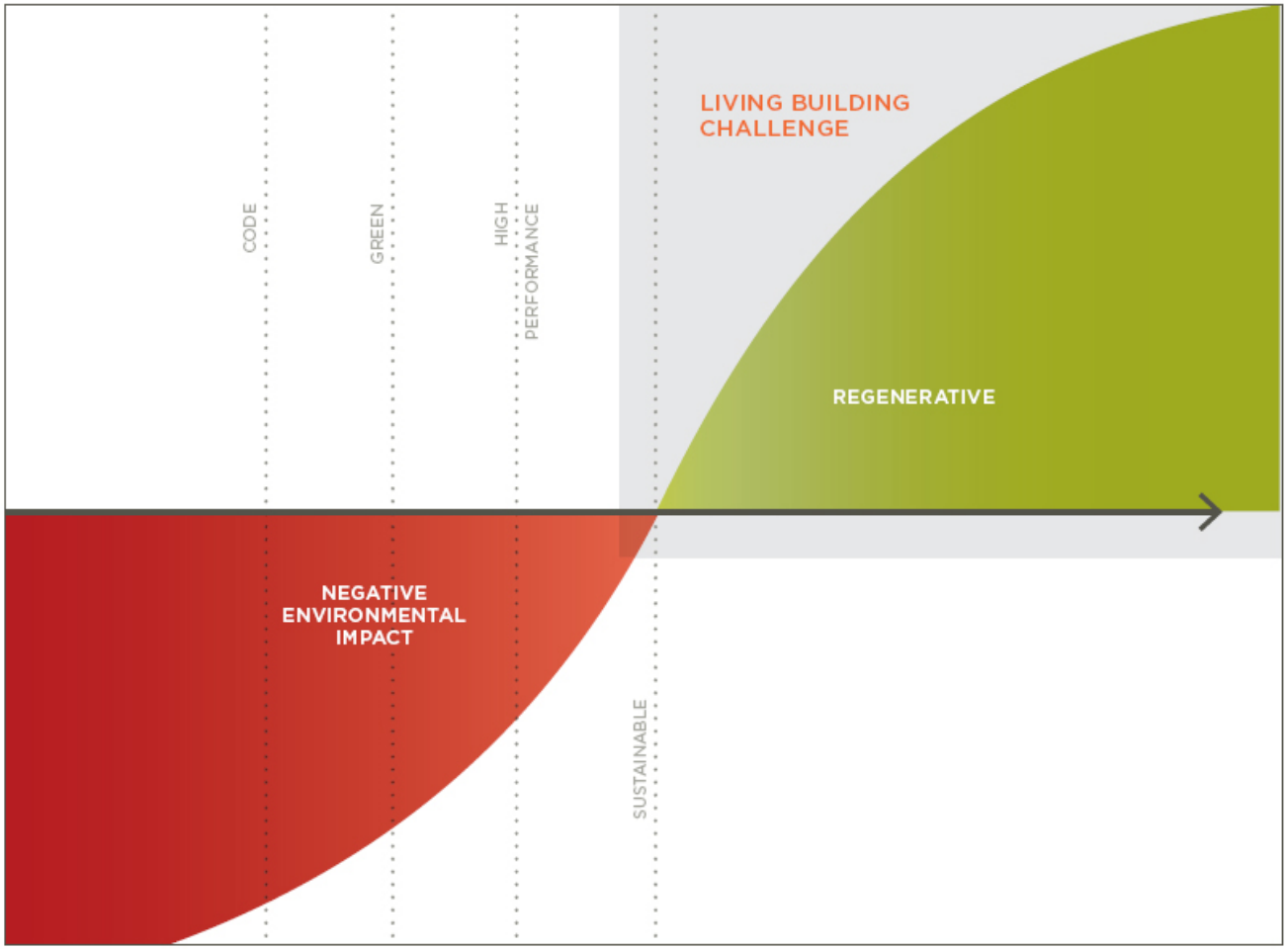
LIVING BUILDING CHALLENGE℠ 3.0

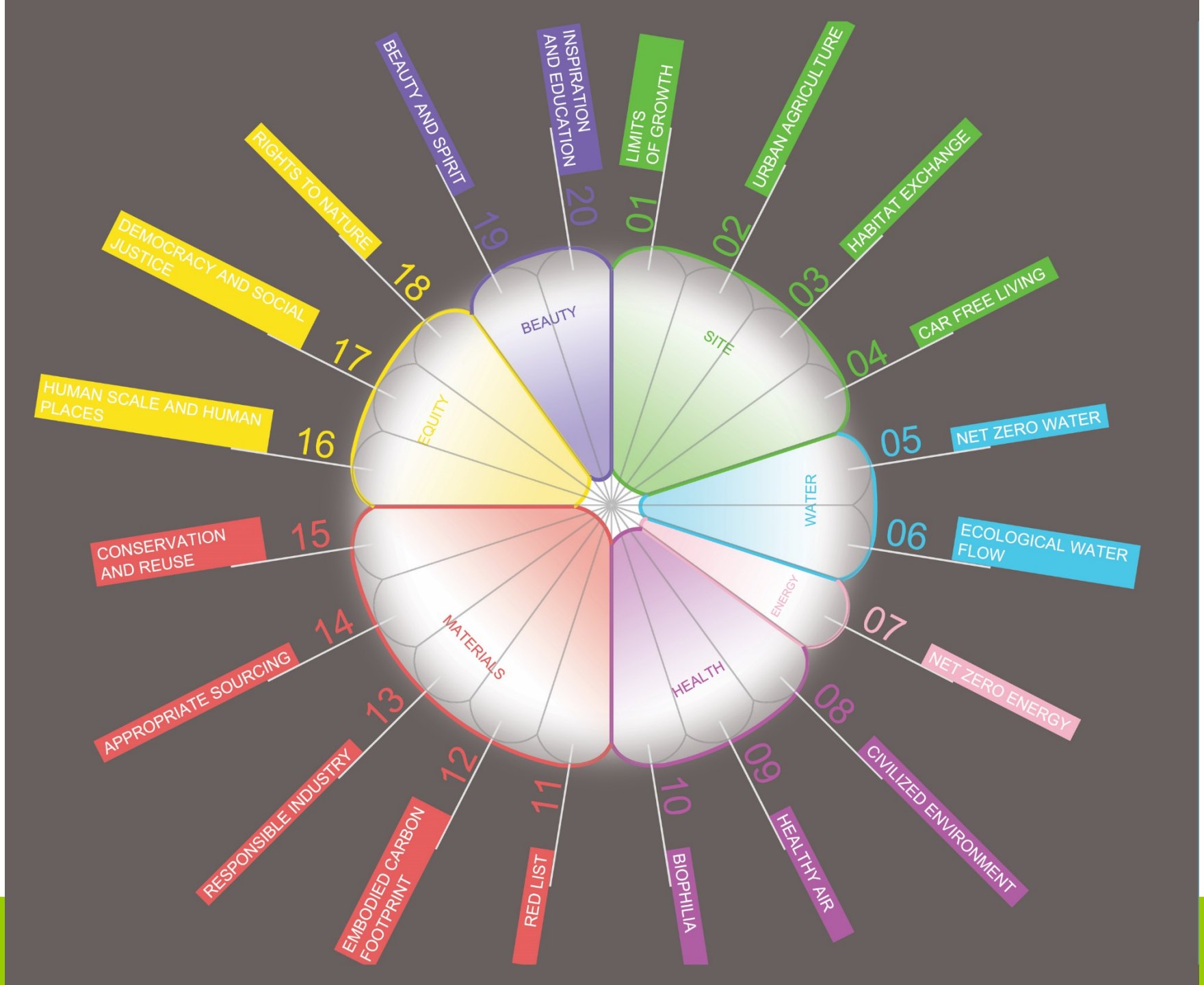
A Visionary Path to a Regenerative Future

INTERNATIONAL LIVING FUTURE INSTITUTE℠

SETTING THE IDEAL AS THE INDICATOR OF SUCCESS

THE LIVING BUILDING CHALLENGE IS A PHILOSOPHY, CERTIFICATION AND ADVOCACY TOOL FOR PROJECTS TO MOVE BEYOND MERELY BEING LESS BAD AND TO BECOME TRULY REGENERATIVE.




BEAUTY
SITE
WATER
ENERGY
HEALTH
MATERIALS
EQUITY
01 LIMITS OF GROWTH
02 URBAN AGRICULTURE
03 HABITAT EXCHANGE
04 CAR FREE LIVING
05 NET ZERO WATER
06 ECOLOGICAL WATER FLOW
07 NET ZERO ENERGY
08 CIVILIZED ENVIRONMENT
09 HEALTHY AIR
10 BIOPHILIA
11 RED LIST
12 EMBODIED CARBON FOOTPRINT
13 RESPONSIBLE INDUSTRY
14 APPROPRIATE SOURCING
15 CONSERVATION AND REUSE
16 HUMAN SCALE AND HUMAN PLACES
17 DEMOCRACY AND SOCIAL JUSTICE
18 RIGHTS TO NATURE
19 BEAUTY AND SPIRIT
20 INSPIRATION AND EDUCATION

PROVEN PERFORMANCE RATHER THAN ANTICIPATED OUTCOMES

The Living Building Challenge is comprised of seven performance categories, or 'Petals': Place, Water, Energy, Health & Happiness, Materials, Equity and Beauty. Petals are subdivided into a total of twenty Imperatives, each of which focuses on a specific sphere of influence. This compilation of Imperatives can be applied to almost every conceivable building project, of any scale and any location—be it a new building or an existing structure.

THERE ARE TWO RULES TO BECOMING A LIVING BUILDING:

- All Imperatives are mandatory. Many of the Imperatives have temporary exceptions to acknowledge current market limitations. These are listed in the Petal Handbooks, which should be consulted for the most up-to-date rulings. Temporary exceptions will be modified or removed as the market changes. With this Standard, the Institute requires advocacy for essential improvements to the building industry.
- Living Building Challenge certification is based on actual, rather than modeled or anticipated, performance. Therefore, projects must be operational for at least twelve consecutive months prior to evaluation for the majority of our Imperative verifications. Some Imperatives can be verified after construction, through a preliminary audit.

The Hawaii Preparatory Academy Energy Lab, Kamuela, HI
Living Certification - Living Building Challenge 1.3
Photo: Matthew Millman Photography / Courtesy: Flansburgh Architects

Imperative omitted from Typology

Solutions beyond project footprint are permissible

The 20 Imperatives of the Living Building Challenge: Follow down the column associated with each Typology to see which Imperatives apply.

	LIVING BUILDING CHALLENGE			
	BUILDINGS	RENOVATIONS	LANDSCAPE + INFRASTRUCTURE	
PLACE				01. LIMITS TO GROWTH
	SCALE JUMPING		SCALE JUMPING	02. URBAN AGRICULTURE
			SCALE JUMPING	03. HABITAT EXCHANGE
				04. HUMAN POWERED LIVING
WATER			SCALE JUMPING	05. NET POSITIVE WATER
ENERGY			SCALE JUMPING	06. NET POSITIVE ENERGY
HEALTH & HAPPINESS				07. CIVILIZED ENVIRONMENT
				08. HEALTHY INTERIOR ENVIRONMENT
				09. BIOPHILIC ENVIRONMENT
MATERIALS				10. RED LIST
			SCALE JUMPING	11. EMBODIED CARBON FOOTPRINT
				12. RESPONSIBLE INDUSTRY
				13. LIVING ECONOMY SOURCING
				14. NET POSITIVE WASTE
EQUITY				15. HUMAN SCALE + HUMANE PLACES
				16. UNIVERSAL ACCESS TO NATURE & PLACE
			SCALE JUMPING	17. EQUITABLE INVESTMENT
				18. JUST ORGANIZATIONS
BEAUTY				19. BEAUTY + SPIRIT
				20. INSPIRATION + EDUCATION

LIVING BUILDING CHALLENGE™

LIVING CERTIFICATION

A project achieves Living Certification or Living Building Certification by attaining all Imperatives assigned to its Typology. All twenty Imperatives are required for Buildings, fifteen for Renovations and seventeen for Landscape and Infrastructure projects.

PETAL CERTIFICATION

While achieving Living Certification is the ultimate goal, meeting the Imperatives of multiple Petals is a significant achievement in and of itself. Petal Certification requires the achievement of at least three of the seven Petals, one of which must be either the Water, Energy or Materials Petal.

Imperative 01, Limits to Growth and Imperative 20, Inspiration and Education are required.

NET ZERO ENERGY BUILDING CERTIFICATION

NET ZERO ENERGY CERTIFICATION

The marketplace has characterized net zero energy in many different ways. The Institute has a simple definition:

One hundred percent of the building's energy needs on a net annual basis must be supplied by on-site renewable energy. No combustion is allowed.

The Net Zero Energy Building Certification program uses the structure of the Living Building Challenge 3.0 to document compliance, it requires four of the Imperatives to be achieved: 01, Limits to Growth, 06, Net Positive Energy (reduced to one hundred percent), 19, Beauty + Spirit, and 20, Inspiration + Education.

The requirement for Imperative 06, Net Positive Energy is reduced to one hundred percent, one hundred and five percent is required for Petal and Living Building Certification only.

As with Living Building and Petal Certification, NZEB certification is based on actual performance rather than modeled outcomes.

David and Lucile Packard Foundation, Los Altos, CA
Net Zero Energy Building Certification
Photo: Terry Lorrant

LIVING CERTIFICATION

A project achieves Living Certification or Living Building Certification by attaining all Imperatives assigned to its Typology.

All twenty (20) Imperatives are required for Buildings, fifteen (15) for Renovations and
Seventeen (17) for Landscape and Infrastructure projects.

PETAL CERTIFICATION

While achieving Living Certification is the ultimate goal, meeting the Imperatives of multiple Petals is a significant achievement in and of itself.

Petal Certification requires the achievement of at least three of the seven Petals, one of which must be either the Water, Energy or Materials Petal.

Imperative 01, Limits to Growth and Imperative 20, Inspiration and Education are required.

PLACE

PLACE

RESTORING A HEALTHY INTERRELATIONSHIP WITH NATURE

PETAL INTENT

The intent of the Place Petal is to realign how people understand and relate to the natural environment that sustains us. The human built environment must reconnect with the deep story of place and the unique characteristics found in every community so that story can be honored, protected and enhanced. The Place Petal clearly articulates where it is acceptable for people to build, how to protect and restore a place once it has been developed, and how to encourage the creation of communities that are once again based on the pedestrian rather than the automobile. In turn, these communities need to be supported by a web of local and regional agriculture, since no truly sustainable community can rely on globally sourced food production.

The continued spread of sprawl development and the vastly increasing number of global megapolises threatens the few wild places that remain. The decentralized nature of our communities impedes our capacity to feed ourselves in a sustainable way and also increases transportation impacts and pollution. The overly dense urban centers in turn crowd out healthy natural systems, isolating culture from a sense of place. As prime land for construction diminishes, more 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 existing human developments. Automobiles, often used as single occupancy vehicles, have become integral to our communities when we should depend on "people power" —walking and bicycling—as the primary mode of travel, and supplement it with shared transit.

IDEAL CONDITIONS + CURRENT LIMITATIONS

The Living Building Challenge envisions a moratorium on the seemingly never-ending growth outward, and a focus instead on compact, connected communities with healthy rather than inhumane levels of density—inherently conserving the natural resources that support human health and the farmlands that feed us, while also inviting natural systems back into the daily fabric of our lives. 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 our surroundings. There is a frontier mentality that seems to encourage people to keep pursuing the next open territory and to value the untouched site more than the secondhand site. Humanity is territorial by nature, and we tend to view our impacts through a narrow lens. It is not unusual for us to encourage unhealthy solutions, so long as they are "not in my backyard" and allow us the social stature to "keep up with the Joneses." We must erase the taboo associated with certain forms of transit and abandoned industrial and commercial facilities, and we must once again give our regard to the many others that cohabit the earth with us.

SCALE JUMPING PERMITTED FOR URBAN AGRICULTURE (IMPERATIVE 02) AND HABITAT EXCHANGE (IMPERATIVE 03)

PLACE

LIMITS TO GROWTH

IMPERATIVE

01

Projects may only be built on greyfields or brownfields: previously developed[6] sites that are not classified as on or adjacent to any of the following sensitive ecological habitats[7]:

- Wetlands: maintain at least 15 meters, and up to 70 meters of separation
- Primary dunes: maintain at least 40 meters of separation
- Old-growth forest: maintain at least 60 meters of separation
- Virgin prairie: maintain at least 30 meters of separation
- Prime farmland
- Within the 100-year flood plain

Project teams must document site conditions prior to the start of work. On-site landscape must be designed so that as it matures and evolves it increasingly emulates the functionality of indigenous ecosystems with regard to density, biodiversity, plant succession, water use, and nutrient needs. It shall also provide wildlife and avian habitat appropriate to the project's transect through the use of native and naturalized plants and topsoil. No petrochemical fertilizers or pesticides can be used for the operation and maintenance of the on-site landscape.

6 Sites that qualify must have been altered from a greenfield prior to December 31, 2007.
7 Refer to the Place Petal Handbook for clarifications and exceptions. There are cases when building on a greenfield or a sensitive ecological habitat is allowed based on project type, Transect or other conditions.

PLACE

URBAN AGRICULTURE

IMPERATIVE

02

The project must integrate opportunities for agriculture appropriate to its scale and density using the Floor Area Ratio (FAR) as a basis for calculation. The table below outlines the mandatory agricultural requirements for all projects. Single-family homes must also demonstrate the capacity to store at least a two-week supply of food.[8]

PERCENT OF PROJECT AREA FOR FOOD PRODUCTION

Project F.A.R.	Minimum Percent Required
< 0.05	80%
0.05 - 0.09	50%
0.10 - 0.24	35%
0.25 - 0.49	30%
0.5 - 0.74	25%
0.75 - 0.99	20%
1.0 - 1.49	15%
1.5 - 1.99	10%
2.0 - 2.99	5%
> 3.0	1%

8 Refer to the Place Petal Handbook for clarifications such as acceptable urban agriculture practices, area calculation information as well as exceptions by Transect.

PLACE

HABITAT EXCHANGE

IMPERATIVE

03

For each hectare of development, an equal amount of land away from the project site must be set aside in perpetuity through the Institute's Living Future Habitat Exchange Program[9] or an approved Land Trust organization.[10] The minimum offset amount is 0.4 hectare.

HABITAT
LIVING FUTURE EXCHANGE

9 ILFI now operates a Habitat Exchange Program in cooperation with conservation organizations. For more information visit **www.living-future.org/exchange.**

10 Refer to the Place Petal Handbook for clarifications such as information about Land Trusts as well as exceptions.

PLACE

HUMAN POWERED LIVING

IMPERATIVE

04

Each new project should contribute toward the creation of walkable, pedestrian-oriented communities and must not lower the density of the existing site. Teams must evaluate the potential for a project to enhance the ability of a community to support a human powered lifestyle, and provide a mobility plan that addresses the interior and exterior of the project and demonstrates at a minimum the following:

ALL PROJECTS (EXCEPT SINGLE FAMILY HOMES):

- Secure, weather protected storage for human powered vehicles that provide facilities to encourage biking.[11]
- Consideration and enhancement of pedestrian routes, including weather protection on street frontages.
- Promotion of the use of stairs over elevators through interior layout and quality of stairways.
- Advocacy in the community to facilitate the uptake of human powered transportation.

PROJECTS IN TRANSECTS L4-L6 MUST ALSO PROVIDE:

- A transit subsidy for all occupants of the building (if owner occupied) or a requirement for tenant employers to provide such a subsidy.
- Showers and changing facilities that can be accessed by all occupants of the building.
- At least one electric vehicle charging station.

SINGLE FAMILY HOMES (ALL TRANSECTS):

An assessment of how the residents can reduce their transportation impact through car sharing, use of public transportation, alternative fueled vehicles, or bicycles is required.

11 Bike storage is recommended for 15% of occupants; teams should consider the occupancy type and location of the project.

WATER

WATER

CREATING DEVELOPMENTS THAT OPERATE WITHIN THE WATER BALANCE OF A GIVEN PLACE AND CLIMATE

PETAL INTENT

The intent of the Water Petal is to realign how people use water and to redefine 'waste' in the built 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 avoided the majority of these problems to date 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 AND CURRENT LIMITATIONS

The Living Building Challenge envisions a future whereby all developments are configured based on the carrying capacity of the site: harvesting sufficient water to meet the needs of a given population while respecting the natural hydrology of the land, the water needs of the ecosystem the site inhabits, and those of its neighbors. Indeed, water can be used and purified and then used again—and the cycle repeats.

Currently, such practices are often illegal due to health, land use and building code regulations (or because of the undemocratic ownership of water rights) that arose precisely because people were not properly safeguarding the quality of their water. Therefore, reaching the ideal for water use means challenging outdated attitudes and technology with decentralized site- or district-level solutions that are appropriately scaled, elegant and efficient.

SCALE JUMPING PERMITTED FOR NET POSITIVE WATER (IMPERATIVE 05)

WATER

NET POSITIVE WATER

IMPERATIVE

05

Project water use and release must work in harmony with the natural water flows of the site and its surroundings. One hundred percent of the project's water needs must be supplied by captured precipitation or other natural closed loop water systems,[12] and/or by re-cycling used project water, and must be purified as needed without the use of chemicals.

All stormwater and water discharge, including grey and black water, must be treated onsite and managed either through re-use, a closed loop system, or infiltration. Excess stormwater can be released onto adjacent sites under certain conditions.

12 Refer to the Water Petal Handbook for clarifications and exceptions, such as allowances for a municipal potable water use connection if required by local heath regulations.

ENERGY

Rooftop Solar Array at The Bullitt Center
Seattle, WA
Photo: Benjamin Benschneider

ENERGY

RELYING ONLY ON CURRENT SOLAR INCOME

PETAL INTENT

The intent of the Energy Petal is to signal a new age of design, wherein the built environment relies solely on renewable forms of energy and operates year round in a safe, pollution-free manner. In addition, it 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 (CO_2) 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 AND CURRENT LIMITATIONS

The Living Building 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 there has been considerable progress 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, together with the current cost of the systems available, are the major limitations to reaching our goals.

SCALE JUMPING PERMITTED FOR NET POSITIVE ENERGY (IMPERATIVE 06)

NETZERO ENERGY BUILDING CERTIFICATION

ENERGY

NET POSITIVE ENERGY

IMPERATIVE

06

One hundred and five percent of the project's energy needs must be supplied by on-site renewable energy on a net annual basis, without the use of on-site combustion.[13] Projects must provide on-site energy storage for resiliency.[14]

13 Refer to the Energy Petal Handbook for a list of renewable energy systems, clarifications and exceptions.

14 Projects must demonstrate that sufficient back-up battery power be installed for emergency lighting (at least 10 percent of lighting load) and refrigeration use for up to one week for greater resiliency.

Solar array at The Hawaii Preparatory Academy Energy Lab, Kamuela, HI
Living Certification - Living Building Challenge 1.3
Photo: Matthew Millman Photography / Courtesy: Flansburgh Architects

HEALTH & HAPPINESS

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 environmental conditions that must be present to create robust, healthy spaces, rather than to address all of the potential ways that an interior environment could be compromised.

Many developments provide substandard conditions for health and productivity and human potential is greatly diminished in these places. By focusing attention on the major pathways of health we create environments designed to optimize our well-being.

IDEAL CONDITIONS AND CURRENT LIMITATIONS

The Living Building Challenge envisions a nourishing, highly productive and healthy built environment. However, even best available solutions require acceptance and engagement by the project occupants and project owner. It is difficult to ensure that developments will remain healthy over time, since environmental conditions such as air quality, thermal control, and visual comfort can easily be compromised in numerous ways. It can also be complicated to ensure optimal conditions due to the unpredictable nature of how people operate and maintain their indoor spaces.

HEALTH & HAPPINESS

CIVILIZED ENVIRONMENT

07

Every regularly occupied space must have operable windows that provide access to fresh air and daylight.[15]

15 Refer to the Health Petal Handbook for clarifications, exceptions and information regarding minimum requirements for windows.

HEALTH & HAPPINESS

HEALTHY INTERIOR ENVIRONMENT

IMPERATIVE

08

To promote good indoor air quality, a project must create a Healthy Interior Environment Plan that explains how the project will achieve an exemplary indoor environment including the following:

- Compliance with the current version of ASHRAE 62, or international equivalent
- Smoking must be prohibited within the project boundary
- Results from an Indoor Air Quality test before and nine months after occupancy[16]
- Compliance with the CDPH Standard Method v1.1-2010 (or international equivalent) for all interior building products that have the potential to emit Volatile Organic Compounds[17]
- Dedicated exhaust systems for kitchens, bathrooms, and janitorial areas
- An entry approach that reduces particulates tracked in through shoes[18]
- An outline of a cleaning protocol that uses cleaning products that comply with the EPA Design for the Environment label (or international equivalent[19])

16 Testing protocols must be consistent with the United States Environmental Protection Agency Compendium of Methods for the Determination, or International equivalent. Refer to the Health Petal Handbook for the required Air Quality Conditions.
17 California Department of Public Health. Products not regulated by CDHP do not need to comply.
18 Refer to the Health Petal Handbook for the specifics of approved entry strategies.
19 www.epa.gov/dfe

NRDC Midwest Office, Chicago, IL
Petal Certification
Courtesy: Studio Gang Architects

HEALTH & HAPPINESS

BIOPHILIC ENVIRONMENT

The project must be designed to include elements that nurture the innate human/nature connection. Each project team must engage in a minimum of one all-day exploration of the biophilic design potential for the project. The exploration must result in a biophilic framework and plan for the project that outlines the following:[20]

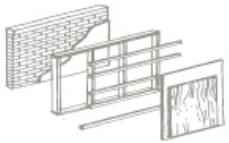
- How the project will be transformed by deliberately incorporating nature through Environmental Features, Light and Space, and Natural Shapes and Forms
- How the project will be transformed by deliberately incorporating nature's patterns through Natural Patterns and Processes and Evolved Human-Nature Relationships
- How the project will be uniquely connected to the place, climate and culture through Place-based Relationships
- The provision of sufficient and frequent human-nature interactions in both the interior and exterior of the project to connect the majority of occupants with nature directly

The plan must contain methods for tracking biophilia at each design phase. The plan should include historical, cultural, ecological, and climatic studies that thoroughly examine the site and context for the project.

20 Each of the Biophilic Design Elements outlined on Table 1-1, Page 15 of Biophilic Design: The Theory, Science, and Practice of Bringing Buildings to Life by Stephen R. Kellert, Judith H. Heerwagen, and Martin L. Mador should be used as a reference.

Omega Institute, Rhinebeck, NY
Living Certification - Living Building Challenge 1.3
Photo: Farshid Assassi / Courtesy: BNIM Architects

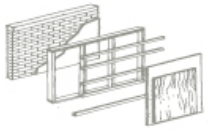
MATERIALS



UniverCity Childcare Centre
Burnaby, BC
Courtesy: space2place

MATERIALS

ENDORSING PRODUCTS THAT ARE SAFE FOR ALL SPECIES THROUGH TIME



SCALE JUMPING PERMITTED FOR EMBODIED CARBON FOOTPRINT (IMPERATIVE 11)

PETAL INTENT

The intent of the Materials Petal is to help create a materials economy that is non-toxic, ecologically regenerative, transparent and socially equitable. Throughout their life cycle, building materials are responsible for many adverse environmental issues, including personal illness, habitat and species loss, pollution, and resource depletion. The Imperatives in this section aim to remove the worst known offending materials and practices and drive business towards 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 the construction process, but also to strive for corrections in the industry itself. At the present time it is impossible to gauge the true environmental impact and toxicity of the built environment due to a lack of product-level information, although the Living Building Challenge continues to shine a light on the need for transformative industrial practices.

IDEAL CONDITIONS + CURRENT LIMITATIONS

The Living Building Challenge envisions a future where all materials in the built environment are regenerative and have no negative impact on human and ecosystem health. The precautionary principle guides all materials decisions when impacts are unclear.

There are significant limitations to achieving the ideal for the materials realm. Product specification and purchase has 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, yet many manufacturers are wary of sharing trade secrets that afford them a competitive advantage, and make proprietary claims about specific product contents.

Declare, the Institute's ingredients label for building products, is a publicly accessible label and online database with an official connection to the Materials Petal. Not only does Declare contribute to the overt methodology for removing a temporary exception, it also provides a forum for sharing the information compiled by a project team as part of their documentation requirements for certification.

declareproducts.com

The Hawaii Preparatory Academy Energy Lab, Kamuela, HI
Living Certification - Living Building Challenge 1.3
Photo: Matthew Millman Photography / Courtesy: Flansburgh Architects

MATERIALS

RED LIST

10

There are temporary exceptions for numerous Red List items due to current limitations in the materials economy. Refer to the Materials Petal Handbook for complete and up-to-date listings.

The project cannot contain any of the following Red List materials or chemicals:[21]

- Alkylphenols
- Asbestos
- Bisphenol A (BPA)
- Cadmium
- Chlorinated Polyethylene and Chlorosulfonated Polyethlene
- Chlorobenzenes
- Chlorofluorocarbons (CFCs) and Hydrochlorofluorocarbons (HCFCs)
- Chloroprene (Neoprene)
- Chromium VI
- Chlorinated Polyvinyl Chloride (CPVC)
- Formaldehyde (added)
- Halogenated Flame Retardants (HFRs)
- Lead (added)
- Mercury
- Polychlorinated Biphenyls (PCBs)
- Perfluorinated Compounds (PFCs)
- Phthalates
- Polyvinyl Chloride (PVC)
- Polyvinylidene Chloride (PVDC)
- Short Chain Chlorinated Paraffins
- Wood treatments containing Creosote, Arsenic or Pentachlorophenol
- Volatile Organic Compounds (VOCs) in wet applied products[23]

21 A link to the list of CAS Registry Numbers that correspond with each Red List item is available in the Materials Petal Handbook.

22 Wet applied products (coatings, adhesives and sealants) must have VOC levels below the South Coast Air Quality Management District (SCAQMD) Rule 1168 for Adhesives and Sealants or the CARB 2007 Suggested Control Measure (SCM) for Architectural Coatings as applicable. Containers of sealants and adhesives with capacity of 16 ounces or less must comply with applicable category limits in the California Air Resources Board (CARB) Regulation for Reducing Emissions from Consumer Products.

MATERIALS

EMBODIED CARBON FOOTPRINT

IMPERATIVE

11

The project must account for the total embodied carbon (tCO_2e) impact from its construction through a one-time carbon offset in the Institute's new Living Future Carbon Exchange or an approved carbon offset provider.[23]

CARBON
LIVING FUTURE EXCHANGE

23 Refer to the Materials Petal Handbook for approved carbon offset programs, clarifications and exceptions.

Omega Institute, Rhinebeck, NY
Living Certification - Living Building Challenge 1.3
Photo: Farshid Assassi / Courtesy: BNIM Architects

MATERIALS

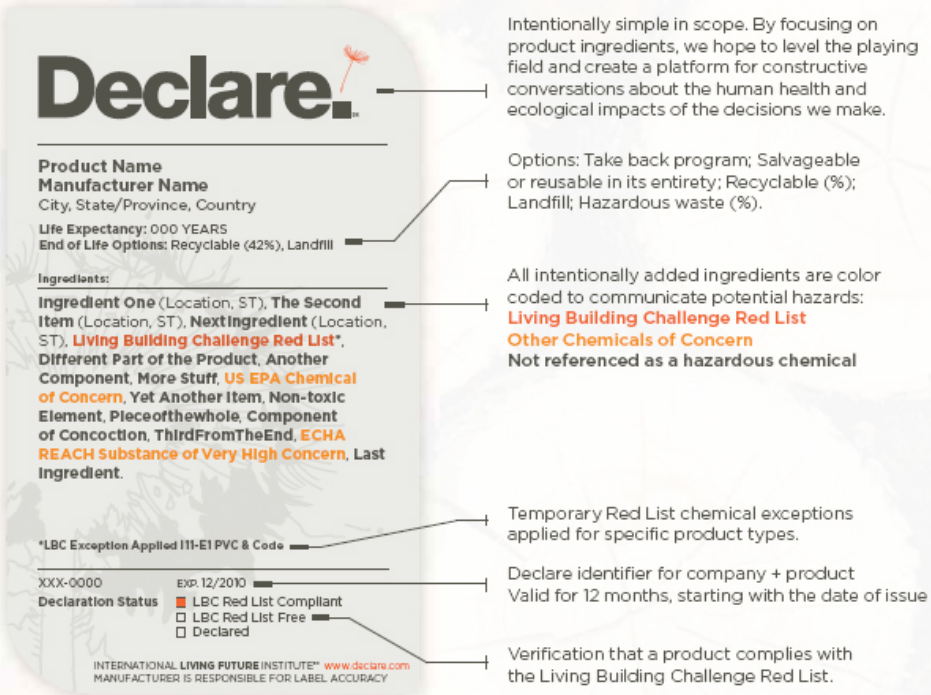
RESPONSIBLE INDUSTRY

The project must advocate for the creation and adoption of third-party certified standards for sustainable resource extraction and fair labor practices. Applicable raw materials include stone and rock, metal, minerals, and timber.

For timber, all wood must be certified to Forest Stewardship Council (FSC)[24] 100% labeling standards, from salvaged sources, or from the intentional harvest of timber onsite for the purpose of clearing the area for construction or restoring/maintaining the continued ecological function of the onsite bionetwork.

All projects must use, at a minimum, one Declare product for every 500 square meters of gross building area and must send Declare program information[25] to at least 10 manufacturers not currently using Declare.

IMAGE DEPICTS A "BLANK" LABEL PRIOR TO CUSTOMIZATION BY MANUFACTURER



24 Refer to the Materials Petal Handbook for a full list of exceptions such as an exception for wood in existing buildings undergoing renovation.
25 www.declareproducts.com

MATERIALS

LIVING ECONOMY SOURCING

IMPERATIVE

13

The project must incorporate place-based solutions and contribute to the expansion of a regional economy rooted in sustainable practices, products and services.

Manufacturer location for materials and services must adhere to the following restrictions:

- 20% or more of materials construction budget[26] must come from within 500 km of construction site.
- An additional 30% of materials construction budget must come from within 1000 km of the construction site or closer.
- An additional 25% of materials construction budget must come from within 5000 km of the construction site.
- 25% of materials may be sourced from any location.
- Consultants must come from within 2500 km of the project location.[27]

26 Materials construction budget is defined as all material costs and excludes labor, soft costs and land. Declare products and salvaged materials may be counted at twice their value. Certain natural building materials may include labor cost in their calculation. Refer to the Materials Petal Handbook for more information.

27 There is a temporary exception for specialty consultants and subcontractors, who may travel up to 5,000 km. Refer to the Materials Petal Handbook for additional exceptions.

Painters Hall
Courtesy: Pringle Creek Community

MATERIALS

NET POSITIVE WASTE

14

The project team must strive to reduce or eliminate the production of waste during design, construction, operation, and end of life in order to conserve natural resources and to find ways to integrate waste back into either an industrial loop or natural nutrient loop.[28]

All Projects must feature at least one salvaged material per 500 square meters of gross building area or be an adaptive reuse of an existing structure.

The project team must create a Material Conservation Management Plan that explains how the project optimizes materials in each of the following phases:

- Design Phase, including the consideration of appropriate durability in product specification
- Construction Phase, including product optimization and collection of wasted materials
- Operation Phase, including a collection plan for consumables and durables
- End of Life Phase, including a plan for adaptable reuse and deconstruction

During construction, the project team must divert wasted material to the following levels:

MATERIAL	MINIMUM DIVERTED/WEIGHT
Metal	99%
Paper & Cardboard	99%
Soil & Biomass	100%
Rigid foam, Carpet & Insulation	95%
All others - combined weighted average[29]	90%

For all project types, there must be dedicated infrastructure for the collection of recyclables and compostable food scraps.

A project that is located on a site with existing infrastructure must complete a pre-building audit that inventories available materials and assemblies for reuse or donation.

28 Refer to the Materials Petal Handbook for calculation details, clarifications and exceptions.
29 Hazardous materials in demolition waste, such as lead-based paint, asbestos, and polychlorinated biphenyls (PCBs), are exempt from percentage calculations.

EQUITY

The Bullitt Center, Seattle, WA
Photo: Benjamin Benschneider

EQUITY

SUPPORTING A JUST, EQUITABLE WORLD

PETAL INTENT

The intent of the Equity Petal is to transform developments 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 that embraces all sectors of humanity and allows the dignity of equal access and fair treatment is a civilization in the best position to make decisions that protect and restore the natural environment that sustains all of us.

There is a disturbing trend toward privatizing infrastructure and creating polarized attitudes of 'us' vs. 'them'—allowing only those of a certain economic or cultural background to participate fully in community life. Although opposite on the spectrum, enclaves for the wealthy are only one step removed from the racial and ethnic ghettos that continue to plague our neighborhoods. A subset of this trend is the notion that individuals can own access to nature itself, by privatizing admittance to waterways, beaches and other wilderness areas, cutting off most people from the few pristine environmental places that remain. Only by realizing that we are indeed all in this together can the greatest environmental and social problems be addressed.

We need to aggressively challenge the notion that property ownership somehow implies that we can do whatever we like, even externalize the negative environmental impacts of our actions 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 those houses. The factory is diminishing its neighbors' rights to clean air, water and soil. When a building towers over another structure, its shadow diminishes that structure's ability to generate clean and renewable energy, thereby impeding the rights to energy independence. We all deserve access to sunlight and clean air, water and soil.

We need to prioritize the concept of "citizen" above that of "consumer." Equity implies the creation of communities that provide universal access to people with disabilities, and allow people who can't afford expensive forms of transportation to fully participate in the major elements of society. Indeed, most projects in the built environment greatly outlive the original owner or developer—society inherits

continued >>

SCALE JUMPING PERMITTED

EQUITY

SUPPORTING A JUST, EQUITABLE WORLD

the legacies of bad decisions and good decisions alike. Since the act of building is a considerable environmental impact shared by all, there is an inherent responsibility to ensure that any project provides some public good and does not degrade quality of life. Finally, it is essential that we recognize the business practices and welfare of the people that we support as we design and build our developments.

JUST, the Institute's ingredients label for social justice, is a publicly accessible label and online database with an official connection to the Equity Petal. JUST provides a powerful forum for helping project teams support organizations that share the values of a responsible equitable living future.

Justorganizations.org

IDEAL CONDITIONS + CURRENT LIMITATIONS

The Living Building Challenge envisions communities that allow equitable access and treatment to all people regardless of physical abilities, age, or socioeconomic status.

Current limitations to reaching this ideal stem from ingrained cultural attitudes about the rights associated with private ownership and the varying rights of people.

It is necessary to change zoning standards in order to protect the rights of individuals who are 'downstream' of water, air and noise pollution, and who are adversely impacted due to lack of sunlight or exposure to toxins. Past attempts by zoning standards to protect people from particularly egregious pollutants resulted in sterile, single-use areas. A healthy, diverse community is one that encourages multiple functions, and is organized in a way that protects the health of people and the environment.

SCALE JUMPING PERMITTED

EQUITY

HUMAN SCALE AND HUMANE PLACES

IMPERATIVE

15

The project must be designed to create human-scaled rather than automobile-scaled places so that the experience brings out the best in humanity and promotes culture and interaction.
In context of the character of each Transect, there are specific maximum (and sometimes minimum) requirements for paved areas, street and block design, building scale and signage that contribute to livable places.

The project must follow the following design guidelines:

TRANSECT		L1	L2	L3	L4	L5	L6
Surface Cover	Maximum dimension of surface parking lot before a separation is required on all four sides e.g., building, wall, or 3 m wide (minimum) planted median or bioswale	20 m x 30 m					
	Total area of surface parking lot allowed. All other parking requirements must be handled in structured or underground parking.	20%	20%	20%	15%	5%	0%
TRANSECT		**L1**	**L2**	**L3**	**L4**	**L5**	**L6**
Streets + Intersections Only applicable if adding new streets	Maximum street width, measured either shoulder-to-shoulder or curb-to-curb	5 m		7.5 m	10 m	15 m	22.5 m
	Maximum street width before driving lanes must be separated by a pedestrian strip and planting median. Additional lanes may be included on the other side of median to a maximum of 22.5 m total width of driving area	Not applicable Development of this kind is not permitted in a Natural Habitat Preserve or Rural Agricultural Zone		15 m			
	Maximum street width before tree plantings and sidewalks are required on both sides			7.5 m			
	Minimum overall width of sidewalks and planted median			1/3 street width			
	Maximum distance between trees in furnishing zone and planted median			9 m			
	Maximum distance between circulation routes Access way must be 3 m wide minimum to qualify			45 m		60 m	
	Maximum street block size			60 m x 120 m		120 m x 120 m	
TRANSECT		**L1**	**L2**	**L3**	**L4**	**L5**	**L6**
Signage	Number of free-standing signs per development	1					
	Maximum dimensions of free-standing sign(s)	2 m x 2.5 m		2.5 m x 3 m		3.5 m x 6 m	
	Maximum elevation of sign's bottom edge above ground	2 m	3 m	6 m	9 m	12 m	12 m or roof-mounted
TRANSECT		**L1**	**L2**	**L3**	**L4**	**L5**	**L6**
	Maximum single family residence size	N/A	425 m²				
Proportion	Maximum distance between façade openings	N/A	30 m				
	Maximum footprint for any building with a single use, single owner or single tenant. Acceptable to provide additional floor area for tenant on upper/lower floor(s)	3750 m² excludes floor area of atriums, courtyards and daylight shafts					
Human Scale	Provision of places for people to gather and connect internally and/or with the neighborhood.	1	1	One every 1000 m² (10,760sf)			
	Provision of elements along the project edge which support the human scale of the larger neighborhood, such as seat walls, art, displays, or pocket parks. Single Family residences are excluded	1	1	One every 4000 m² (43,000sf)			

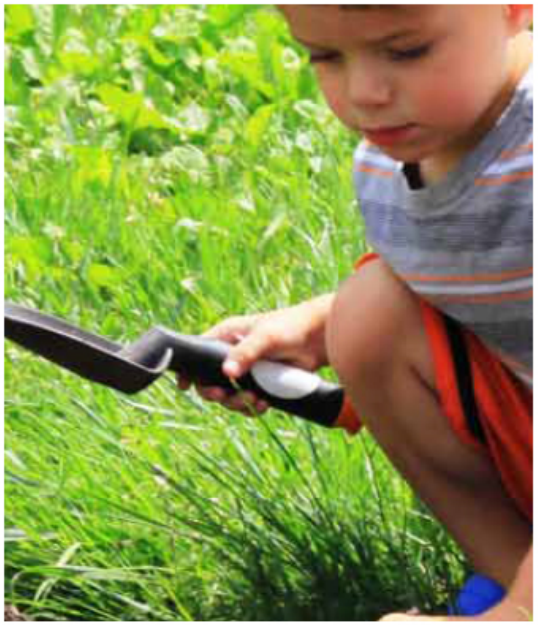
UniverCity Childcare Centre, Burnaby, BC
Photo: Martin Tessler

EQUITY

UNIVERSAL ACCESS TO NATURE & PLACE

IMPERATIVE

16



All primary transportation, roads and non-building infrastructure that are considered externally focused must be equally accessible[30] to all members of the public regardless of background, age and socioeconomic class—including the homeless—with reasonable steps taken to ensure that all people can benefit from the project's creation.

For any project (except single family residential) located in Transect L3-L6, the public realm must be provided for and enhanced through design measures and features such as street furniture, public art, gardens and benches that are accessible to all members of society.

Access for those with physical disabilities must be safeguarded through designs meeting the Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines.[31]

continued >>

30 Refer to the Equity Petal Handbook for a complete list of applicable infrastructure and exceptions that address issues of safety.
31 Refer to the Equity Petal Handbook for specific exceptions, such as those for private residences and historic structures. Complete ADA and ABA Accessibility Guidelines are available online: www.access-board.gov/adaag/about

Science Education at Phipps Conservatory and Botanical Gardens, Pittsburgh, PA
Net Zero Energy Building Certification
Photo: Cory Doman

EQUITY

UNIVERSAL ACCESS TO NATURE & PLACE

IMPERATIVE

16

The project may not block access to, nor diminish the quality of, fresh air, sunlight and natural waterways for any member of society or adjacent developments. The project must also appropriately address any noise audible to the public.

- **Fresh Air:** The project must protect adjacent property from any noxious emissions that would compromise its ability to use natural ventilation. All operational emissions must be free of Red List items, persistent bioaccumulative toxicants, and known or suspect carcinogenic, mutagenic and reprotoxic chemicals.

- **Sunlight:** The project may not block sunlight to adjacent building façades and rooftops above a maximum height allotted for the Transect.[32]

  The project may not shade the roof of a development with which it shares a party wall, unless the adjoining development was built to a lesser density than acceptable for the Transect.[33]

- **Natural Waterways:** The project may not restrict access[34] to the edge of any natural waterway, except where such access can be proven to be a hazard to public safety or would severely compromise the function of the development.[35] No project may assume ownership of water contained in these bodies or compromise the quality or quantity that flows downstream. If the project's boundary is more than sixty meters long parallel to the edge of the waterway, it must incorporate and maintain an access path to the waterway from the most convenient public right-of-way.[36]

32 Detailed exceptions relating to transects are in the Equity Petal Handbook
33 This corresponds to a neighboring building that is at least two stories in L2-L3; four stories in L4; eight stories in L5; and sixteen stories in L6.
34 Public access throughway must allow approach to waterway from land for pedestrians and bicyclists, and from the water via boat. No infrastructure to support any water-based transport is required.
35 For example, a working dock or marina might need to restrict shoreline access for safety reasons. A private residence may not.
36 The easement containing the pathway must be at least three meters wide and allow entry to both pedestrians and bicyclists.

EQUITY

EQUITABLE INVESTMENT

IMPERATIVE 17

For every dollar of total project cost,[37] the development must set aside and donate half a cent or more to a charity[38] of its choosing or contribute to ILFI's Equitable Offset Program, which directly funds renewable infrastructure for charitable enterprises.[39/40]

EQUITY
LIVING FUTURE EXCHANGE

37 Project cost includes land, soft costs, hard costs and FFE.
38 The Charity must be located in the country of the project and be a registered charity or 501 c 3.
39 Projects may choose to split the offset as desired between multiple charities or ILFI's offset program.
40 Public agencies and charitable organizations are exempt from this requirement.

Global Change Institute at University of Queensland, Brisbane, Australia
Courtesy: HASSELL

EQUITY

JUST ORGANIZATIONS

IMPERATIVE **18**

The project must help create a more JUST, equitable society through the transparent disclosure of the business practices of the major organizations involved. At least one of the following project team members must have a JUST Label for their organization:

- Architect of Record
- MEP Engineer of Record
- Structural Engineer of Record
- Landscape Architect of Record
- Interior Architect of Record
- Owner/Developer

Project teams are also required to send JUST program information[41] to at least ten project consultants, sub-consultants or product suppliers as part of ongoing advocacy.

Just.

Organization Name:
Organization Type:
Headquarters:
Satellite Facilities:
Number of Employees:

Social Justice and Equity Indicators:

Diversity
- ☐☐☐ Non-Discrimination
- ☐☐☐ Gender Diversity
- ☐☐☐ Ethnic Diversity

Equity
- ☐☐☐ Full Time Employment
- ☐☐☐ Pay-Scale Equity
- ☐☐☐ Employee/Union Friendly
- ☐☐☐ Living Wage
- ☐☐☐ Gender Pay Equity
- ☐☐☐ Family Friendly

Safety
- ☐☐☐ Occupational Safety
- ☐☐☐ Hazardous Chemicals

Worker Benefit
- ☐☐☐ Worker Happiness
- ☐☐☐ Employee Health Care
- ☐☐☐ Continuing Education

Local Benefit
- ☐☐☐ Local Control
- ☐☐☐ Local Sourcing

Stewardship
- ☐☐☐ Responsible Investing
- ☐☐☐ Community Volunteering
- ☐☐☐ Positive Products
- ☐☐☐ Charitable Giving
- ☐☐☐ Animal Welfare
- ☐☐☐ Transparency

THE SOCIAL JUSTICE LABEL
SPC-001 EXP. 10/26/2014

INTERNATIONAL LIVING FUTURE INSTITUTE® justorganizations.com

An innovative social justice transparency platform through which organizations can shed light on their operations, including how they treat their employees and where they make financial and community investments.

22 Social and equity indicators.

Asking all companies and organizations to accept social responsibility and to be truly transformative and transparent by publicly declaring and showcasing their social justice and equity policies and practices through the indicator metrics.

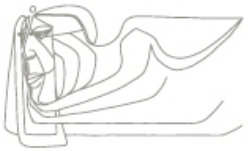
JUST label is valid for 12 months, starting with the date of issue.

JUST classification number.

41 www.justorganizations.com

The Bullitt Center, Seattle, WA
Photo: Benjamin Benschneider

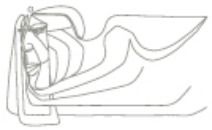
BEAUTY



VanDusen Botanical Garden
Visitor Center, Vancouver, BC
Photo: Nic Lehoux / Courtesy: Perkins+Will

BEAUTY

CELEBRATING DESIGN THAT UPLIFTS THE HUMAN SPIRIT



PETAL INTENT

The intent of the Beauty Petal is to recognize the need for beauty as a precursor to caring enough to preserve, conserve and serve the greater good. As a society, we are often surrounded by ugly and inhumane physical environments. If we do not care for our homes, streets, offices and neighborhoods, then why should we extend care outward to our farms, forests and fields? When we accept billboards, parking lots, freeways and strip malls as being aesthetically acceptable, in the same breath we accept clear-cuts, factory farms and strip mines.

IDEAL CONDITIONS AND CURRENT LIMITATIONS

The Living Building Challenge envisions designs that elevate our spirits and inspire 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 square meter of construction, on each project. This intentionality of good design and graceful execution must carry forth into a program for educating the public about the environmental qualities of their Living Building Challenge project.

There are no current limitations to this Petal other than our imaginations and what we as a society choose to value.

Green Roof at Phipps Conservatory and Botanical Gardens, Pittsburgh, PA
Net Zero Energy Building Certification
Photo: Paul G. Wiegman

BEAUTY

BEAUTY & SPIRIT

IMPERATIVE

The project must contain design features intended solely for human delight and the celebration of culture, spirit and place appropriate to its function and meaningfully integrate public art.

Omega Institute, Rhinebeck, NY
Living Certification - Living Building Challenge 1.3
Photo: Farshid Assassi / Courtesy: BNIM Architects

BEAUTY

INSPIRATION & EDUCATION

IMPERATIVE 20

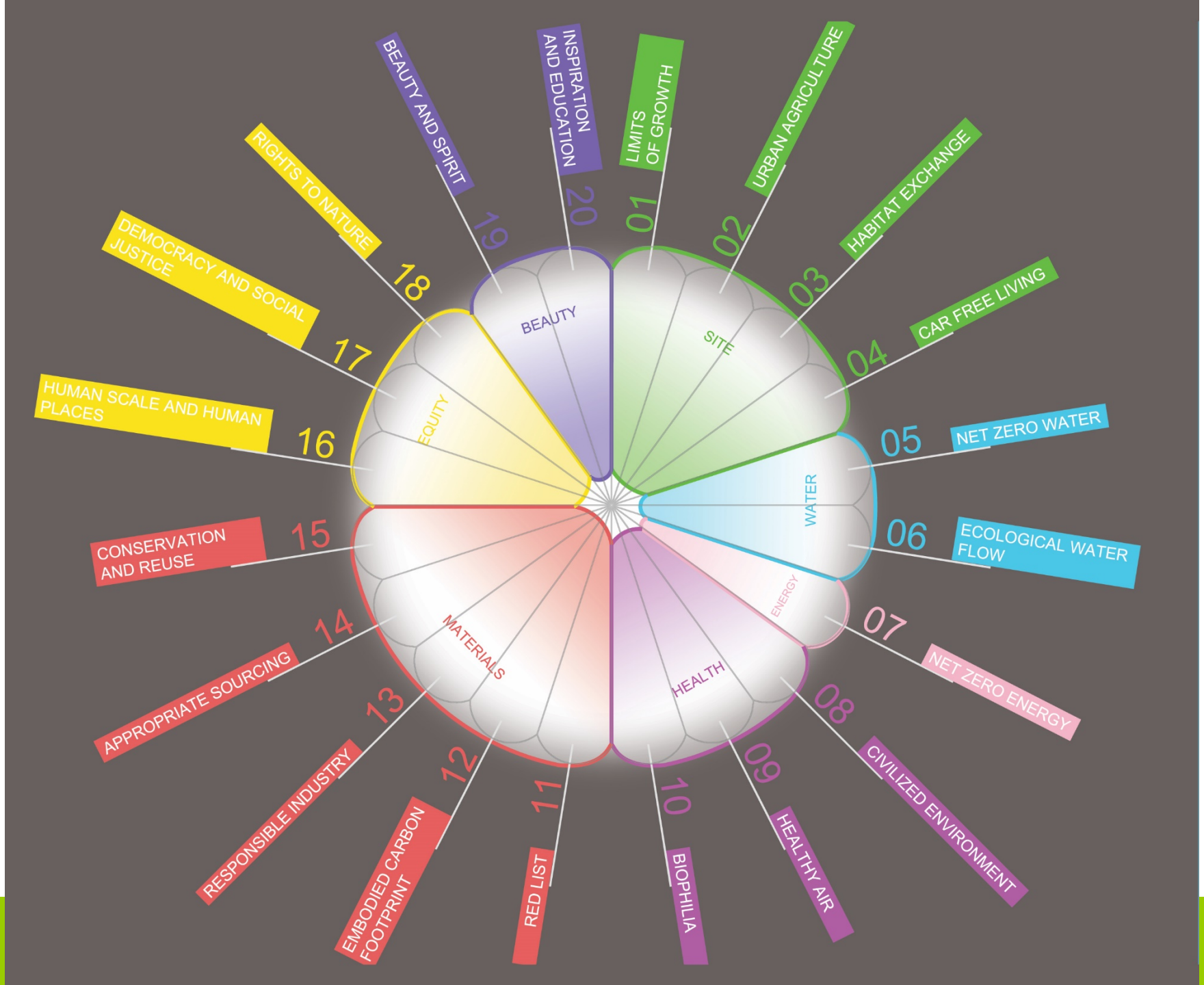
Educational materials about the operation and performance of the project must be provided to the public to share successful solutions and to motivate others to make change.

Projects must provide:[42]

- An annual open day for the public.
- An educational web site that shares information about the design, construction, and operation of the project.
- A simple brochure describing the design and environmental features of the project, as well as ways for occupants to optimize project function.
- A copy of the Operations and Maintenance Manual.
- Interpretive signage that teaches visitors and occupants about the project.
- A Living Building Case Study to be posted on the Institute website.

42 Refer to the Beauty and Inspiration Petal Handbook for additional information.

Living wall at Bertschi School, Seattle, WA
Living Certification - Living Building Challenge 2.0
Photo: Benjamin Benschneider


BEAUTY
SITE
WATER
ENERGY
HEALTH
MATERIALS
EQUITY
01 LIMITS OF GROWTH
02 URBAN AGRICULTURE
03 HABITAT EXCHANGE
04 CAR FREE LIVING
05 NET ZERO WATER
06 ECOLOGICAL WATER FLOW
07 NET ZERO ENERGY
08 CIVILIZED ENVIRONMENT
09 HEALTHY AIR
10 BIOPHILIA
11 RED LIST
12 EMBODIED CARBON FOOTPRINT
13 RESPONSIBLE INDUSTRY
14 APPROPRIATE SOURCING
15 CONSERVATION AND REUSE
16 HUMAN SCALE AND HUMAN PLACES
17 DEMOCRACY AND SOCIAL JUSTICE
18 RIGHTS TO NATURE
19 BEAUTY AND SPIRIT
20 INSPIRATION AND EDUCATION