LIVING BUILDING CHALLENGE™ 2.0

A Visionary Path to a Restorative Future

INTERNATIONAL
LIVING BUILDING
INSTITUTE™

November 2009

NOTIFICATION

Cover image used under a Creative Commons license, photo credit: flickr user Jojo Nicdao

Living Building Challenge copyright © 2006, 2008, 2009 by Cascadia Region Green Building Council and International Living Building Institute. All rights reserved. No part of this document may be modified, nor elements of this document used out of existing context without written permission. For information, address the International Living Building Institute, 410 Occidental Ave S, Seattle, WA 98104.

Living Building Challenge is a trademark of Cascadia Region Green Building Council (Cascadia) and International Living Building Institute (ILBI). The terms "Living Buildings" and "Living Building" and "Living Building Leader" and "Living Future" are also trademarks of Cascadia Region Green Building Council and International Living Building Institute. No use of these terms is allowed without written permission from ILBI, and no project may claim to reach 'Living Building' status without review and approval by ILBI.

ILBI grants substantial limited uses in order to encourage a wide distribution, including the following:

- This particular document may be printed and distributed in its entirety by any organization for the purposes of education or adoption of the Challenge. This stipulation does not apply to the Living Building Challenge User's Guide or other related documents unless expressly specified.
- This document may be emailed in PDF form only - without any modifications made - to any individual or organization for the purposes of education or adoption of the Challenge.
- This document may be posted on websites in its entirety and unmodified in PDF form for the purposes of education or to encourage the adoption of the Challenge. However, ILBI encourages organizations to instead provide a link to the program website at www.ilbi.org in order to maintain access to the most current version of the document.

Use of this document in any form implies acceptance of these conditions. ILBI reserves the right to modify and update Living Building Challenge at its sole discretion.

AUTHORSHIP

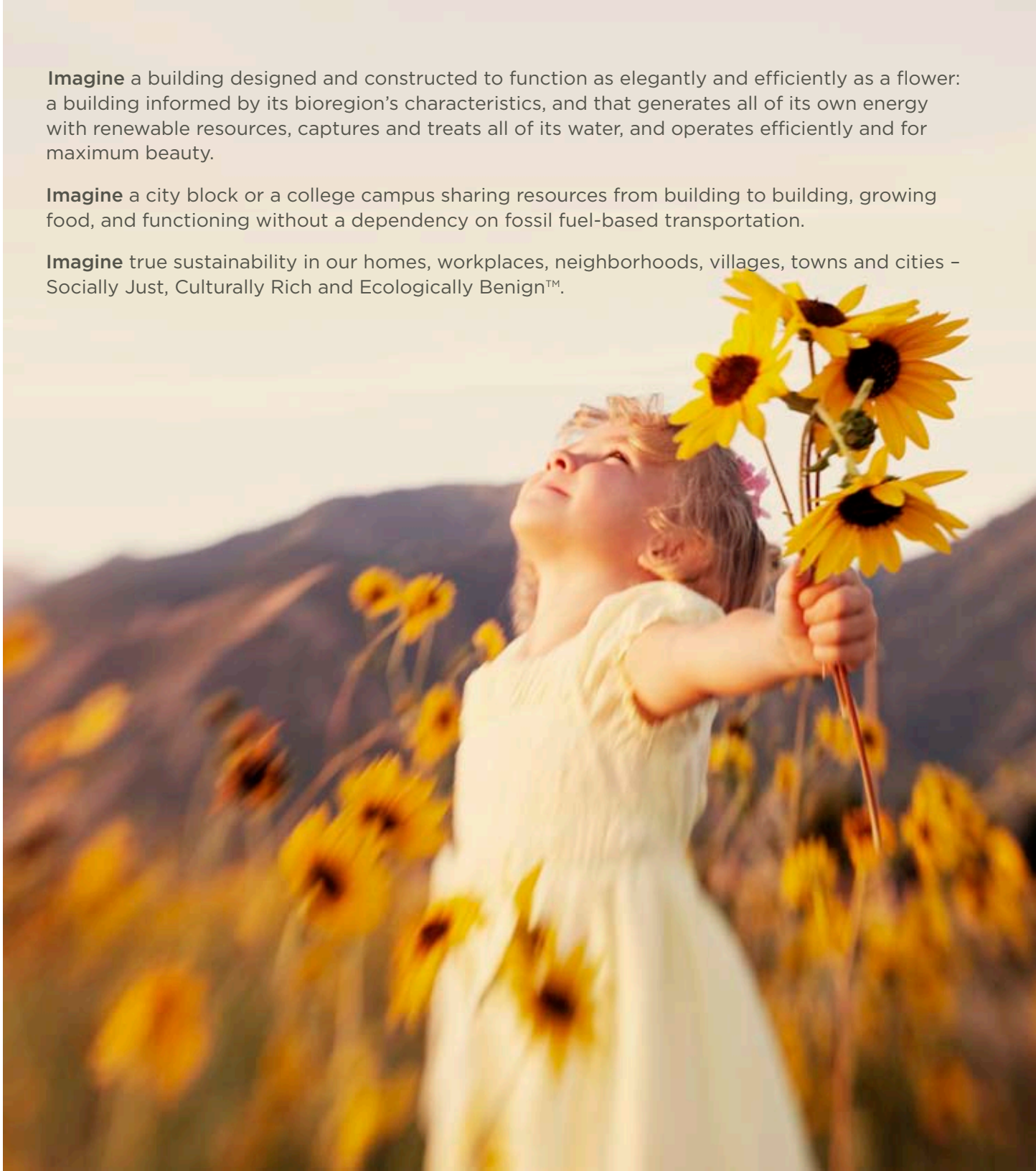
Living Building Challenge was originally conceived and authored by Jason F. McLennan prior to joining Cascadia. McLennan serves as the Principal Investigator overseeing the development of the standard and associated tools together with Eden Brukman, Vice President of the ILBI, and other Cascadia and ILBI staff. McLennan and Brukman jointly authored Living Building Challenge version 2.0, with significant input from practitioners throughout North America.

NOW IS THE RIGHT TIME FOR A WORLD OF LIVING BUILDINGS, SITES AND COMMUNITIES

Imagine a building designed and constructed to function as elegantly and efficiently as a flower: a building informed by its bioregion's characteristics, and that generates all of its own energy with renewable resources, captures and treats all of its water, and operates efficiently and for maximum beauty.

Imagine a city block or a college campus sharing resources from building to building, growing food, and functioning without a dependency on fossil fuel-based transportation.

Imagine true sustainability in our homes, workplaces, neighborhoods, villages, towns and cities – Socially Just, Culturally Rich and Ecologically Benign™.



2.0™

EMBRACE THE PSYCHOLOGY OF THE END GAME

The International Living Building Institute issues a challenge:

to all design professionals, contractors and building owners 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 to 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 built environment with the natural environment, into a civilization that creates greater biodiversity, resilience and opportunities for life with each adaptation and development.

TABLE OF CONTENTS

EXECUTIVE SUMMARY 5

HOW THE LIVING BUILDING CHALLENGE WORKS 7

WHAT IS DIFFERENT ABOUT VERSION 2.0? 11

SUMMARY MATRIX 13

PETALS

SITE 14
- Limits to Growth
- Urban Agriculture
- Habitat Exchange
- Car Free Living

WATER 19
- Net Zero Water
- Ecological Water Flow

ENERGY 22
- Net Zero Energy

HEALTH 24
- Civilized Environment
- Healthy Air
- Biophilia

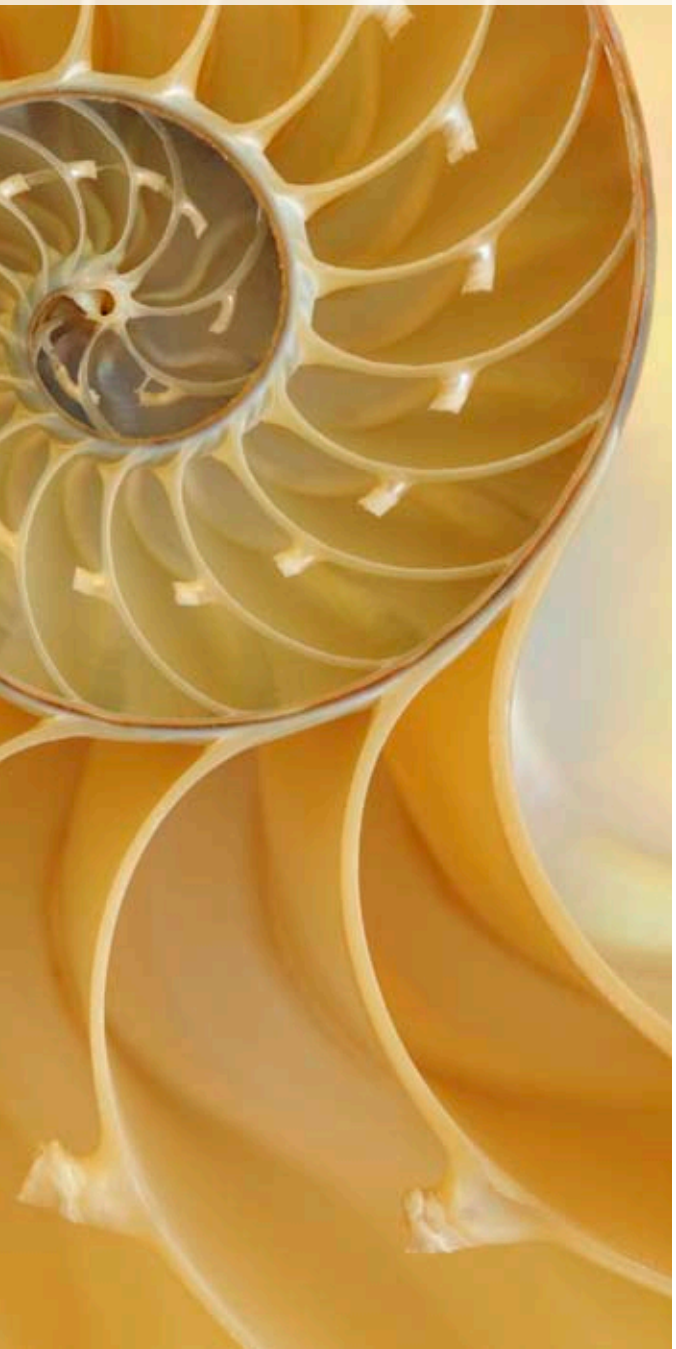
MATERIALS 28
- Red List
- Embodied Carbon Footprint
- Responsible Industry
- Appropriate Sourcing
- Conservation + Reuse

EQUITY 36
- Human Scale + Humane Places
- Democracy + Social Justice
- Rights to Nature

BEAUTY 40
- Beauty + Spirit
- Inspiration + Education

ADDITIONAL RESOURCES FOR DEEPER ENGAGEMENT 43

EXECUTIVE SUMMARY



TRANSFORMATIVE IMPACT ACROSS ALL SCALES OF DEVELOPMENT: FROM BUILDINGS TO SITES, NEIGHBORHOODS AND COMMUNITIES

The Living Building Challenge is attempting to raise the bar. It defines the most advanced measure of sustainability in the built environment possible today and acts to diminish the gap between current limits and ideal solutions. This certification program covers all building at all scales and is a unified tool for transformative design, allowing us to envision a future that is Socially Just, Culturally Rich and Ecologically Benign. Whether your project is a single building, a park, a college campus or even a complete neighborhood community, Living Building Challenge 2.0 provides a framework for design, construction and the symbiotic relationship between people and all aspects of the built environment. Indeed, "Living Building Challenge" is not a merely a noun that defines the character of a particular solution for development, but more relevant if classified as a series of verbs – calls for action that describe not only the 'building' of all of humanity's longest lasting artifacts, but also of the relationships and broader sense of community and connectivity they engender. It is a challenge to immerse ourselves in such a pursuit - and many refer to the ability to do so as a "paradigm shift".

Projects that achieve this level of performance can claim to be the 'greenest' anywhere, and will serve as role models for others that follow. Whether you consider your project to be restorative, regenerative or merely net zero impact, it has a home in the construct of the Living Building Challenge.

Although it may be difficult to simultaneously achieve all of the requirements of the Living Building Challenge, understanding the standard and documenting compliance is inherently easy: there are never more than twenty simple and profound Imperatives that must be met for any type of project, at any scale, in any location around the world. This program is decidedly not a checklist of best practices – all facets of the Living Building 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 Building Challenge is relegated to the genius of the design teams, who are expected to make informed decisions appropriate to the project and bioregion.

The Living Building Challenge is a cohesive standard – pulling together the most progressive thinking from the worlds of architecture, engineering, planning, landscape design and policy. It challenges us to ask the question: What if every single act of design and construction 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 food and 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.

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 less than 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 twenty years, "green building" has grown to become the most important and progressive trend in the building industry. There have been huge steps forward in the design, construction and operation of buildings, and yet 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 peak oil, peak water, world that is globally interconnected yet ecologically impoverished.

A world with seven billion people and counting.

A world where every single major ecological system is in decline and the rate of that decline is increasing.

A world where global temperature increases means shifting rainfall distributions, acidified oceans and potentially catastrophic sea-level rise.

Nothing less than a sea change in building, infrastructure and community design is required. Indeed, this focus needs to be the great work of our generation. We must remake our cities, towns, neighborhoods, homes and offices, and all the spaces and infrastructure in-between. This is part of the necessary process of reinventing our relationship with the natural world – reestablishing ourselves not separate from, but "part and parcel with, creation".[1]

Since it was launched in 2006, the Living Building Challenge has inspired and motivated rapid and significant change: dozens of projects have sprouted up all over North America and beyond; the regulatory environment has embraced a series of reforms, and most importantly, a new sense of what is possible has permeated design communities.

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. We invite you to join us, so that together we can begin on our path towards restoration and a sustainable Living Future.

1 To paraphrase Edward O. Wilson, two-time Pulitzer Prize winning author and scientist.

HOW THE LIVING BUILDING CHALLENGE WORKS

PROVEN PERFORMANCE RATHER THAN ANTICIPATED OUTCOMES

The Living Building Challenge is comprised of seven performance areas, or 'Petals': Site, Water, Energy, Health, 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 Typology, or project type[2], be it a building (both renovation of an existing structure[3], or new construction), infrastructure, landscape or community development. Naturally, strategies to create Living Buildings, Sites or Communities will vary widely by occupancy, use, construction type and location – this is necessary – but the fundamental considerations remain the same.

Two rules govern the standard:

1. All Imperatives assigned to a Typology are mandatory.
   Some Typologies have fewer than twenty Imperatives because the requirements are either not appropriate or applicable. Refer to the summary matrix on page 13 to view the list of Imperatives that must be met for your project type.

   Many of the Imperatives have temporary exceptions to acknowledge current market limitations. These are listed in the footnotes of each section. Exceptions will be modified or removed as the market changes. With this standard, the ILBI requires dialogue on the essential improvement of the building industry.

2. 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.

2 Refer to the User's Guide for a list of structures that may not seek certification due to occupancy types that are inherently in conflict with the overarching goals of the Living Building Challenge.

3 Specific modifications to the program requirements are listed in the User's Guide to recognize anticipated limitations of existing buildings.

The Living Building Challenge is versatile. There are four Typologies, and teams must identify the one that aligns with the project to determine which Imperatives apply[4]:

Renovation: This typology is for any project that does not form the substantial portion of a complete building reconstruction. Sample projects include single-floor tenant improvements, residential kitchen remodels or historic rehabilitations of a portion of a building.

Landscape or Infrastructure (non-conditioned development): This typology is for any project that does not include a physical structure as part of its primary program, although open-air 'park-like' structures, restrooms, amphitheatres and the like do fall into this category. Projects may be as diverse as roads, bridges, plazas, sports facilities or trails.

Building: This typology is for any project that encompasses the construction of a roofed and walled structure created for permanent use – either new or existing.

Neighborhood: This typology is for any project that contains multiple buildings[5] in a continuous campus, neighborhood, district or village. Sample projects include university, college or corporate campuses; residential streets; business or industrial districts; or small villages and towns.

To encourage proper development in specific settings, the standard draws on the work of Duany Plater-Zyberk & Company[6], who created the New Urbanism Transect model for rural to urban categorization. The Transect is a powerful basis for Planning, and demonstrates that different types of standards befit different development realities. The Living Transect, which applies to several Imperatives throughout the Living Building Challenge, is an adaptation of the original Transect concept; the significant modification herein is a reclassification of Transect zones T3 and T4 to increase density. The Challenge encourages the transition of suburban zones either to grow into new urban areas with greater density, or be dismantled and repurposed as new rural zones for food production, habitat and ecosystem services.

4 These are general descriptions. Refer to the User's Guide for a detailed portrayal of each Typology, including a complete definition of renovation projects as compared to whole Living Building designs.

5 To qualify as a Neighborhood project, there must be a concurrent development of at least four separate buildings by a minimum of three separate owners or six separate buildings by a single owner.

6 www.dpz.com

Every Landscape + Infrastructure, Building or Neighborhood project must select a Living Transect category from the following options:

L1. Natural Habitat Preserve (Greenfield sites): This is comprised of land that is set aside as a nature preserve or is defined as sensitive ecological habitat. It may not be developed except in limited circumstances related to the preservation or interpretation of the landscape as described in Imperative One: Limits to Growth.

L2. Rural Agriculture Zone: This is comprised of land with a primary function for agriculture and development that relates specifically to the production of food as described in Imperative One: Limits to Growth. Small towns and villages do not apply. (Floor Area Ratio ≤ 0.09)

L3. Village or Campus Zone: This is comprised of relatively low-density mixed-use development found in rural villages and towns, and may also include college or university campuses. (F.A.R. of 0.1 – 0.49)

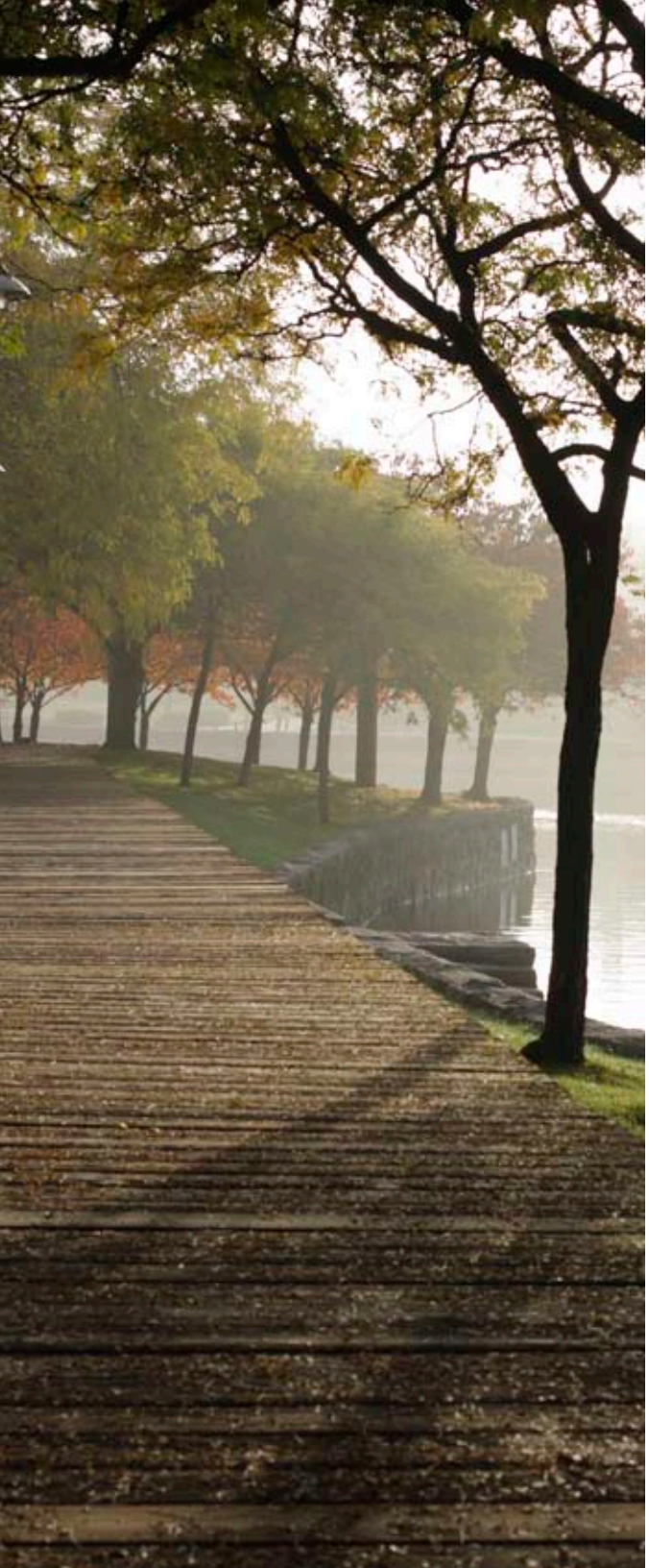
L4. General Urban Zone: This is comprised of light- to medium-density mixed-use development found in larger villages, small towns or at the edge of larger cities. (F.A.R. of 0.5 – 1.49)

L5. Urban Center Zone: This is comprised of a medium- to high-density mixed-use development found in small to mid-sized cities or in the first 'ring' of a larger city. (F.A.R. of 1.5 – 2.99)

L6. Urban Core Zone: This is comprised of high-to very high-density mixed use development found in large cities and metropolises. (F.A.R. ≥ 3.0)

Living Building Challenge projects have their own 'utility,' generating their own energy and processing their own waste. They more appropriately match scale to technology and end use, and result in greater self-sufficiency and security. Yet, the ideal scale for solutions is not always within a project's property boundary. Depending on the technology, the optimal scale can vary when considering environmental impact, first cost and operating costs. To address these realities, the Living Building Challenge has inserted the concept of Scale Jumping to allow multiple buildings or projects to operate in a cooperative state – sharing green infrastructure as appropriate and allowing for Living Building, Site or Community status to be achieved as elegantly and efficiently as possible. Refer to the summary matrix on page 13 to view all Imperatives that may employ the Scale Jumping mechanism.[7]

7 Refer to the User's Guide for more information on Scale Jumping.



SOME USEFUL GUIDING INFORMATION

- The internal logic of the Living Building Challenge is based on pragmatic experience with what has already been built in the marketplace.
- This standard is an evolving tool. Periodically, new releases that update or provide clarification for the Imperatives will be made available. Specific guidelines on how to document compliance and to seek Living Building certification is contained in the Living Building Challenge User's Guide, available to Community members via the ILBI website. Living Building Community membership is renewed annually. (Refer to page 43 for more information about the Community.)
- The Living Building Challenge does not dwell on basic best practice issues so it can instead focus on fewer, high level needs. It is assumed that to achieve this progressive standard, typical best practices are being met. The implementation of this standard requires leading-edge technical knowledge, an integrated design approach, and design and construction teams well versed in advanced practices related to 'green building'.
- Regional solutions are manifested in all Living Building Challenge projects due to a number of variables, including climate factors and building characteristics. For example, becoming water-independent in the desert demands "evolving" building design to be more like a cactus and less like a tree. Making a thirty-story building energy independent requires great investments in efficiency and in a building skin that fundamentally harnesses energy. All architecture and design will be richer because of this response to place.

WHAT IS DIFFERENT ABOUT VERSION 2.0?

Those already familiar with the previous iterations of the Living Building Challenge[8] will notice some significant changes in this document. We encourage you to thoroughly review this version of the standard and to revisit the greatly expanded and updated User's Guide. The following are substantive differences for you to note about Version 2.0:

1. All potential types of construction in the built environment are addressed, working across various scales of development and settings, from partial building renovations to entire structures, and from individual landscape and infrastructure projects to whole communities.

2. A new Petal category has been introduced – Equity – to incorporate issues of universal access and social justice for the first time in a building rating system.

3. The Indoor Quality Petal has been renamed: Health.

4. The classification 'Prerequisite' has been renamed, Imperative. Depending on the Typology of your project, there may be different requirements for the successful implementation of an Imperative. These distinctions are outlined in this document within the definition of each Imperative, and are further detailed in the User's Guide.

5. There are now twenty Imperatives. The new Imperatives are:

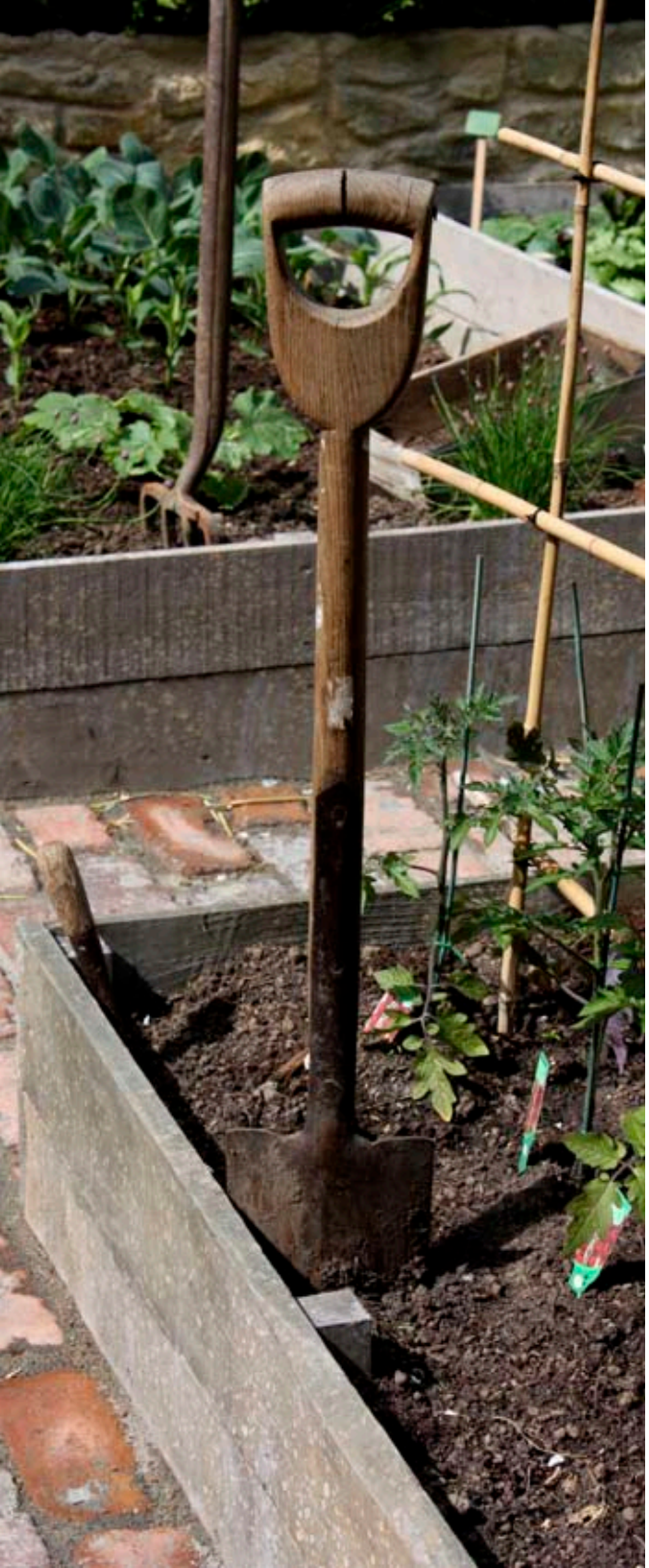
   Site Petal:
   - Urban Agriculture
   - Car Free Living

   Health Petal:
   - Biophilia

   Equity Petal:
   - Human Scale and Humane Places
   - Democracy and Social Justice
   - Rights to Nature

(continued)

8 Living Building Challenge versions 1.0, 1.1, 1.2, 1.3 were written to facilitate only the construction of buildings to meet the rigor of the standard.



6. Several existing Imperatives have been consolidated:
    - ‘Responsible Site Selection’ and ‘Limits to Growth’ have merged under the title: Limits to Growth.
    - ‘Healthy Air: Source Control’ and ‘Healthy Air: Ventilation’ have merged under the title: Healthy Air.

7. Several existing Imperatives have been renamed and their requirements expanded to more accurately define expectations:
    - was Sustainable Water Discharge; now Ecological Water Flow
    - was Construction Carbon Footprint; now Embodied Carbon Footprint
    - was Appropriate Materials/Services Radius; now Appropriate Sourcing
    - was Leadership in Construction Waste; now Conservation and Reuse

8. The order of the Petals has changed, and therefore the Imperatives have been renumbered. The new order reflects primary synergies between Petals: Site, Water, Energy, Health, Materials, Equity, Beauty.

Many of these changes are a reflection of compelling feedback and discussions with Living Building Challenge Community members and project teams pursuing certification. The program will continue to adapt and evolve over the ensuing years with the participation of our growing community of practitioners.

SUMMARY MATRIX

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

Imperative omitted from Typology

Scale Solutions beyond project footprint are permissible

	Limits to Growth	Urban Agriculture	Habitat Exchange	Car Free Living	Net Zero Water	Ecological Water Flow	Net Zero Energy	Civilized Environment	Healthy Air	Biophilia	Red List	Embodied Carbon Footprint	Responsible Industry	Appropriate Sourcing	Conservation + Reuse	Human Scale + Humane Places	Democracy + Social Justice	Rights to Nature	Beauty + Spirit	Inspiration + Education
Renovation			*Scale Jumping*		*Scale Jumping*		*Scale Jumping*													
Landscape + Infrastructure			*Scale Jumping*		*Scale Jumping*	*Scale Jumping*	*Scale Jumping*					*Scale Jumping*								
Building		*Scale Jumping*	*Scale Jumping*		*Scale Jumping*	*Scale Jumping*	*Scale Jumping*					*Scale Jumping*								
Neighborhood		*Scale Jumping*	*Scale Jumping*		*Scale Jumping*	*Scale Jumping*	*Scale Jumping*					*Scale Jumping*								
	Site				Water		Energy	Health			Materials					Equity			Beauty	

SITE

RESTORING A HEALTHY COEXISTENCE WITH NATURE

	Limits To Growth	Urban Agriculture	Habitat Exchange	Car Free Living
Renovation			Scale Jumping	
Landscape + Infrastructure				
Building		Scale Jumping		
Neighborhood				

PETAL INTENT

The intent of the Site Petal is to clearly articulate where it is acceptable for people to build, how to protect and restore a place once it has been developed, and to encourage the creation of communities that are once again based on the pedestrian rather than the automobile. Such communities should, in turn, be supported by local and regional agriculture, since no truly 'sustainable' community can exist that relies on globally-sourced food production.

The continued spread of sprawl development threatens the few wild places that remain and our capacity to feed ourselves responsibly, and the decentralized nature of our communities increases transportation impacts and pollution. As flat, prime land for construction diminishes, more and 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 development. Automobiles, often used as single occupancy vehicles, have become integral to our communities when we should be relying on "people power" – walking and bicycling – supplemented by shared transit as the primary mode of travel.

IDEAL CONDITIONS + CURRENT LIMITATIONS

The Living Building Challenge envisions a moratorium on the seemingly never-ending growth outward and a focus on compact, connected communities – inherently conserving the natural resources that support human health and the farmland that feed us. 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 frontier' and to value the virgin site more than the second-hand 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 value the many other creatures and beings that cohabit the earth with us.

01

LIMITS TO GROWTH

Projects may only be built on greyfields or brownfields – previously developed[9] sites that are not classified as any of the following:

On or adjacent to sensitive ecological habitats[10] such as:

- wetlands[11]: maintain at least 15 meters, and up to 70 meters[12] of separation
- primary dunes[13]: maintain at least 40 meters of separation
- old-growth forest[14]: maintain at least 60 meters of separation
- virgin prairie[15]: maintain at least 30 meters of separation
- prime farmland[16]
- within the 100-year flood plain[17]

Project teams must document conditions prior to the start of work. On-site landscape[18] may only include native and/or naturalized species planted in such a way that emulates density and biodiversity of indigenous ecosystems and supports succession[19].

9 Sites that qualify must have been altered from a greenfield prior to December 31, 2007. There is an exception for projects whose primary purpose is related to the protection or interpretation of the virgin land and for some greenfield sites surrounded by existing development. Refer to the User's Guide for more information.

10 Increased setbacks may be appropriate on specific sites. The following are minimum distances to property line boundaries. Refer to the Glossary in the User's Guide for the definition of Sensitive Ecological Habitats and other terms used herein.

11 There is an exception for projects whose primary purpose is related to wetland protection or interpretation and demonstrates that the site's ecological systems are not disturbed.

12 Minimum buffer widths vary, depending on the wetland classification. Refer to the User's Guide for more information.

13 There is an exception for projects whose primary purpose is related to primary dune protection or interpretation and demonstrates that the site's ecological systems are not disturbed.

14 There is an exception for projects whose primary purpose is related to old-growth forest protection or interpretation and demonstrates that the site's ecological systems are not disturbed.

15 There is an exception for projects whose primary purpose is related to virgin prairie protection or interpretation and demonstrates that the site's ecological systems are not disturbed.

16 There is an exception for projects whose primary purpose is related to farming or is a working farm/farmhouse.

17 There is an exception for working ports, docks and all Landscape and Infrastructure projects, as well as projects whose primary purpose is related to farming. There is also an exception for projects that are part of an existing historic community developed prior to 1945, or in neighborhoods that meet the density threshold of Transect L5 or L6.

18 In this context, "landscape" is considered to be planted area outside of the square footage of agricultural cover required per Imperative Three: Urban Agriculture.

19 Refer to the User's Guide to learn more about plant succession.

02

URBAN AGRICULTURE

All projects must integrate opportunities for agriculture[20] appropriate to the scale and density of the project using its Floor Area Ratio (F.A.R.) as the basis for calculation.[21]

This basic chart outlines mandatory agricultural allowances:

Transect	F.A.R.	Percent of Project Area[22] that must be used for Food Production
2	< 0.05[23]	80%
	0.05 ≤ 0.09	50%
3	0.10 ≤ 0.24	35%
	0.25 ≤ 0.49	30%
4	0.5 ≤ 0.74	25%
	0.75 ≤ 0.99	20%
	1.0 ≤ 1.49	15%
5	1.5 ≤ 1.99	10 %
	2.0 ≤ 2.99	5 %
6	> 3.0	No mandatory requirement

20 The User's Guide defines acceptable urban agriculture practices and the formula for determining how much square footage must be given over to agriculture. Specific agricultural strategies (e.g., crops, orchards and/or husbandry) should be determined by the project team based on the surrounding location, climate, and culture.

21 The density of a project is inversely related to the agriculture requirement. Refer to the User's Guide for more detailed information, including a strict interpretation of how to calculate the F.A.R. for your project and for acceptable agricultural uses on your site.

22 Project area is equal to the total site square meters. This figure should be uniformly applied to all Imperatives.

23 Projects with this F.A.R. are considered to be farm or ranchland. There is an exception for projects whose primary purpose is related to protection or interpretation of sensitive ecological habitats as defined in Imperative 01: Limits to Growth.

03

HABITAT EXCHANGE

For each hectare of development, an equal amount of land must be set-aside in perpetuity as part of a habitat exchange[24].

24 0.4 hectare is the minimum offset amount. Compliance path and acceptable habitat exchange programs are provided in the User's Guide.

04

CAR FREE LIVING

Each new project should contribute towards the creation of walkable, pedestrian-oriented communities.

Evaluate the potential for a project to enhance the ability of a community to support a car free lifestyle[25] based on the density and the proportion of the following occupancy types within a defined catchment area[26] surrounding the project site:

a. Residential
b. Commercial or institutional
c. Office or light-industrial

Pedestrian-oriented communities are optimized when all three are represented and not one is demonstrably dominant.

For Building and Neighborhood projects, the proposed development may not lower the density of the existing site or the catchment area of the Transect. For Neighborhood projects, the proposed development also may not cause the predominant occupancy type within the catchment area to exceed the maximum percentage allotted in the table below:

Transect	L3	L4	L5	L6
Maximum percentage of any single occupancy type[27] within catchment area	70%	60%	50%	40%

25 This is not the same as mandating the elimination of cars from the development. "Car free" is defined by the potential for a majority of people living in the neighborhood to have a productive and rich lifestyle without need of a car.

26 The catchment area is defined as the surroundings within a one km radius from the project site, taking into account natural and human-made barriers. Refer to the User's Guide for step-by-step instructions for the calculation.

27 The three distinct occupancy types to consider for this calculation include residential, commercial/institutional, and office/light-industrial development. Select only the predominant occupancy within the catchment area and estimate its overall F.A.R. to determine the contributing percentage.

WATER

CREATING WATER INDEPENDENT SITES, BUILDINGS AND COMMUNITIES

	Net Zero Water	Ecological Water Flow
Renovation	Scale Jumping	
Landscape + Infrastructure		Scale Jumping
Building		
Neighborhood		

PETAL INTENT

The intent of the Water Petal is to realign how people use water and 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 portent significant problems ahead.

IDEAL CONDITIONS AND CURRENT LIMITATIONS

The Living Building Challenge envisions a future whereby all buildings, infrastructure, and communities 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 it 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 by the undemocratic ownership of water rights, which 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 and efficient.

05

NET ZERO WATER[28]

One hundred percent of occupants' water use[29] must come from captured precipitation or closed loop water systems[30] that account for downstream ecosystem impacts and that are appropriately purified without the use of chemicals.

28 This Imperative may be attempted using the Scale Jumping design overlay, which endorses the implementation of solutions beyond the building scale that maximize ecological benefit while maintaining self-sufficiency at the city block, neighborhood, or community scale. For more information on Scale Jumping, refer to the User's Guide.

29 There is an exception for water that must be from potable sources due to local health regulations, including sinks, faucets and showers but excluding irrigation, toilet flushing, janitorial uses and equipment uses. However, due diligence to comply with this Imperative must be demonstrated by filing an appeal(s) with the appropriate agency (or agencies).

30 An exception is made for an initial water purchase to get cisterns topped off. A Living Building only buys water once.

06

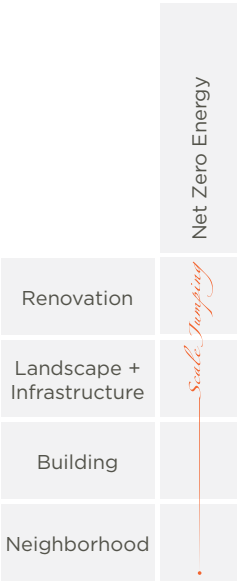
ECOLOGICAL WATER FLOW

One hundred percent of storm water and building water discharge must be managed onsite to feed the project's internal water demands or released onto adjacent sites for management through acceptable natural time-scale surface flow, groundwater recharge, agricultural use or adjacent building needs.[31]

31 Acceptable onsite storm water management practices are defined in the User's Guide. Municipal storm sewer solutions do not qualify. For Building projects that have a F.A.R. equal to or greater than 1.5 in Transects L5 or L6, a conditional exception may apply, which allows some water to leave the site at a reduced rate and depends on site and soil conditions and the surrounding development context. Greater flexibility is given to projects with higher densities. Refer to the User's Guide for more detailed information.

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 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 unsustainable 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. 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, founded on renewable energy that supplies incredibly efficient buildings and infrastructure without the crutch of combustion in the process.

Although there has been considerable progress made to advance renewable energy technologies, there is still a need for a greater yield from these systems and new 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.

07

NET ZERO ENERGY[32]

One hundred percent of the project's energy needs[33] must be supplied by on-site renewable energy[34] on a net annual basis.

32 This Imperative may be attempted using the Scale Jumping design overlay, which endorses the implementation of solutions beyond the building scale that maximize ecological benefit while maintaining self-sufficiency at the city block, neighborhood, or community scale. For more information on Scale Jumping, refer to the User's Guide.

33 This must include all electricity, heating and cooling requirements. Back-up generators are excluded. System may be grid-tied or off the grid.

34 Renewable energy is defined as photovoltaics, 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. No combustion of any kind is allowed.

HEALTH

MAXIMIZING PHYSICAL AND PSYCHOLOGICAL HEALTH AND WELL BEING

	Civilized Environment	Healthy Air	Biophilia
Renovation			
Landscape + Infrastructure			
Building			
Neighborhood			

PETAL INTENT

The intent of the Health Petal is to focus on the major 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. Most buildings provide substandard conditions for health and productivity. There is a direct correlation between decreased comfort and increased environmental impacts, since solutions in the physical environment to improve well-being are often energy-intensive and wasteful.

IDEAL CONDITIONS AND CURRENT LIMITATIONS

The Living Building Challenge envisions a nourishing, highly productive and healthful indoor environment.

However, even best laid plans require acceptance and engagement by the building occupant and building owner. It is difficult to ensure that places will remain vibrant over time, since sensory aspects 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 a building.

08

CIVILIZED ENVIRONMENT

Every occupiable space must have operable windows[35] that provide access to fresh air and daylight[36].

35 There are exceptions for spaces where the absence of daylight is critical to the performance of the space (such as a theatre) or where operable windows could pose a health risk (such as laboratory spaces with fume hoods where air flow could be compromised). A list of exempt spaces is in the User's Guide.

36 Minimum requirements for window sizes and placement relative to interior spaces and program are defined in the User's Guide. Maximum distances between an operable window and occupant are also described.

09

HEALTHY AIR

To promote good indoor air quality, Renovations, Buildings, and buildings completed as part of Neighborhood projects must meet the following criteria:

- Entryways must have an external dirt track-in system and an internal dirt track-in system contained within a separate entry space.[37]
- All kitchens, bathrooms, copy rooms, janitorial closets and chemical storage spaces must be separately ventilated and exhaust directly to outside air.
- Ventilation rates must be designed to comply with ASHRAE 62.1-2007 and equipment must be installed to monitor levels of carbon dioxide (CO_2), temperature and humidity.
- Smoking must be prohibited within the project boundary.

Conduct air quality testing[38] at pre-occupancy and after nine months of occupancy to measure levels of Respirable Suspended Particulates (RSP) and Total Volatile Organic Compounds (TVOC).

37 Acceptable Dirt track in systems are defined in the User's Guide.

38 Monitoring is required to provide occupants opportunities for improving indoor air quality over time. Maximum thresholds will not be used to test compliance with the Living Building Challenge, but are listed in the User's Guide for reference. A minimum of one test is required for each separate HVAC system installed.

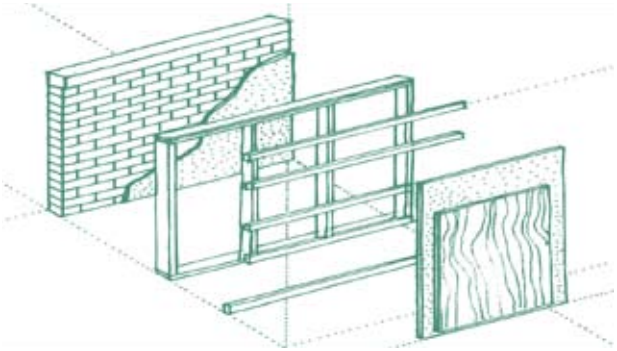
10

BIOPHILIA

The project must be designed to include elements that nurture the innate human attraction to natural systems and processes. Each of the six established Biophilic Design Elements[39] must be represented for every 2,000 m^2 of the project:

- Environmental features
- Natural shapes and forms
- Natural patterns and processes
- Light and space
- Place-based relationships
- Evolved human-nature relationships

39 These attributes of Biophilic design are defined and described in Biophilic Design: The Theory, Science and Practice of Bringing Buildings to Life by Stephen R. Kellert, Judith Heerwagen, and Martin Mador. Other than for Imperative 19: Beauty + Spirit, design attributes that are expressly required elsewhere in the Living Building Challenge may not be used to satisfy this Imperative. Refer to the User's Guide for additional information.



MATERIALS

ENDORSING PRODUCTS AND PROCESSES THAT ARE SAFE FOR ALL SPECIES THROUGH TIME

	Red List	Embodied Carbon Footprint	Responsible Industry	Appropriate Sourcing	Conservation + Reuse
Renovation					
Landscape + Infrastructure					
Building					
Neighborhood					

Scale Temporal

PETAL INTENT

The intent of the Materials Petal is to induce a successful materials economy that is non-toxic, transparent and socially equitable. Throughout their lifecycle, materials are responsible for many adverse environmental issues including illness, squandered embodied energy, pollution, and resource depletion. The Imperatives in this section aim to remove the worst known offending materials and practices. 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. 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.

IDEAL CONDITIONS AND CURRENT LIMITATIONS

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

There are significant limitations to achieving the ideal for the materials realm. The biggest shortcoming is due to the market itself. While there is a huge number of "green" products for sale, there is also a shortage of good data that really 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 continue to make proprietary claims.

Product specification and purchase has far-reaching impacts, and consumers are starting to weigh these in parallel with other more conventional attributes, such as aesthetics, function and cost. The ILBI recognizes the Pharos Project[40] protocol developed by the Healthy Building Network as the best framework for evaluating materials and the most progressive tool for consumer benefit.

40 www.PharosProject.net

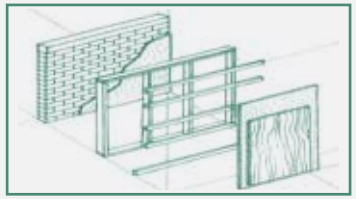
11

RED LIST[41]

The project cannot contain any of the following Red List materials or chemicals[42].

- Asbestos
- Cadmium
- Chlorinated Polyethylene and Chlorosulfonated Polyethlene[43]
- Chlorofluorocarbons (CFCs)
- Chloroprene (Neoprene)
- Formaldehyde (added)
- Halogenated Flame Retardants[44]
- Hydrochlorofluorocarbons (HCFCs)
- Lead (added)
- Mercury
- Petrochemical Fertilizers and Pesticides[45]
- Phthalates
- Polyvinyl Chloride (PVC)
- Wood treatments containing Creosote, Arsenic or Pentachlorophenol

There are temporary exceptions for numerous Red List items due to current limitations in the materials economy. Refer to the Living Building Community Dialogue for complete and up-to-date listings.



41 This list is composed of materials that we believe should be phased out of production due to health/toxicity concerns and will be updated as new science emerges.

42 Due to manifold manufacturing processes, there is a Small Component exception for complex products made from more than ten constituent parts. A small component is discrete and contained in its form as introduced into the product's assembly, and must be less than ten percent of a product by both weight and volume.

It is acceptable to jump one Zone, as defined in Imperative 14: Appropriate Sourcing, if compliant materials or products are not procurable within apportioned Zones. Once a compliant product is available within the Zone as originally designated in this standard, the exception will be removed.

Each exception request must be submitted in writing with explanation. Final documentation for granted exceptions must be accompanied by a copy of a letter sent to the manufacturer stipulating that the product purchase does not constitute an endorsement, together with a statement that requests that the company stops using the Red List material/chemical. Letters to the manufacturer are required for all exceptions, including those listed in the Standard and User's Guide. Sample letter templates are posted online in the Living Building Community. Refer to the User's Guide for more information.

43 HDPE and LDPE are excluded.

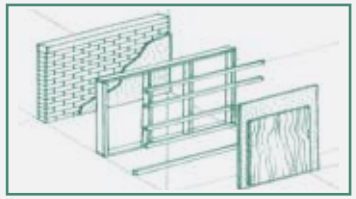
44 Halogenated flame retardants include PBDE, TBBPA, HBCD, Deca-BDE, TCPP, TCEP, Dechlorane Plus and other retardants with bromine or chlorine..

45 To attain Living Building status, petrochemical fertilizers and pesticides may not be used for the duration of the certification period or be needed for subsequent operations and maintenance.

12

EMBODIED CARBON FOOTPRINT

The project must account for the total footprint of embodied carbon (tCO_2e) from its construction and projected replacement parts through a one-time carbon offset tied to the project boundary.[46]



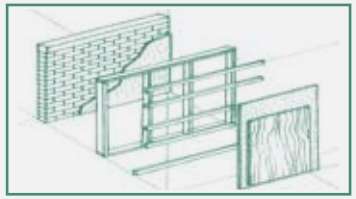
46 Registered projects receive access to a carbon calculator to determine offset requirements. Superstructure and interior components of floors, walls and ceilings are included in the calculation of projected replacement parts based on a 100-year life expectancy of the building. The amount of carbon offsets required may be reduced by 50 percent for renovations of existing buildings. Refer to the User's Guide for more information.

13

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, and timber.[47]

For timber, all wood must be certified by the Forest Stewardship Council (FSC)[48], from salvaged sources, or from the intentional harvest of timber onsite for the purpose of clearing the area for construction[49].



47 Subsequent iterations of this standard will include listed regulations for other industries as they become available. All regulations referenced must be from independent third party organizations and not funded by the industries themselves. For industries that do not yet have standards in place, documentation must be accompanied by a copy of a letter sent to the corresponding national trade association and ASTM International encouraging the development and enforcement of such criteria. Only one letter per industry sector is required by project team. Sample letter templates are posted online in the Living Building Community. Refer to the User's Guide for more information.

48 An exception is made for wood in situ in existing buildings undergoing renovation.

49 It is acceptable to jump one Zone, as defined in Imperative 14: Appropriate Sourcing, if compliant materials or products are not procurable within apportioned Zones. Once a compliant product is available within the Zone as originally designated in this standard, the exception will be removed. Refer to the User's Guide for more information.

14

APPROPRIATE SOURCING

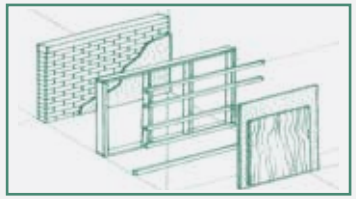
The project must incorporate place-based solutions and contribute to the expansion of a regional economy rooted in sustainable practices, products and services.[50]

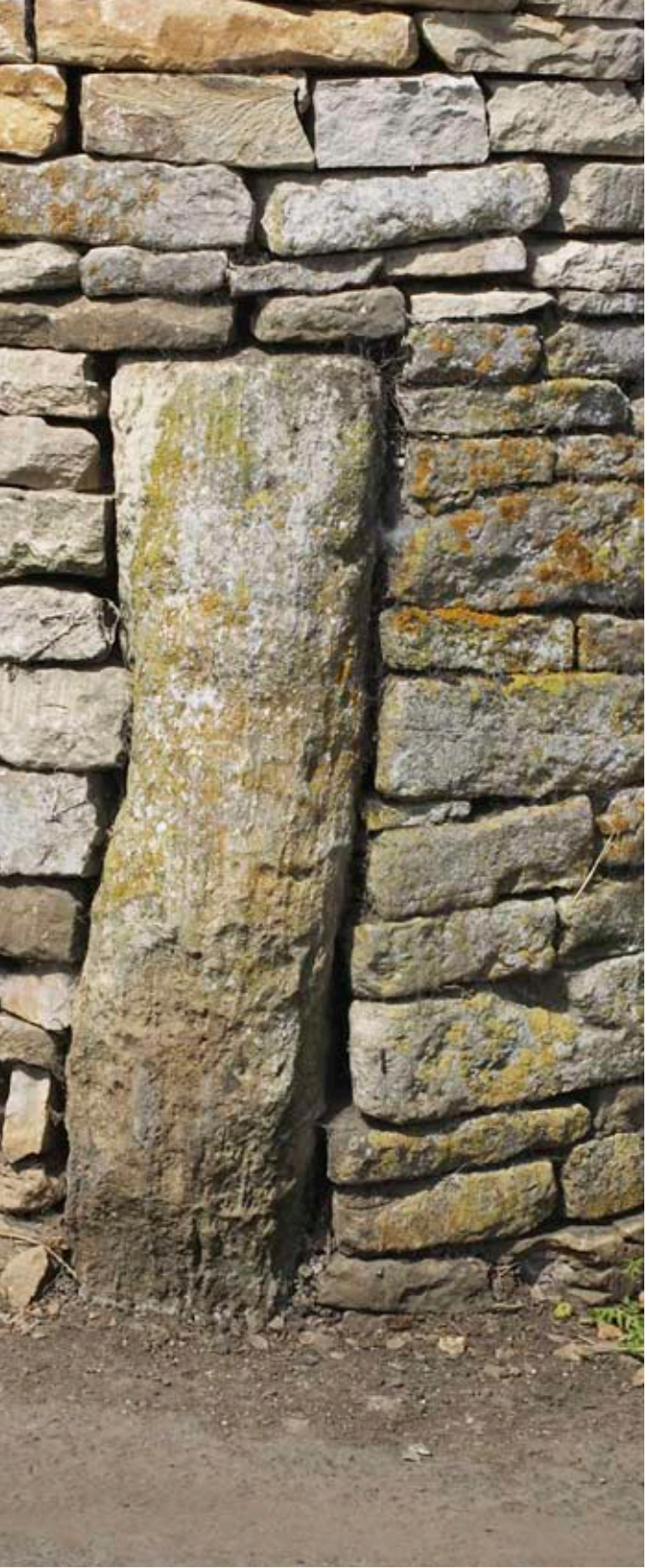
Source locations for materials and services must adhere to the following restrictions[51]:

Zone	Max. Distance	Materials or Services	MasterFormat 2004 Classification[52]
7	20,004 km	Ideas	-
6	15,000 km	Renewable Technologies[53]	Divisions: 42[54], 48
5	5,000 km	Assemblies that actively contribute to building performance[55] and adaptable reuse once installed	Divisions: 08 (all exterior products), 11*, 14*, 22[56], 23*, 26, 33*, 44* Sections: 07 50 00*, 10 21 23*, 10 22 00*, 10 70 00*, 44 40 00*
4	2,500 km	Consultant Travel[57]	-
3[58]	2,000 km	Light or low-density materials	Sections: 07 31 00, 07 33 00[59], 07 40 00, 09 50 00, 09 60 00
2	1,000 km	Medium weight and density materials	Divisions: 06[60], 08 (all interior products) Sections: 07 32 00, 09 20 00, 09 30 00, 12 30 00
1	500 km	Heavy or high-density materials	Divisions: 03, 04, 05*[61], 31[62], 32[63]

* Zone designation refers to the location of the manufacturing facility only; raw material sourcing is not tracked.

(continued)





Footnotes for Appropriate Sourcing

50 Responsible materials specification and project team member selection also further reduces the impacts associated with Imperative 12: Embodied Carbon Footprint, building resilience toward a viable economy in a post-peak oil age.

51 There is a variance for remote locations, such as Alaska, Hawaii and Yukon that expands the Zone radius as follows: Zone 1 = 2,000 km; Zones 2 and 4 = 5,000 km; Zones 3 and 5 = 8,000 km. A temporary exception is made for specialty consultants, who may travel up to 8,000 km.

For all other project locations, it is also acceptable to jump one Zone to comply with either Imperative 11 or 13 if compliant materials or products are not procurable within apportioned Zones. Once a compliant product is available within the Zone as originally designated in this standard, the exception will be removed. Refer to the User's Guide for more information.

The use of salvaged materials is encouraged to acknowledge the considerable value of a material's embodied energy. When procuring salvaged materials, teams are allowed to expand the Zone radius as follows: Zone 1 = 1,500 km; Zone 2 = 2,000 km; Zone 3 = 2,500 km.

52 MasterFormat Divisions that are not listed do not need to be tracked. If only select sections are listed, then only these aspects of the Division need to be tracked. Assemblies classified under Division 13 are not tracked directly – products used as a result of specification in this Division that correlate primarily with other MasterFormat Divisions should be sourced accordingly.

53 Renewable energy technologies are defined as wind, solar thermal, photovoltaic or fuel cell – also see footnote 34.

54 Appropriate sourcing only applies to solar equipment specified under Division 42. Other products that are classified in this Division do not need to be tracked.

55 Assemblies include products that contribute to the successful attainment of the Energy and Water Petals over time, such as high performance windows, mechanical equipment and decentralized water systems. Refer to the User's Guide for a complete listing and rationale of this Zone distinction.

56 For plumbing equipment specified in Division 22, Zone designation refers to the location of the manufacturing location only; raw material sourcing is not tracked.

57 This Zone designation applies only to major project team members including the general contractor, architect of record, mechanical, electrical, plumbing and structural engineers of record. A temporary exception is made for specialty consultants and subcontractors, who may travel up to 5,000 km.

58 The radius distinction for Zones 2 and 3 are two-fold: first, the manufacturer must be within the set Zone from the site; and second, the raw materials must be sourced from within the same set Zone from the manufacturer location.

59 The plant component of Natural Roof Covering specified in Section 07 33 00 must be sourced within the Zone 1 distance.

60 For plastic products specified in Division 06, Zone designation refers to the location of the manufacturing location only; raw material sourcing is not tracked.

61 Products that are classified under the following sections of Division 05 may be sourced within the Zone 2 distance: Metal Fabrications (05 50 00) and Decorative Metals (05 70 00).

62 Products that are classified under the following sections of Division 31 may be sourced within the Zone 5 distance: Erosion and Sedimentation Controls (31 25 00) and Slope Protection (31 35 00).

63 Products that are classified under the following sections of Division 32 may be sourced within the Zone 5 distance: Irrigation (32 80 00)

15

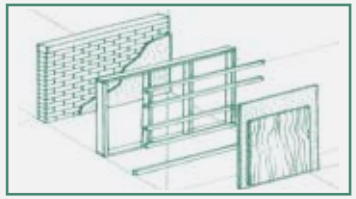
CONSERVATION + REUSE

All projects teams must strive to reduce or eliminate the production of waste during design, construction, operation, and end of life in order to conserve natural resources. All projects must comply with the following:

Project teams must create a material conservation management plan[64] that explains how the project optimizes materials in each of the following phases:

- Design Phase[65], 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.

(continued)



64 Refer to the User's Guide for examples of acceptable material conservation management plans.

65 Projects using sites with existing infrastructure must complete a "pre-building audit" that inventories available materials and assemblies for reuse or donation.

During construction, teams must divert wasted material from landfills[66] to the following levels:

Material	Minimum Diverted/Weight[67]
Metals	95%
Paper and Cardboard	95%
Soil, and biomass	100%
Rigid Foam, carpet & insulation	90%
All others - combined weighted average[68]	80%

Hazardous materials in demolition waste, such as lead-based paint, asbestos, and polychlorinated biphenyls (PCBs), are exempt from percentage calculations.

For all Typologies, there must be dedicated infrastructure for the collection of recyclables[69] and compostable food scraps. For Neighborhood projects, there must be onsite compost facilities to accommodate all food scraps.

66 Diverted waste includes those that are recycled, reused, salvaged or composted. Incineration or allocation as "alternative daily cover" is not permitted.

67 Although project teams are expected to make every effort to avoid landfill deposits, there is a temporary exception for meeting this level of diversion in jurisdictions where municipalities do not have systems in place to collect all listed construction materials. Final documentation must be accompanied by a copy of a letter sent to the Authority Having Jurisdiction stipulating that these basic public systems should be created. Sample letter templates are posted in the Living Building Community. Refer to the User's Guide for more information.

68 The allowed combined weighted average for the following list of materials accounts for the lack of diversion markets in certain jurisdictions: asphalt; concrete and concrete masonry units (CMUs); brick, tile and masonry materials; untreated lumber; plywood, oriented strand board (OSB) and particle board; gypsum wallboard scrap; glass; plumbing fixtures; windows; doors; cabinets; architectural fixtures; millwork, paneling and similar; electric fixtures, motors, switch gear and similar HVAC equipment; duct work; control systems; and switches.

69 There is a temporary exception in jurisdictions where municipalities do not have systems in place to collect all listed recyclables. Final documentation must be accompanied by a copy of a letter sent to the Authority Having Jurisdiction stipulating that these basic public systems should be created. Sample letter templates are posted in the Living Building Community. Refer to the User's Guide for more information.

EQUITY

SUPPORTING A JUST, EQUITABLE WORLD

	Human Scale + Humane Places	Democracy + Social Justice	Rights to Nature
Renovation			
Landscape + Infrastructure			
Building			
Neighborhood			

PETAL INTENT

The intent of the Equity Petal is to correlate the impacts of design and development to its ability to foster a true sense of community. A society that embraces all sectors of humanity and allows the dignity of equal access is a civilization in the best position to make decisions that protect and restore the natural environment.

There is a disturbing trend towards 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 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.

IDEAL CONDITIONS AND CURRENT LIMITATIONS

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

Current limitations of reaching this ideal stem primarily from ingrained cultural attitudes about the rights associated with private ownership. 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 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.

16

HUMAN SCALE + HUMANE PLACES

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[70] for paved areas, street and block design, building scale and signage that contribute to livable places.

70 The Building typology includes a maximum single-family residence size of 425 square meters (4,575 square feet). Due to the range project types encapsulated in civic and infrastructure design, refer to the User's Guide for detailed guidelines for typologies in all Transects.

17

DEMOCRACY + SOCIAL JUSTICE

All primary transportation, roads and non-building infrastructure[71] that are considered externally focused[72] must be equally accessible[73] 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 all projects types located in Transect L3-L6, street furniture (such as benches) must be provided for and accessible to all members of society. For the Neighborhood typology, a minimum of fifteen percent of housing units must meet an affordable housing standard. Provisions must be in place for these units to remain affordable through time.[74]

Access for those with physical disabilities must be safeguarded through designs meeting the Americans with Disabilities Act (ADA).[75]

71 A complete list of applicable infrastructure is in the User's Guide. Internal infrastructure, such as courtyards, is not included.

72 Roads, street, alleys and major pathways between buildings need to be accessible to the public. No gated communities or restricted access campuses are permitted.

73 There is an exception for instances wherein such access would seriously threaten the security of the public directly or indirectly.

74 Refer to the User's Guide for more detailed information about Transect requirements.

75 The ADA shall be considered the minimum design compliance path for infrastructure and public buildings both in the United States and in other countries. The Renovation typology does not have to meet this requirement if the project is private in nature or if it can be shown that compliance would damage the historical character of the building. Complete ADA Accessibility Guidelines (ADAAG) are available online: www.access-board.gov/adaag/about

18

RIGHTS TO NATURE

The project may not block access to, nor diminish the quality of, fresh air[76], sunlight and natural waterways for any member of society or adjacent developments[77].

Fresh Air: The project must be designed to protect adjacent properties[78] from any noxious emissions that would compromise its ability to use natural ventilation. All operational emissions must be free of Red List chemicals[79], persistent bioaccumulative toxicants, and known or suspect carcinogenic, mutagenic and reprotoxic chemicals[80].

Sunlight: The project may not block sunlight to adjacent building façades[81] and rooftops such that they are shaded above the maximum height allotted in the table below:

Transect	L2-L4	L5	L6
Maximum shade height on adjacent façade, measured on Winter Solstice between 10 am - 2 pm (meters)	6 m	10 m	15 m

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. This corresponds to a neighboring building that is at least two stories in L2-L3; three stories in L4; five stories in L5; and ten stories in L6.

Natural Waterways (such as ocean shoreline, rivers, lakes, wetlands, ponds, and creeks): The project may not restrict access[82] 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.[83] No project may assume ownership of water contained in these bodies or compromise the quality or quantity that flows downstream.

If a project's boundary is more than sixty meters long parallel to the edge of the waterway, the project must incorporate and maintain an access path to the waterway from the most convenient public right-of-way. The pathway must be at least three meters wide and allow entry to both pedestrians and bicyclists.

76 External acoustics or sources of noise are considered as part of the access to air requirement.

77 As noted in Imperative 08: Healthy Air, 'adjacent properties' are defined as any and all sites that share a property line with the project.

78 Adjacent properties' are defined as any and all sites that share a property line with the project.

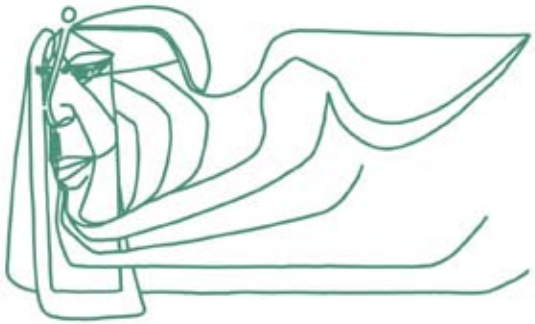
79 Refer to Imperative 11: Red List, in the Materials Petal, for a list of applicable materials and chemicals.

80 Refer to the Pharos Project Chemical And Material Library for more information about these hazardous chemicals.

81 For projects located in Transect L4-L6, refer to the User's Guide for instruction when there is no other building immediately adjacent to the proposed development.

82 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.

83 For example, a working dock or marina might need to restrict shoreline access for safety reasons. A private residence may not.



BEAUTY

CELEBRATING DESIGN THAT CREATES TRANSFORMATIVE CHANGE

	Beauty + Spirit	Inspiration + Education
Renovation		
Landscape + Infrastructure		
Building		
Neighborhood		

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

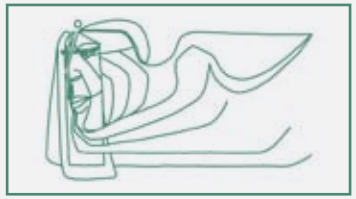
The Living Building Challenge envisions designs that elevate our spirits. Mandating beauty is, by definition, an impossible task. And yet, the level of discussion and, ultimately, the results are elevated through attempting difficult but critical tasks. In this Petal, the Imperatives are based merely on genuine efforts. 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 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.

19

BEAUTY + SPIRIT

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



20

INSPIRATION + EDUCATION

Educational materials about the performance and operation of the project must be provided to the public[84] to share successful solutions and to motivate others to make change. Non-sensitive areas of Building, Landscape + Infrastructure and Neighborhood projects must be open to the public at least one day per year to facilitate direct contact with the Living Building Challenge.

84 Sample educational materials tailored to building occupancy and project type are provided in the User's Guide.

ADDITIONAL RESOURCES FOR DEEPER ENGAGEMENT

The International Living Building Institute is continually working to create tools and resources to advance the understanding and implementation of the principles of the Living Building Challenge, and we want to ensure that all enthusiasts are aware of the various ways to learn more about and to participate in the evolution of the program.

This section lists several auxiliary offerings created by the ILBI that expand the role of the Living Building Challenge beyond a framework for development, to also be an overlay for education, outreach and advocacy, and an informal influence through continued conversations and networking.

THE LIVING BUILDING COMMUNITY: WWW.ILBI.ORG

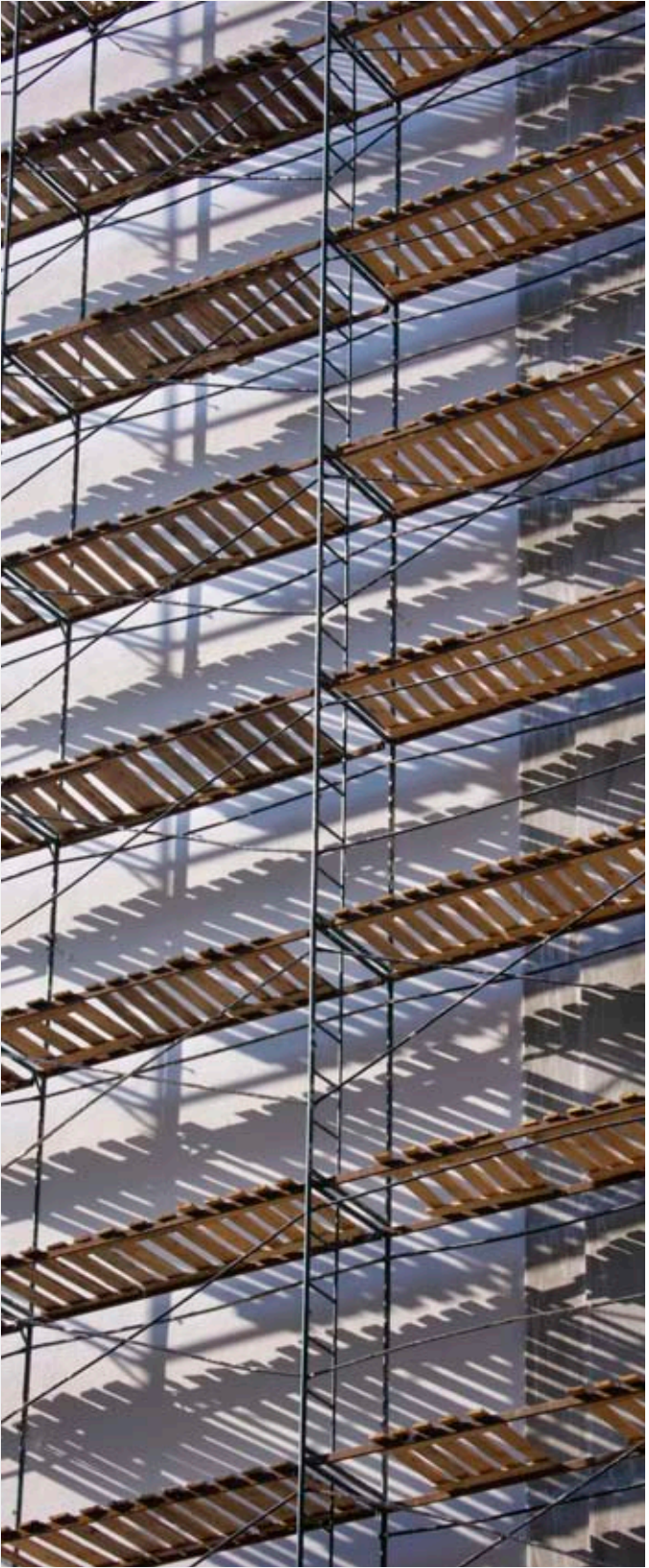
The online presence for the Living Building Challenge, the Community is the 'go-to' site for all key resources for the program. In addition to housing the current and previous published standards and the User's Guide, other documents such as studies, articles about projects pursuing the Challenge, project team generated support information, and additional collaborative tools are also available. Some areas of the website are accessible solely to Community members, and subscriptions are available for an annual fee. We strongly recommend individuals and organizations join the Community even if you are not yet directly incorporating the Living Building Challenge into your work, since the resources and professional connections are invaluable for all projects. Key features of the Community website include the following:

How to register a project

Registration is the first step toward Living Building Challenge certification and is accessible to Community members. Only registered projects are eligible for direct feedback from the ILBI. Project teams may apply for individual Petal designation by satisfying the requirements within a single category, or for Living Renovation, Building, Landscape, Infrastructure or Neighborhood status by attaining all requirements assigned to a Typology. Though documentation of compliance with Imperatives may be submitted throughout the process, verification of claims via onsite audit takes place only after a project is fully completed and operational for at least twelve consecutive months. Visit the Community for further details about the registration and certification process.

How to meet the Living Building Challenge: the User's Guide

The companion guide to this document, The Living Building Challenge User's Guide provides technical information and support to Community members. Throughout the standard, you will find references to the User's Guide as the source for added detail. In-depth commentaries, compliance paths and documentation requirements are also located in the User's Guide. It, too, is a burgeoning component of the Living Building Challenge, so members are encouraged to visit the website regularly as the User's Guide evolves.



How to seek clarifications: the 'Dialogue'

Ultimately, the success of the Living Building Challenge will rely on the active engagement of project teams and creative input from knowledgeable individuals. The Dialogue section was created to support specific requests for clarification and channel feedback and constructive criticism about the standard. Using the seven Petals of the Living Building Challenge to instigate conversations, this forum yields modifications to future releases of the standard itself and also serves as a platform for distributing strategies for success.

How to connect with others: the 'Pow Wow'

An informal counterpart to the Dialogue, the Pow Wow is a forum where all Community members can share program-related thoughts and musings, start open-ended conversations and ask questions of peers. It also provides an opportunity for all enthusiasts to get to know one another in an online environment.

How to share information: the 'Brain Trust'

The Brain Trust is intended to be a key starting point for increased cooperation and communication across disciplines to generate Inter-organizational Collaboration. The building industry and all its sectors must transcend beyond the typical constraints imposed by traditional competition and 'trade secrets', and find ways to educate each other, train each other, and push each other. Indeed, more important than any single project is the spirit of helping a network of projects achieve the high threshold for performance set by the Living Building Challenge.

Members of the Community can share design strategies, tools, and research inspired by the Living Building Challenge in this repository, organized by the contributor category (Student, Professional, ILBI Staff) and cross-referenced to the corresponding Petals.

LIVING BUILDING LEADER – TRAINING THE NEXT GENERATION OF EXCEPTIONAL PRACTITIONERS

A series of online sessions taught by experts in the diverse fields that underpin the multidisciplinary effort that is green building, the goal of the Living Building Leader program is to cultivate thought and action leaders to help shepherd in a new era where humanity works in concert with the natural environment. Individuals can choose to take select courses within a Petal category as interest dictates, or seek Living Building Leader designation by completing all required coursework and sitting the exam. More information about this program can be found in the Education section of the ILBI website or directly at www.livingbuildingleader.org.

AMBASSADOR PROGRAM – SPREADING THE WORD ABOUT LIVING BUILDING CHALLENGE

The ILBI is training a network of Advocates and Ambassadors, volunteers who will motivate a global audience to implement the restorative design principles outlined in the Living Building Challenge. Depending upon your interests and qualifications, you may serve as an Advocate or an Ambassador. Both roles are integral to the success of the program. Advocates use one-on-one networking opportunities to increase awareness of the Challenge and organize regular meetings for local Living Building Challenge Collaborative. Ambassadors give skilled presentations about the specifics of the Living Building Challenge to interested parties throughout their region. More information about the Ambassador program and the online application are available in the Education section of the ILBI website.

RESEARCH

The International Living Building Institute and its prime collaborator, the Cascadia Region Building Council, have jointly launched multiple research efforts to further the adoption and understanding of the Living Building Challenge throughout North America and beyond. Each year the ILBI and Cascadia will publish new findings and will either post this information in the public Resources section of the ILBI website or in the Community Brain Trust.

In 2009, we published a groundbreaking study that explores the financial implications – both first cost premiums and paybacks – of creating Living Buildings, including nine different building types in each of four distinct climate zones. The remarkable results encourage the immediate uptake of the Living Building Challenge.

In addition, we authored several reports that not only identify regulatory barriers and hurdles to adopting the Living Building Challenge, but also present short- and long-term strategies for removing obstacles in codes and building standards. Because each study has a distinct focus within this larger topic, together they act as a powerful suite of references to help prospective project teams pursue true sustainability in the built environment.

We encourage you to download and review each of these documents.

The International Living Building Institute will continue to initiate new research and partner with like-minded organizations. The following are a few of the interest areas we plan to tackle next:

- Humane Places: defining the ideal scale for utility infrastructure based on environmental impacts and long-term costs
- Living Building Financial Study, continued: determining cost differentials for Living Neighborhood projects, both community- and district-scale
- Material Conservation and Reuse: maximizing the opportunities for adaptive reuse and salvaged goods
- Red List Ready: charting expectations for and outcomes of a product's social and ecological footprint

OTHER WAYS TO GET INVOLVED

Continued advancement of the Living Building Challenge will require many minds and great ideas. In addition to your participation in the Living Building Community, the International Living Building Institute is looking for assistance in various ways, including:

- Providing informal feedback on version 2.0
- Creating a Living Building Challenge Collaborative discussion group in your region
- Making charitable donations to help sponsor the progress of the standard and its subsidiary programs.
- Becoming a fan of the International Living Building Institute on Facebook and following us on Twitter: www.twitter.com/livingbuilding

A BRIEF HISTORY OF THE LIVING BUILDING CHALLENGE

The idea for the Living Building Challenge first emerged in the mid-nineties during the creation of the National Institute of Standards and Technology (NIST)-funded EpiCenter project in Bozeman, Montana. The goal of this project, led by Bob Berkebile and Kath Williams, was to produce the most advanced sustainable design project in the world. Jason F. McLennan guided the research and technology efforts on the project, and began conceptualizing the requirements for what is now known as a Living Building. Following EpiCenter, Berkebile and McLennan continued to develop these ideas and publish several articles on the concept.[85]

In 2000, BNIM Architects was selected to design the new headquarters of the David and Lucile Packard Foundation and, as part of this work, researched the economic and environmental implications of the Living Building concept along with levels of LEED® certification. In 2001, findings were presented in a document called the Packard Matrix, which demonstrated that the Living Building was the smartest long-term choice economically, although it carried a hefty first-cost premium. An updated study completed one year later showed the premium to be a bit smaller. And recently, the Living Building Financial Study has proven that first-cost premiums continue to diminish and certain building types make immediate financial sense.

In 2005, McLennan began to turn the theoretical idea of a 'living' building into a codified standard: Living Building Challenge version 1.0. He presented this standard to the Cascadia Region Green Building Council (Cascadia) in August 2006, and three months later the Challenge was formally launched. In 2009, Cascadia founded the International Living Building Institute (ILBI) to encourage the creation of Living Buildings, Sites and Communities in countries around the world while inspiring, educating and motivating a global audience about the need for fundamental and transformative change.

The ILBI is a non-governmental organization dedicated to the creation of a truly sustainable built environment in all countries around the world. Comprised of the leading green building experts, futurists and thought-leaders, we believe that providing a compelling vision for the future is a fundamental requirement of reconciling humanity's relationship with the natural world.

85 Refer to the In The News section of the ILBI website to download early publications.

2.0™

INTERNATIONAL LIVING BUILDING INSTITUTE™
410 Occidental Ave S Seattle, WA 98104 206.223.2028

www.ilbi.org