

LIVING BUILDING CHALLENGESM 4.0

**A Visionary Path to a
Regenerative Future**



INTERNATIONAL
LIVING FUTURE
INSTITUTESM

LIVING BUILDING CHALLENGESM 4.0

A Visionary Path to a Regenerative Future



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IMAGINE a building designed and constructed to function as elegantly and efficiently as a flower: a building informed by its bioregion’s characteristics, that generates all of its own energy with renewable resources, captures and treats all of its water, and that 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 RestorativeSM.

IT'S TIME TO CREATE A LIVING FUTURE AND A WORLD OF LIVING BUILDINGS

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EXECUTIVE SUMMARY: CREATING A REGENERATIVE WORLD TOGETHER

OUR GOAL IS SIMPLE. IN THE WORDS OF BUCKMINSTER FULLER— TO MAKE THE WORLD WORK FOR 100% OF HUMANITY IN THE SHORTEST POSSIBLE TIME THROUGH SPONTANEOUS COOPERATION WITHOUT ECOLOGICAL OFFENSE OR THE DISADVANTAGE OF ANYONE.¹

The Living Building ChallengeSM is an attempt to dramatically raise the bar from a paradigm of doing less harm to one in which we view our role as a steward and co-creator of a true Living Future. The Challenge defines the most advanced measure of sustainability in the built environment today and acts to rapidly diminish the gap between current limits and the end-game positive solutions we seek.

The Challenge aims to transform how we think about every single act of design and construction as an opportunity to positively impact the greater community of life and the cultural fabric of our human communities. The program has always been a bit of a Trojan horse—a philosophical worldview cloaked within the frame of a certification program. The Challenge is successful because it satisfies our left-brain craving for order and thresholds, and our right-brain intuition that the focus needs to be on our relationship with and understanding of the whole of life.

¹ The Living Building Challenge was the 2012 winner of the Buckminster Fuller Prize, the world's top award for socially responsible design.

As such the program is a philosophy first, an advocacy tool second, and a certification program third. Within the larger Living Future Challenge framework that covers the creation of all human artifacts and edifices, the Living Building Challenge focuses on humanity's most abundant creations—its buildings. It is in essence a unified tool for transformative thought, allowing us to envision a future that is Socially Just, Culturally Rich and Ecologically Restorative.

Regardless of the size or location of the project, the Living Building Challenge provides a framework for design, construction and the symbiotic relationship between people, our community, and nature. The Living Building Challenge calls for action to restore the relationship between people and nature in an increasingly urbanized world as we become more and more disconnected from the world with which we evolved. 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 Living Building[®] certification can claim to be the greenest anywhere, and will serve as role models in their communities for redefining the future of the built environment. Whether the project is restorative, regenerative, or operates with a net zero impact, it has a home in the construct of the Living Building Challenge.

continued >>

Although it is ambitious to achieve all of the requirements of the Living Building Challenge, the performance-based approach creates a simplicity and ease of use: There are twenty simple and profound Imperatives that must be met for any type of project, at any scale, in any location around the world.

This Standard is decidedly not a checklist of best practices—the Imperatives 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 not up to our Institute—but rather to the genius of the design teams, owners, and occupants themselves, who are expected to make informed and vested decisions appropriate to the project, place, and bioregion.

The Living Building Challenge is a holistic standard, pulling together the most progressive thinking from the worlds of architecture, engineering, planning, interiors, landscape design, and policy. It challenges us to ask these questions:

What if every single act of design and construction made the world a better place? if every intervention resulted in greater biodiversity and social equity; additional outlets for beauty and personal expression; a deeper understanding of climate, culture, and place; a realignment of our food and transportation systems; increased soil health; 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 only a dozen years remain to completely reshape humanity's relationship with nature and to realign our ecological footprint to be within the planet's carrying capacity.

Incremental change has not been an option in the past decade, and in the coming one it must become an approach of the past.

Over the last thirty 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. That is why, with the launch of the Living Building Challenge 4.0 we are also releasing the Core Green Building Certification, defining the ten essential requirements that define a baseline for green building. It is time to build a bridge between the highest levels of main stream green building certification programs and the Living Building Challenge and to propel the industry toward more Living Buildings.

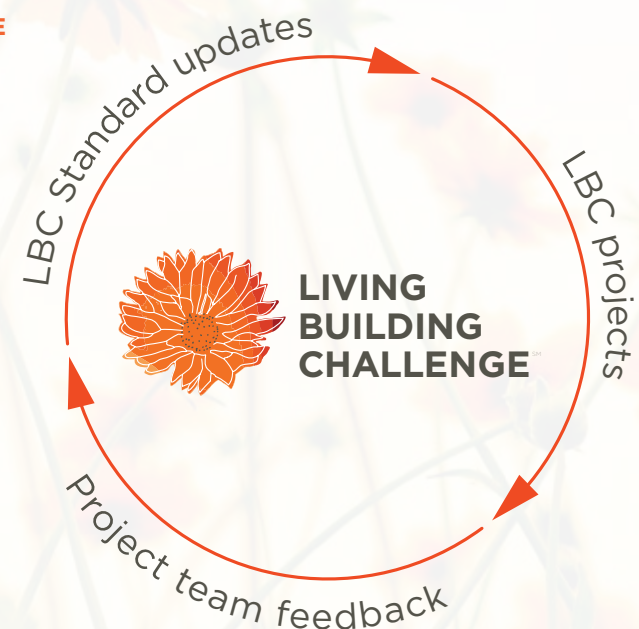
The Living Building Challenge is an ever-evolving program shaped by the incredible experiences of our project teams as they continually break new ground. Over time, feedback from a diverse array of stakeholders actively using the challenge helps us understand how to refine and improve the program to have the greatest impacts.

Institute staff are also monitoring changes in the field and the market, and making adjustments to the program as needed to reflect current realities and opportunities. We also strive to keep raising the bar as we learn together, moving our projects closer still to the goal of a regenerative living future.

- The internal logic of the Living Building Challenge is based on pragmatic, tested experience with what has already been built in the marketplace. Each new Living Building adds further weight to the evidence that a world of Living Buildings is possible now.
- Because this Standard is continuously informed by the work that project teams are doing on the ground, Petal Handbooks clarify and consolidate the rules at a set point in time to provide a unified reference for project teams. The Dialogue (see page 70) provides an online platform for project teams to request further clarifications and new exceptions and search for articles by topic. A glossary of critical program definitions is provided on page 78.
- The Living Building Challenge does not dwell on basic best-practice issues, so it can instead focus on critical high-level goals. It is assumed that to achieve this aspirational standard, typical best practices are already being met and championed by the team's expert consultants. 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, building characteristics and community context. For example, becoming water-independent in the desert demands the evolution of a project's design to emulate a cactus instead of a tree. The built environment will be richer, and the stress on our resources will lessen as more and more projects have this focus on an appropriate response to place.

ITERATIVE PROCESS



LIVING BUILDING CHALLENGE 4.0 FOCUSES ON THE RELATIONSHIP BETWEEN IMPACT AND EFFORT

This revised version of the Living Building Challenge has been developed based on two goals: to simplify the program so the level of effort of teams is better aligned with their impacts, at both project and market scales; and to fill the gap between the highest levels of mainstream green building certifications, and the entry point to the Living Building Challenge. The resulting Standard is streamlined, eliminating time consuming requirements that were not directly influencing projects or markets. LBC 4.0 also raises the bar by requiring that teams address basic issues in all Petals, even if the project is primarily focused on a more limited scope of priorities. In addition, a number of new performance-based compliance paths have been added to increase flexibility for teams. These changes promise to relieve some of the frustrations of the previous versions, while maintaining the high standards and inspirational vision that the ILFI community expects from the Living Building Challenge.

A FEW KEY CHANGES INCLUDE THE FOLLOWING:

The Living Building Challenge now has ten Core Imperatives that address the fundamental tenets of each Petal. All the Core Imperatives are required for Petal Certification, and together they constitute the requirements of the new Core Green Building Certification. Notable updates in LBC 4.0 by Imperative include:

I-01 ECOLOGY OF PLACE includes a performance-based approach to the project location and local ecology and community.

I-02 URBAN AGRICULTURE introduces a secondary path to improve the accessibility to fresh food in conjunction with on-site food production. Required percentages of site area have been simplified and are now based on Transect rather than Floor Area Ratio (FAR). Food storage requirements are modified.

THE WATER PETAL has been divided into two Imperatives, Core and Living, and requires comparison to a baseline.

THE ENERGY PETAL has been separated into Core and Living Imperatives that incorporate an EUI minimum and embodied carbon.

I-09 HEALTHY INTERIOR ENVIRONMENT is now a Core Imperative that outlines baseline requirements to achieve good indoor air quality.

I-10 HEALTHY INTERIOR PERFORMANCE includes some of the previous requirements of LBC 3.1 Civilized Environment and Healthy Interior Environment plus some expanded options for fresh air and controls.

I-11 ACCESS TO NATURE is a new Imperative based on one of the previous requirements of the LBC 3.1 Biophilic Environment Imperative.

I-12 RESPONSIBLE MATERIALS is a new Core Imperative setting a materials baseline for all projects.

I-13 RED LIST has an updated list based on classes of chemicals, as a means to clarify the process for updating the Red List Chemical Abstract Services Registry Number list and avoid regrettable substitutions. The threshold for compliance has been set at 90%.

I-14 RESPONSIBLE SOURCING has an FSC project certification pathway and the calculation to determine the number of required Declare labels has been changed.

I-18 INCLUSION is a new Imperative addressing diversity in hiring and access to training. The Just label requirement has been changed and incorporated in this Imperative.

I-19 BIOPHILIC DESIGN includes most of the requirements of the LBC 3.1 Biophilic Environment Imperative integrated with the requirements from the LBC 3.1 Beauty + Spirit Imperative.

I-20 EDUCATION + INSPIRATION now requires one Living Future Accredited (LFA) professional on each project team.²

² <https://living-future.org/education-lfa-2/>

CALL TO ACTION

THE PAST DECADE HAS SEEN RELATIVELY SMALL PROGRESS TOWARD ADDRESSING GLOBAL CLIMATE CHANGE; WE ARE REACHING A POINT WHERE THE NEXT DECADE WILL SEE CHANGE TO OUR ECOSYSTEM HEALTH, FRESH WATER SUPPLIES AND CLIMATES AT UNPRECEDENTED LEVELS.

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 and each other—reestablishing ourselves as not separate from, but part of nature, “because the living environment is what really sustains us.”³

³ E. O. Wilson (biologist, theorist, researcher and naturalist that has been inspirational in the evolution of the Living Building Challenge) from “A Conversation with E.O. Wilson,” *NOVA*, PBS, March 31, 2008, <https://www.pbs.org/wgbh/nova/article/conversation-ee-wilson/>.

Since it was launched in 2006, the Living Building Challenge has inspired and motivated rapid and significant change: projects have sprouted up all over North America and beyond—currently, there are efforts underway in a dozen countries with several million square feet of Living Building Challenge projects in progress—each as a beacon in the dark showing what is possible; the regulatory environment has embraced a series of reforms; and most importantly, a new sense of possibility has permeated design communities as a result of the first 100+ certified projects.

Now that the Challenge has shown it is possible to achieve, the LBC 4.0 takes the lessons learned from the first 100+ certified projects and the first 500 registered projects and creates a scalable, simple and elegant certification program that can adequately address the radical change the built environment must make in the next decade.

THIS STANDARD IS AN ACT OF OPTIMISM AND BELIEF THAT WITH THE RIGHT TOOLS IN THE HANDS OF PASSIONATE, LITERATE, AND SENSITIVE INDIVIDUALS, A REVOLUTIONARY TRANSFORMATION IS POSSIBLE. IT IS A PROGRAM THAT ASKS US TO THINK HOLISTICALLY AND TO ENGAGE BOTH OUR RIGHT AND LEFT BRAINS, HEAD AND HEART.

WHAT DOES GOOD LOOK LIKE?

We invite you to join us so that together we can continue to forge ahead on our path toward restoration and a Living Future.

The International Living Future Institute issues a challenge:

TO ALL DESIGN PROFESSIONALS, CONTRACTORS AND BUILDING OWNERS to transform the way we create the built environment radically and eliminate any negative impact on global health.

TO POLITICIANS AND GOVERNMENT OFFICIALS to remove barriers to systemic change, and to realign incentives to 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.

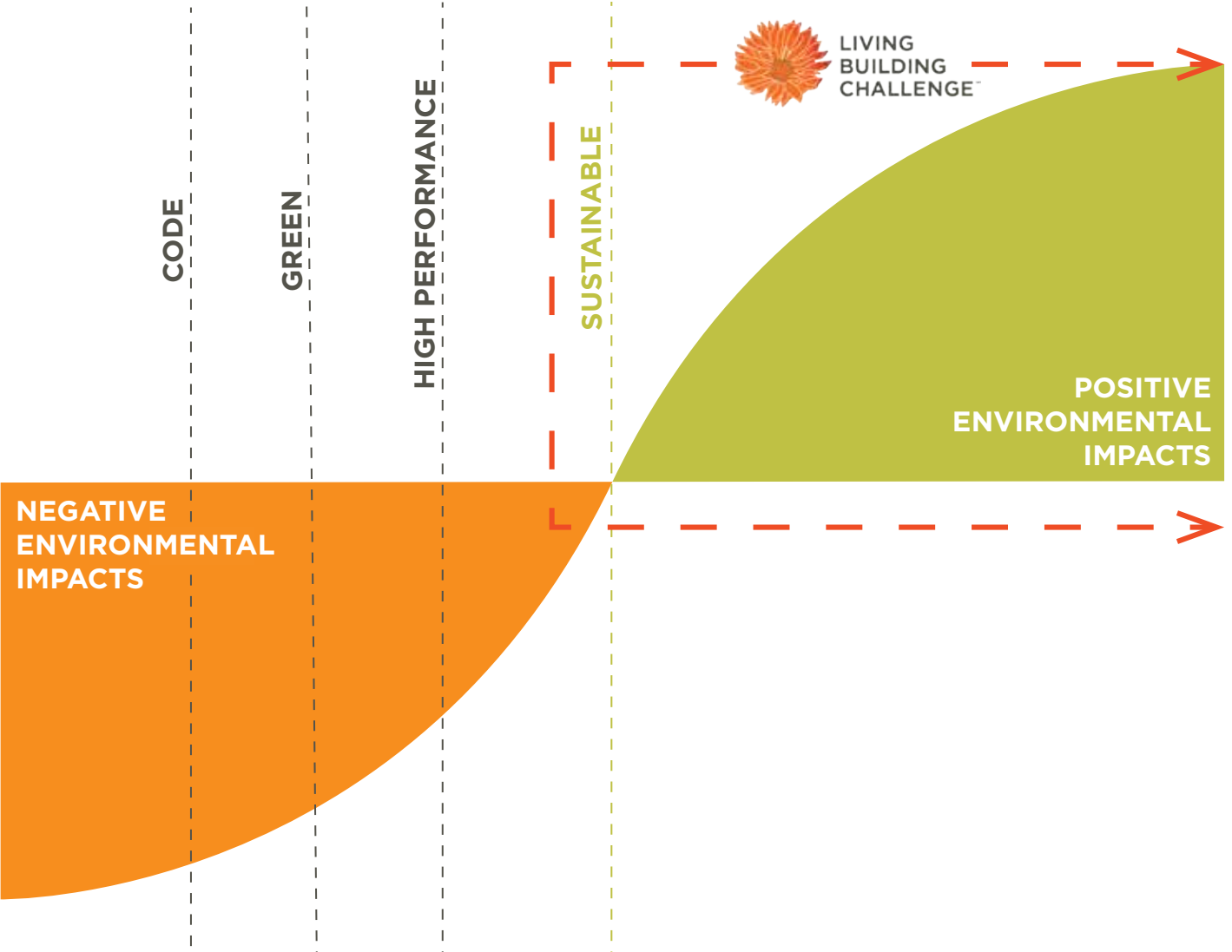
INSTEAD OF A WORLD THAT IS MERELY A LESS BAD VERSION OF THE ONE WE CURRENTLY HAVE—WE ASK A SIMPLE AND PROFOUND QUESTION—WHAT DOES GOOD LOOK LIKE?

PACKARD FOUNDATION HEADQUARTERS, ZERO ENERGY CERTIFIED - LOS ALTOS, CA

Image by Jeremy Bitterman, courtesy of the Packard Foundation

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.



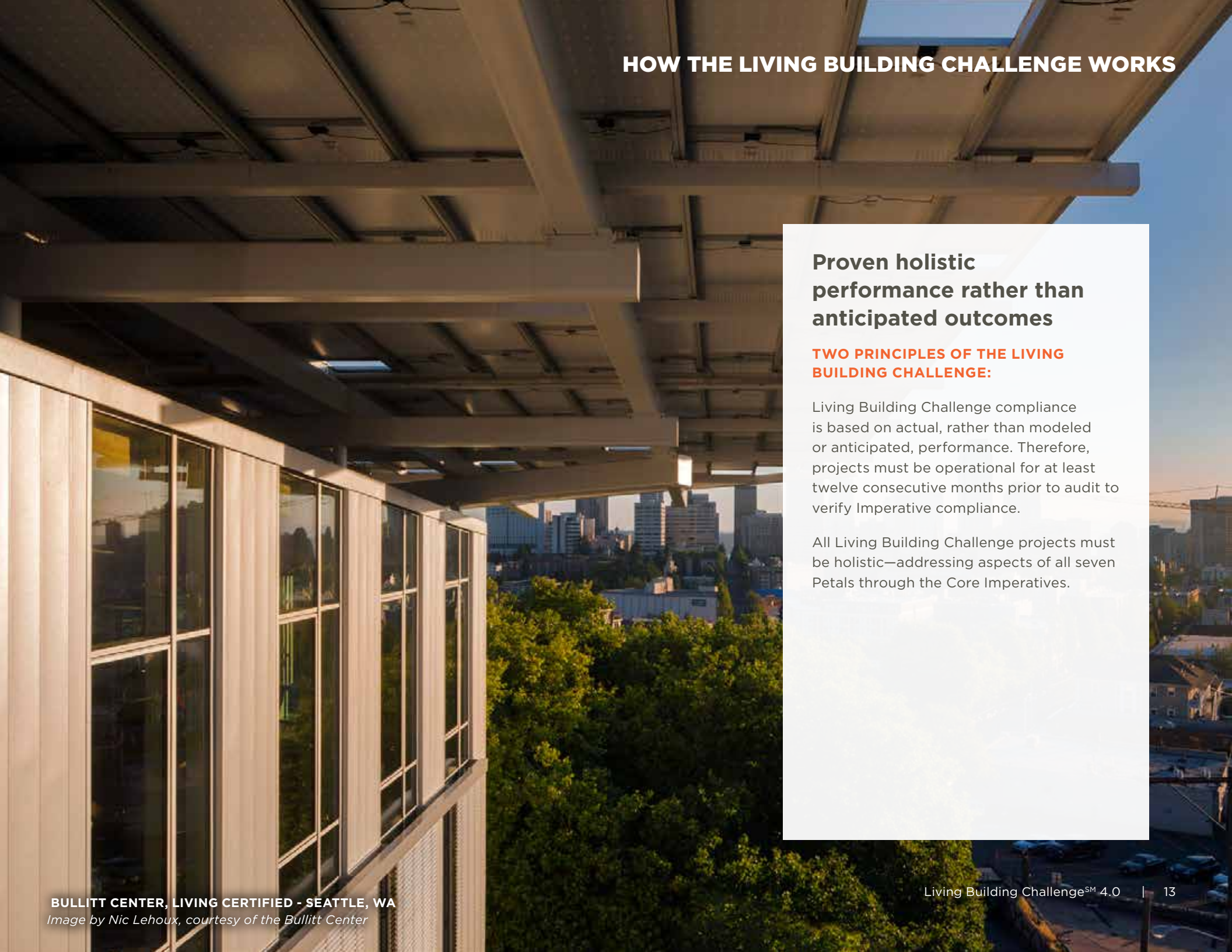
HOW THE LIVING BUILDING CHALLENGE WORKS

Proven holistic performance rather than anticipated outcomes

TWO PRINCIPLES OF THE LIVING BUILDING CHALLENGE:

Living Building Challenge compliance is based on actual, rather than modeled or anticipated, performance. Therefore, projects must be operational for at least twelve consecutive months prior to audit to verify Imperative compliance.

All Living Building Challenge projects must be holistic—addressing aspects of all seven Petals through the Core Imperatives.



BULLITT CENTER, LIVING CERTIFIED - SEATTLE, WA
Image by Nic Lehoux, courtesy of the Bullitt Center

The Living Building Challenge consists of seven performance categories, or “Petals”: Place, Water, Energy, Health + Happiness, Materials, Equity and Beauty.

Each Petal is subdivided into Imperatives, for a total of twenty Imperatives in the Challenge. The 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.

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.



R.W. KERN CENTER, LIVING CERTIFIED - AMHERST, MA
IMAGE BY ROBERT BENSON, COURTESY OF THE R.W. KERN CENTER

The Living Building Challenge is versatile and can apply to **any building project**. These include but are not limited to:

NEW CONSTRUCTION



OR

EXISTING BUILDINGS



OR

INTERIOR PROJECTS



SINGLE-FAMILY RESIDENTIALS



MULTI-FAMILY RESIDENTIALS



COMMERCIAL BUILDINGS



OFFICES
HOSPITALITY
RETAIL
MUSEUMS
GALLERIES
BOTANICAL GARDENS

INSTITUTIONAL BUILDINGS



EDUCATIONAL
GOVERNMENTAL
RELIGIOUS
RESEARCH

MEDICAL + LABORATORY



Living Building Challenge projects come in all shapes and sizes and consist of both new construction and renovation projects—including historic preservation. If you can imagine it, then it can likely be a Living Building given the right application of strategies, technologies, and imagination. Requirements can vary based on project context and conditions, but the intent of the Imperatives remains the same, regardless of project type.

HAWAI'I PREP ACADEMY ENERGY LAB, LIVING CERTIFIED - KAMUELA, HI
IMAGE BY MATTHEW MILLMAN PHOTOGRAPHY, COURTESY OF FLANSBURGH ARCHITECTS

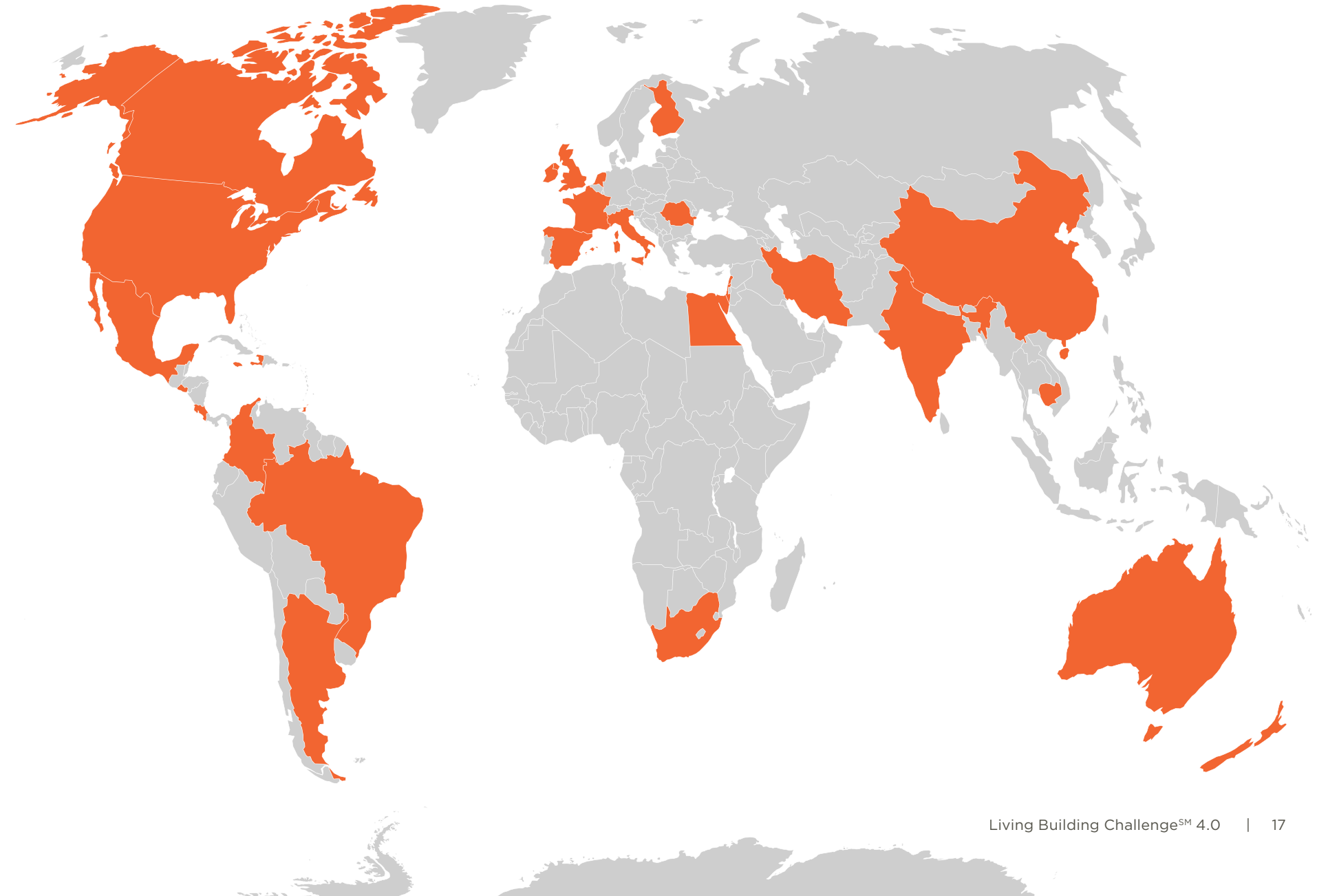


DESERT RAIN, LIVING CERTIFIED - BEND, OR
IMAGE BY CHANDLER PHOTOGRAPHY, COURTESY OF DESERT RAIN

LIVING BUILDINGS IN EVERY CLIMATE ZONE AND COUNTRY

Currently there are projects pursuing certification in nearly every building type.

LIVING BUILDING CHALLENGE PROJECTS CAN BE BUILT IN ANY CLIMATE ZONE ANYWHERE IN THE WORLD—AS EVIDENCED BY THE UNIQUE ARRAY OF PROJECTS CURRENTLY UNDERWAY IN MANY COUNTRIES AROUND THE GLOBE.



TYPOLOGIES

CURRENT AS OF APRIL 2019: 563 REGISTERED PROJECTS IN 29 COUNTRIES.

The Living Building Challenge is versatile and applies to different project scopes, or Typologies. There are four Typologies, and teams must identify the one that aligns with the project's scope to determine which Imperatives apply.

NEW BUILDING: This Typology is for any project that encompasses the construction of a new building.

EXISTING BUILDING: This Typology is for any project that alters either the envelope or the major systems of a building.

INTERIOR: This Typology is for any project that does not alter either the envelope or the major systems of a building.

LANDSCAPE OR INFRASTRUCTURE: This typology is for any project that does not include an enclosed structure as part of its primary program. Projects may be parks, roads, bridges, plazas, sports facilities, or trails.

PACKARD FOUNDATION HEADQUARTERS, ZERO ENERGY CERTIFIED - LOS ALTOS, CA
IMAGE BY JEREMY BITTERMAN, COURTESY OF THE PACKARD FOUNDATION

SUMMARY TABLE

The Living Building Challenge is composed of 20 Imperatives grouped into seven petals. Some Imperatives are not required for all Typologies.

PETAL		IMPERATIVE	TYPOLOGY			
			New Building	Existing Building	Interior	Landscape + Infrastructure
PLACE	1	Ecology of Place	Required	Scale Jumping Allowed	Not Required	Required
	2	Urban Agriculture	Required	Not Required	Not Required	Not Required
	3	Habitat Exchange	Required	Required	Required	Required
WATER	4	Human Scaled Living	Required	Scale Jumping Allowed	Scale Jumping Allowed	Not Required
	5	Responsible Water Use	Required	Not Required	Not Required	Required
ENERGY	6	Net Positive Water	Required	Not Required	Not Required	Required
	7	Energy + Carbon Reduction	Required	Required	Required	Required
HEALTH + HAPPINESS	8	Net Positive Energy	Required	Required	Required	Required
	9	Healthy Interior Environment	Required	Required	Required	Not Required
	10	Healthy Interior Performance	Required	Required	Required	Not Required
MATERIALS	11	Access to Nature	Required	Required	Required	Not Required
	12	Responsible Materials	Required	Required	Required	Required
	13	Red List	Required	Required	Required	Required
	14	Responsible Sourcing	Required	Required	Required	Required
EQUITY	15	Living Economy Sourcing	Required	Required	Required	Required
	16	Net Positive Waste	Required	Required	Required	Required
	17	Universal Access	Required	Scale Jumping Allowed	Scale Jumping Allowed	Scale Jumping Allowed
BEAUTY	18	Inclusion	Required	Required	Required	Required
	19	Beauty + Biophilia	Required	Required	Required	Required
	20	Education + Inspiration	Required	Required	Required	Required

- CORE IMPERATIVE
- SCALE JUMPING ALLOWED
- HANDPRINTING IMPERATIVE
- IMPERATIVE REQUIRED FOR TYPOLOGY
- REQUIREMENT DEPENDENT ON SCOPE
- NOT REQUIRED FOR TYPOLOGY

TRANSECTS

Because the Challenge is performance-based, the guiding principles and performance metrics apply regardless of where in the world the project is located—what changes is the specific mix of strategies and technologies—leaving it up to the genius of the design team to choose the most appropriate design response.

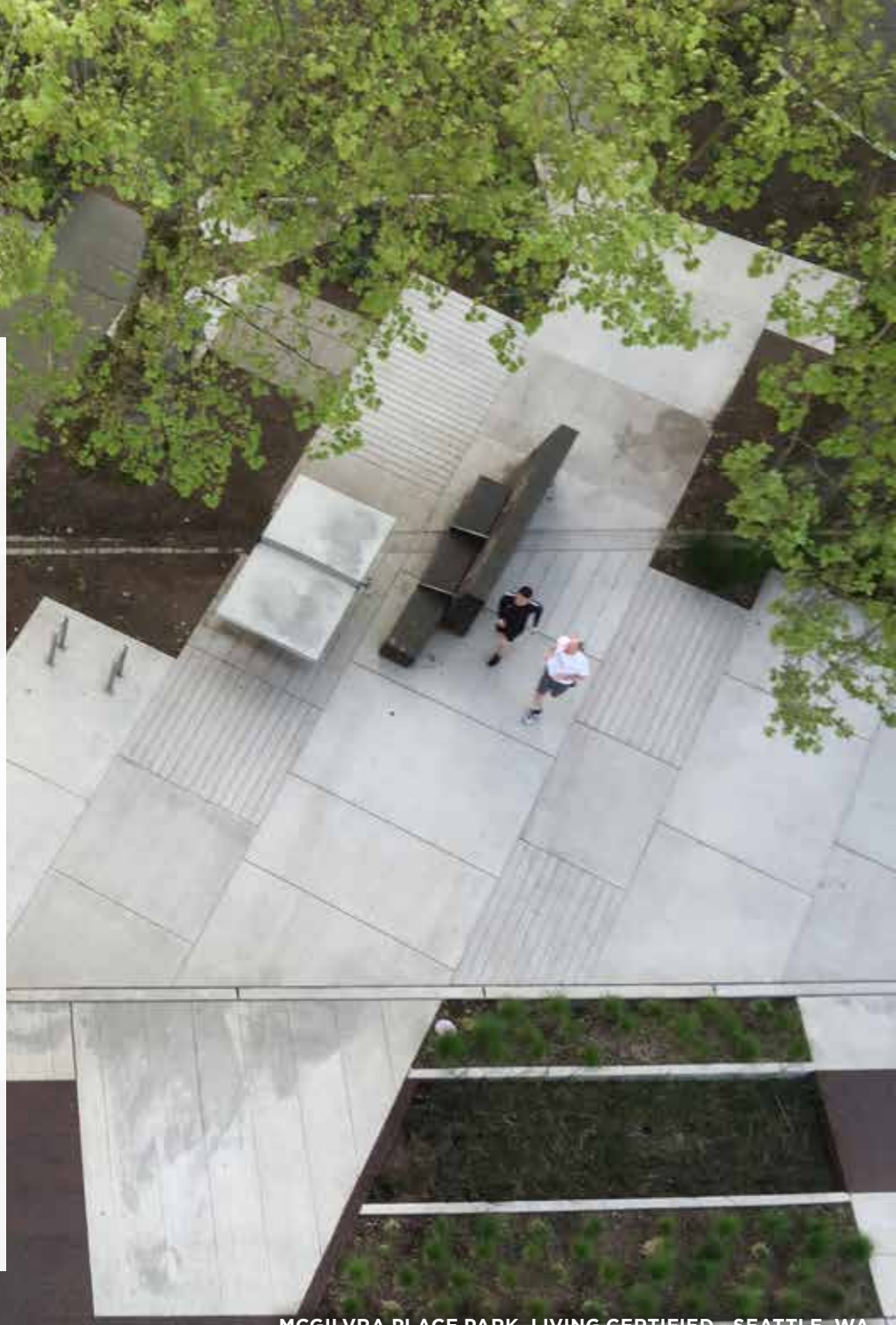
To encourage appropriate development in specific settings, the Standard draws on the work of Duany Plater-Zyberk & Company, who created the New Urbanism Transect model for rural to urban categorization.⁴ The Transect is a powerful basis for planning and demonstrates that different types of standards benefit different development realities.

The Living Transect, which is applied to all projects, is used to modify the requirements for and apply exceptions to a number of Imperatives in the Living Building Challenge. Living Transects are an adaptation of the original Transect concept; the primary modification has been a reclassification of Transect zones T3 and T4 to emphasize appropriate mixed-use densification rather than sprawl.⁵

The Challenge encourages the transition of suburban zones to grow into either new urban areas with greater density; or to create balanced, mixed-use villages that can support full lives with minimal car trips; or to be restructured as new rural zones for food production, habitat, and ecosystem services.

continued >>

⁴ www.transect.org
⁵ These are general descriptions. Refer to the v4.0 Place Petal Handbook for more information.



MCGILVRA PLACE PARK, LIVING CERTIFIED - SEATTLE, WA
 IMAGE COURTESY OF BERGER PARTNERSHIP



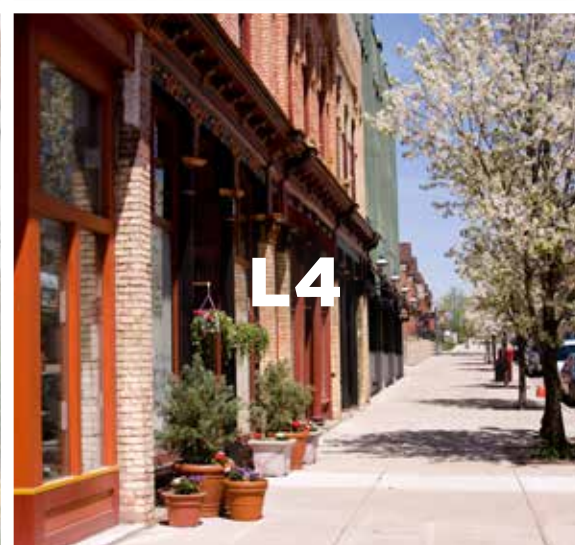
L1



L2



L3



L4



L5



L6

L1. NATURAL HABITAT PRESERVE:

This Transect is comprised of land that is set aside as a nature preserve or is defined as wildlands or sensitive ecological habitat. It may not be developed except in limited circumstances related to the preservation or interpretation of the landscape, as outlined in the Place Petal Handbook.

L2. RURAL ZONE:

This Transect is comprised primarily of land that is used for agriculture and food production-based development, as well as the outlying areas of small towns and villages.

L3. VILLAGE OR CAMPUS ZONE:

This Transect is comprised of relatively low-density mixed-use development found in rural villages and towns, and low-density neighborhoods outside of small cities, and may also include college or university campuses.

L4. GENERAL URBAN ZONE:

This Transect is comprised of light- to medium-density mixed-use development found in larger villages, small towns, or at the edge of larger cities.

L5. URBAN CENTER ZONE:

This Transect 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.

L6. URBAN CORE ZONE:

This Transect is comprised of high-to very high-density mixed use development found in large cities and metropolises.

THE LIVING BUILDING CHALLENGE SPURS PROJECTS TO HAVE THEIR OWN UTILITY, GENERATE THEIR OWN ENERGY, CAPTURE THEIR OWN WATER, AND PROCESS THEIR OWN WASTE. 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 a Scale Jumping overlay to allow multiple buildings or projects to operate in a cooperative state—sharing green infrastructure as appropriate and allowing for environmental and social benefits to be achieved as elegantly and efficiently as possible. Refer to the summary table on page 19 to view all Imperatives that may employ the Scale Jumping overlay.⁶

Please note that some projects may scale from the Living Building Challenge program to the Living Community ChallengeSM program, Standards that are designed to work together.



Imperatives where scale jumping are allowed are marked with this icon.



Carbon neutral with top tier efficiency.

- 100% building energy load offset with on- or off-site renewables
- For existing buildings, combustion allowed
- Embodied carbon reduction and offset



World class efficiency and characteristics, reinforcing a fossil fuel free future.

- 100% building energy load offset with on-site renewables, driving efficiency
- Pathway for premium off-site renewables for certain project types



Responding to climate change with holistic high performance.

Required Imperatives:

- C1 01 Ecology of Place
- C2 04 Human Scaled Living
- C3 05 Responsible Water Use
- C4 07 Energy + Carbon Reduction
- C5 09 Healthy Interior Environment
- C6 12 Responsible Materials
- C7 17 Universal Access
- C8 18 Inclusion
- C9 19 Beauty + Biophilia
- C10 20 Education + Inspiration



PETAL CERTIFICATION

One pillar of deep regenerative design built on a holistic high-performance foundation.

All Core Imperatives are required, plus the remaining Imperatives to complete either the Water, or Energy or Materials Petal.

ALL CORE IMPERATIVES

Water

- 06 Net Positive Water

Energy

- 08 Net Positive Energy

Materials

- 13 Red List
- 14 Responsible Sourcing
- 15 Living Economy Sourcing
- 16 Net Positive Waste



LIVING CERTIFICATION

Summit of holistic aspiration and attainment; fully restorative.

All Imperatives must be achieved to certify:

- 01 Ecology of Place
- 02 Urban Agriculture
- 03 Habitat Exchange
- 04 Human Scaled Living
- 05 Responsible Water Use
- 06 Net Positive Water
- 07 Energy + Carbon Reduction
- 08 Net Positive Energy
- 09 Healthy Interior Environment
- 10 Healthy Interior Performance
- 11 Access to Nature
- 12 Responsible Materials
- 13 Red List
- 14 Responsible Sourcing
- 15 Living Economy Sourcing
- 16 Net Positive Waste
- 17 Universal Access
- 18 Inclusion
- 19 Beauty + Biophilia
- 20 Education + Inspiration

Registration is the first step toward Living Building Challenge certification and is accessible through ILFI membership. Registered projects can benefit from many Institute resources, such as the opportunity to submit program clarification and exception requests through the Dialogue. To register a project, teams will need to provide basic information about the project, owner, and team, most of which can be updated later as the project evolves.

Once projects have completed construction and a 12-month performance period, they can certify under one of the many certification paths.



LIVING BUILDING CHALLENGE CERTIFICATIONS

The Living Building Challenge is a holistic standard, requiring projects to strive for the ideal across the seven Petals. Therefore, both certification options under the LBC require consideration of all the Petals as described in this Standard.

LIVING CERTIFICATION

Living Certification is for projects striving for the highest level of sustainability and regenerative design. A project achieves Living Certification by attaining all Imperatives assigned to its Typology. All twenty Imperatives are required for New Buildings, and the other Typologies have similar, but scope dependent requirements.

PETAL CERTIFICATION

Petal Certification is for projects that want to do a deep dive into one particular issue area, or Petal of the Living Building Challenge. This certification requires the achievement of all the Core Imperatives, in addition to all Imperatives in either the Water, Energy, or Materials Petal.

BETTY AND CLINT JOSEY PAVILION, DIXON WATER FOUNDATION, LIVING CERTIFIED - DECATUR, TX
 IMAGE COURTESY OF THE DIXON WATER FOUNDATION



CORE GREEN BUILDING CERTIFICATION

Core Green Building Certification (Core Certification) is for projects seeking a high aspiration certification that is verified, holistic and readily achievable. Projects must meet the requirements of the ten Core Imperatives – up to two Core Imperatives per Petal – and verify performance for water and energy through a twelve month performance period. All Imperatives required for this certification are described in this Standard, and are consolidated into the Core Green Building Certification Standard.



ZERO ENERGY CERTIFICATION

Zero Energy (ZE) Certification is for projects focused on achieving net zero energy through the on-site production of renewable energy. The marketplace has characterized net zero energy in many different ways, but ILFI 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, with no combustion.



ZERO CARBON CERTIFICATION

Zero Carbon (ZC) Certification is for projects focused on impacting climate change through energy and materials. This certification requires that one hundred percent of the operational energy use associated with the project be offset by new on- or off-site renewable energy. It also requires a targeted energy efficiency level and a reduction in the embodied carbon of the project’s primary materials.⁷ In addition, one hundred percent of the carbon emissions impacts associated with the construction and materials of the project must be disclosed and offset.

For additional information about membership, registration and certification, including links, see pages 74 + 75.

⁷ See glossary and v4.0 Materials Petal Handbook for more information.

TE KURA WHARE, LIVING CERTIFIED - TŪHOE, TĀNEATUA, NZ
 IMAGE COURTESY OF TE KURA WHARE PROJECT TEAM

IT'S TIME TO CREATE A LIVING FUTURE



UNIVERCITY CHILDCARE CENTRE, LIVING CERTIFIED - BURNABY, B.C., CANADA
IMAGE BY MARTIN TESSLER, COURTESY OF UNIVERCITY

PLACE

Restoring a Healthy Relationship Between Nature, Place and Community

I-01 ECOLOGY OF PLACE

I-02 URBAN AGRICULTURE

I-03 HABITAT EXCHANGE

I-04 HUMAN-SCALED LIVING



SCALE JUMPING
PERMITTED FOR
I-02 URBAN AGRICULTURE
I-04 HUMAN-SCALED LIVING

PETAL INTENT

The intent of the Place Petal is to realign how people understand and relate to the natural environment that sustains us. The built environment must reconnect with the ecology 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 that encourages the consumption of local, fresh and seasonal food.

The continued spread of sprawl development and the vastly increasing number of global megalopolises threaten the few wild places that remain. The decentralized nature of our 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. The impact of single-occupancy fossil fuel vehicles on global climate change is devastating. Fortunately, alternatives are plentiful from public transit and car sharing to electric vehicles and bicycles.

IDEAL CONDITIONS + CURRENT LIMITATIONS

The Living Building Challenge envisions a world full of 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 people.

Human behavior and attitudes are the most significant barriers to transforming our surroundings. As the global population reaches unprecedented levels, the pressures to develop previously undeveloped land are even stronger than before and the solutions to develop in a restorative and healthy fashion even more imperative.

PLACE



01

ECOLOGY OF PLACE

The intent of this Imperative is to protect wild and ecologically significant places and encourage ecological regeneration and enhanced function of the communities and places where projects are built.

All projects must avoid building on pristine greenfield, wilderness, prime farmland or in a floodplain unless they meet an exception.⁸ Projects must preserve thriving vibrant ecological environments and habitats.

All project teams must document site and community conditions prior to the start of work, including but not limited to identification of the project's "reference habitat(s)".

All projects must demonstrate that they contribute positively to the ecology of their place and restore or enhance the ecological performance of the site towards a healthy ecological baseline. On-site landscape must be designed to mature and evolve, and emulate the functionality of the reference habitat, as appropriate to the project's Transect.⁹

All project teams must assess cultural and social equity factors and needs in the community and consider those identified needs to inform design and process decisions.

No petrochemical fertilizers or pesticides can be used for the operation and maintenance of the on-site landscape, including urban agriculture.

⁸ Refer to the v4.0 Place Petal Handbook for exceptions to the limits on project locations.
⁹ Refer to the v4.0 Place Petal Handbook for more information regarding the emulation of the reference habitat, including specific aspects to consider.

PLACE

IMPERATIVE

02

URBAN AGRICULTURE



The intent of this Imperative is to integrate opportunities for connecting the community to locally grown fresh food.

All projects must dedicate a portion of their total project area to growing food, or they must dedicate a smaller portion of their total project area to growing food and must also directly provide weekly community access to healthy local food that address a community need, through farmers markets, CSA programs or other local food producers.¹⁰

LIVING TRANSECT	Percent of total project area for Agriculture	
	PATHWAY 1 Agriculture only	PATHWAY 2 Agriculture + food access
1	5%	2% + weekly access
2	20%	10% + weekly access
3	15%	7% + weekly access
4	10%	5% + weekly access
5	5%	2% + weekly access
6	2%	0% + weekly access

Scale jumping can be used as the means to expand the availability of healthy, local food (through agriculture or other means) to a specific population or the community in general via an off-site location such as a food bank, school, or other community resource.

Resilience Strategy

All projects (except residential projects) must provide access to food for 75% of FTE occupants for a minimum of three days during an emergency.

Residential projects must demonstrate the capacity to store at least a two-week supply of food.

¹⁰ Refer to the v4.0 Place Petal Handbook for clarifications of the types of agriculture that are acceptable as well as some ideas for healthy food access compliance.

PLACE

IMPERATIVE

03

HABITAT EXCHANGE

The intent of this Imperative is to protect land for other species as more and more land is taken for human use.

All projects must set aside land equal to the project area (or 0.4 hectares/1 acre, whichever is greater)¹¹ away from the project site, in perpetuity, through an approved Land Trust organization or the Institute's Living Future Habitat Exchange Program.¹²

- ¹¹ Refer to the v4.0 Place Petal Handbook for clarifications, exceptions and other information. ILFI now operates the Living Future Habitat Exchange Program in cooperation with conservation organizations.
- ¹² www.living-future.org/exchange.



TE KURA WHARE, LIVING CERTIFIED - TŪHOE, TĀNEATUA, NZ
IMAGE COURTESY OF TE KURA WHARE PROJECT TEAM

PLACE



04

HUMAN-SCALED LIVING



The intent of this Imperative is to contribute toward the creation of walkable, pedestrian-oriented communities that reduce the use of fossil fuel vehicles.

All projects must maintain or increase the density of the site and support a human-powered lifestyle.

All projects (except single family residential) must also:

- Be built to a human scale that is appropriate for the neighborhood.
- Provide places for occupants to gather and connect with the community.
- Provide sufficient secure, weather-protected storage for human-powered vehicles and facilities, such as showers and lockers, to encourage biking.¹³
- Provide at least two electric vehicle charging stations or one per thirty spaces, whichever is greater.
- Minimize impervious surface parking to no more than 20% (Transects 1-3), 15% (Transect 4), 5% for (Transect 5) and 0% (Transect 6) of the Project Area and ensures that any surface parking area larger than 20m x 30m is separated with planted areas.¹⁴

¹³ Projects must demonstrate how they have addressed on-site bike storage opportunities in order to meet the intent of this Imperative.

¹⁴ For maximum parking guidelines refer to the 4.0 Place Petal Handbook

continued >>

PLACE



04

HUMAN-SCALED LIVING



- Either reduce single-occupancy vehicle (SOV) trips and trips by fossil fuel-based vehicles by 30% over an established baseline relevant to the projects region and occupancy type, or

- Implement at least four of the following best practices:

- Consideration and enhancement of pedestrian routes, including weather protection on street frontages.
- Advocacy in the community to facilitate the uptake of human-powered and public transportation.
- A transit subsidy for all occupants of the building (if owner occupied) or a requirement for tenant employers to provide such a subsidy.
- Carpool coordination assistance.
- Access either to subsidized car sharing and/or to hybrid or EV fleet vehicles.
- Regular survey of occupants to determine current fossil fuel-based SOV trips.

Single-family homes (all Transects) must assess how occupants can reduce their transportation impact through car sharing, use of public transportation, alternative fuel vehicles, or bicycles and implement at least two identified strategies.



WATER

Creating Developments that Operate within the Water Balance of a Given Place and Climate

I-05 RESPONSIBLE WATER USE

I-06 NET POSITIVE WATER



SCALE JUMPING PERMITTED FOR
I-05 RESPONSIBLE WATER USE
I-06 NET POSITIVE WATER

PETAL INTENT

The intent of the Water Petal is to realign how people value water; to address the energy and chemicals involved in transporting, purifying and pumping water; and to redefine “wastewater” as a precious nutrient and resource.

The scarcity of water is a serious issue, as many countries around the world face severe shortages and compromised water quality due to global climate change. 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 suggest significant problems ahead. Closed loop systems based on the resources available, with localized treatment, can help mitigate these issues and create a more resilient water future.

IDEAL CONDITIONS + 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 the ecosystem of the community. 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.



WATER



05

RESPONSIBLE WATER USE



SCALE JUMPING PERMITTED

The intent of this Imperative is to encourage projects to treat water like a precious resource, minimizing waste and the use of potable water, while avoiding downstream impacts and pollution.

All projects must not use potable water for irrigation, and use less water for the project's other needs than a baseline regional building of the same type at the following rates:¹⁵

- New Building: 50%
- Existing Building: 30%

Affordable housing projects can use water handprinting combined with project efficiency to meet water savings goals.¹⁶

All projects must treat all stormwater on site, through natural or mechanical means and without chemicals, and manage all stormwater based on both pre-development hydrology and current ecological conditions, as determined by a qualified professional.

All projects on a Combined Sewer Overflow (CSO) system, or in a floodplain (based on an exception) must incorporate stormwater detention and avoid sheet flow off the site.

- ¹⁵ Refer to the 4.0 Water Petal Handbook for clarifications and exceptions, including an exception based on jurisdictional refusal of the designed systems. That exception does not apply to irrigation systems.
- ¹⁶ There are two ways to create a Handprint: (1) Preventing or avoiding Footprints that would otherwise have occurred, which includes reducing the magnitude of Footprints that occur, relative to what their magnitude would otherwise have been; and (2) Creating positive benefits which would not otherwise have occurred, without impacting the Footprint. All change occurs relative to some baseline, often referenced as "business as usual," or BAU.

WATER

IMPERATIVE

06

NET POSITIVE WATER



SCALE JUMPING PERMITTED

The intent of this Imperative is for project water use and release to work in harmony with the natural water flows of the site and its surroundings.

All projects must supply one hundred percent of the project's water needs through captured precipitation or other natural closed-loop water systems, and/or through recycling used project water, and all water must be purified as needed without the use of chemicals.¹⁷ No potable water may be used for non-potable uses.

All projects must address all grey and black water through on-site treatment and management through reuse, a closed loop system, or infiltration.¹⁸ Projects that are not able to treat and manage on-site may use handprinting within their watershed and community.

Scale jumping strategies are allowed with some limitations. For example, connecting to a community or municipal facility is allowed only if the facility treats waste to tertiary levels, reuses or infiltrates all water in balance with the water shed, and has a biologically based treatment process with no chemicals. For all scale jumping, pump energy must be accounted for through renewable energy sources.

All projects must incorporate a resilience strategy to provide drinking water for up to a week for all regular building occupants through water storage on-site.

- ¹⁷ Refer to the v4.0 Water Petal Handbook for clarifications and exceptions, such as exceptions based on local health regulations.
- ¹⁸ Refer to the Water Petal Handbook for clarifications and exceptions, such as exceptions based on local health regulations.

ENERGY

Relying on Renewable Resources

I-07 ENERGY + CARBON REDUCTION

I-08 NET POSITIVE CARBON



SCALE JUMPING PERMITTED FOR
I-07 ENERGY + CARBON REDUCTION
I-08 NET POSITIVE CARBON

PETAL INTENT

The intent of the Energy Petal is to create new sources of renewable energy that allow projects to operate year-round in a resilient, carbon pollution-free manner. In addition, the Energy Petal prioritizes energy efficiency as a means to reduce wasteful spending, of energy, resources, and capital.

Today, buildings consume more energy than any other final use. Most of the energy generated for these buildings is from ecologically destructive and often politically destabilizing sources that include coal, gas, oil, and nuclear power. Large-scale hydro, while inherently cleaner in generation, comes at the expense of widespread disruption to ecosystems. Combustion of wood pellets and other biomass can release particulates and carbon dioxide (CO₂) into the atmosphere that can affect public health or strain land reserved for food production while robbing the soil of much-needed nutrient recycling. The combined negative impacts of this energy infrastructure are becoming increasingly evident, as ever-increasing carbon emissions from energy use are resulting in changes to the climate that threaten the safety and prosperity of communities worldwide.

The Energy Petal attempts to establish a new paradigm for humans' relationship with energy, in which the places we live, work and play become catalysts for a healthy and resilient future.

IDEAL CONDITIONS + CURRENT LIMITATIONS

The Living Building Challenge envisions safe, resilient and decentralized energy infrastructure, one powered entirely by renewables. The energy grid will supply power equitably to incredibly efficient buildings that do not contribute to the negative externalities associated with combustion or fission.

Although considerable progress has been made to advance the cost-effectiveness and performance of renewable energy technologies, many projects still perpetuate fossil fuel energy infrastructure due to cost or regulatory barriers. In order to truly realize the social, ecological and economic benefits of clean energy, there must be even more urgency placed on move away from combustion-based energy sources. Storage of energy in the form of batteries or advanced materials will also enable teams to more effectively utilize the energy harvested on site and support the phasing out of short-term combustion needs on the utility grid.

ENERGY



07

ENERGY + CARBON REDUCTION



The intent of this Imperative is to treat energy as a precious resource and minimize energy-related carbon emissions that contribute to climate change.

All projects must achieve a reduction in total net annual energy consumption (after accounting for on-site renewable power), as compared to a typical existing building with comparable climate, size, use and occupancy, and combustion must be limited as follows:¹⁹

	NEW BUILDING	EXISTING BUILDING	INTERIOR
ENERGY PERFORMANCE REQUIREMENT	70% reduction from an equivalent building baseline	50% reduction from an equivalent building baseline	35% reduction from an equivalent building baseline
COMBUSTION LIMITS²⁰	Not Allowed (except through existing exceptions)	Allowed for HVAC systems that are not in project scope. Phase out plan and advocacy are required.	
RENEWABLES	Must be on-site to count towards the efficiencies above.		

All projects must meter energy used by the project.

New or Existing Building projects must demonstrate a twenty percent reduction in the embodied carbon of primary materials compared to an equivalent baseline.²¹ Existing Buildings may count in-situ materials against the required twenty percent.

All projects (except Landscape + Infrastructure) must select interior materials with lower than industry average carbon footprint for product categories for which embodied carbon data is readily available.²²

All projects must be designed to be “zero ready” through strategies such as designating area(s) and/or pre-installing wiring and connections for both electric vehicle charging and future installation of renewable energy systems.

¹⁹ Projects must establish their baseline through using tools such as Zero Tool, World Bank EDGE or other approved tools.
²⁰ The allowance for Existing Buildings & Interiors is only for Imperative 07, Energy + Carbon Reduction. Combustion is not allowed, except through an exception, for Imperative 08, Net Positive Carbon.
²¹ Refer to the v4.0 Energy Petal Handbook for recommended tools to establish a baseline
²² Refer to the v4.0 Energy Petal Handbook for relevant interior product categories and industries averages.

ENERGY

IMPERATIVE

08

NET POSITIVE CARBON



The intent of this Imperative is to foster the development and use of carbon-free renewable energy resources while avoiding the negative impacts of fossil fuel use, primarily the emissions that contribute to global climate change.

All projects must supply one hundred and five percent of their project’s energy needs through on-site renewable energy on a net annual basis, without the use of combustion.²³

All projects (except single-family residential) must sub-meter major energy end uses.

All single-family residential projects must develop a method to understand and trouble-shoot energy use.

All projects must account for the total embodied carbon emissions (tCO₂e) from its construction (including the energy consumed during construction) through the utilization of carbon-sequestering materials and/or through a one-time carbon offset purchase through an ILFI-approved carbon offset provider.²⁴

All projects must develop and incorporate a resilience strategy to allow the building to be habitable for one week, or otherwise participate in support for the local community in a disaster, through the use of batteries, storage etc.

²³ Refer to the v4.0 Energy Petal Handbook for a list of renewable energy systems, clarifications, and exceptions, including sub-metering requirements. Energy consumed during construction must be accounted for with either a carbon offset or renewable energy on site.
²⁴ Refer to the v4.0 Energy Petal Handbook for approved carbon offset programs, clarifications, and exceptions.



HEALTH + HAPPINESS

Fostering Environments that Optimize Physical and Psychological Health and Well Being

I-09 HEALTHY INTERIOR ENVIRONMENT

I-10 HEALTHY INTERIOR PERFORMANCE

I-11 ACCESS TO NATURE



PETAL INTENT

The intent of the Health + Happiness Petal is to create healthy spaces that allow all species to thrive by connecting people to nature and ensuring that our indoor spaces have healthy air and natural daylight.

Many developments provide substandard conditions for health, with over fifty percent of global office workers having no access to daylight. Research studies show that a connection to nature has a direct effect on people's productivity, their creativity and their ability to counter stress. Ensuring healthy environments does not rely just on the moment that the building is open, it requires continuous monitoring and diligence to ensure that alterations to systems over time do not diminish people's health.

IDEAL CONDITIONS + CURRENT LIMITATIONS

The Living Building Challenge envisions a nourishing, highly productive and healthy built environment where everyone has fresh air, daylight, views outside and can be connected to the weather, the seasons and the time of day. However, even the best available solutions require acceptance and engagement by the occupants and the project owner. For buildings to be healthy over time takes a commitment from the project occupants and owners.

HEALTH + HAPPINESS



09

HEALTHY INTERIOR ENVIRONMENT

The intent of this Imperative is to promote good indoor air quality and a healthy interior environment for project occupants.

All projects must:

- Comply with the current version of ASHRAE 62, or international equivalent.
- Prohibit smoking within any buildings or enclosed spaces, and within 25' of any building opening, including air supply vents.
- Develop a Healthy Indoor Environment Plan specific to the project's building type and location. The plan must address cleaning protocols, the prevention of particulates and toxins through an entry approach and implementation of at least one strategy to improve air quality.
- Provide views outside and daylight for 75% of occupants.
- Provide direct exhaust for kitchens, bathrooms, and janitorial areas.

HEALTH + HAPPINESS

IMPERATIVE

10

HEALTHY INTERIOR PERFORMANCE

The intent of this Imperative is to demonstrate ongoing high-quality indoor air and a healthy indoor environment.

To promote good indoor air quality performance, all projects must:

- Provide the results from an Indoor Air Quality test one to six months after occupancy, or provide readings from an ILFI-approved continuously monitored indoor air quality system.²⁵
- Comply with the CDPH Standard Method v1.1-2010 (or international equivalent) for 90% of interior building products that have the potential to emit volatile organic compounds (VOCs).
- Implement a cleaning protocol that uses cleaning products that comply with the EPA Safer Choice label (or international equivalent, such as Globally Harmonized System [GHS]).²⁶

All projects must provide 95% of occupants access to views and daylight and opportunities for the remaining five percent of occupants to move to compliant spaces for a portion of their day.²⁷

In addition, all projects must provide at least two of the following:

- Sufficient operable windows to provide natural ventilation for at least six months of the year.
- Ability for the occupants to influence their local airflow and temperature through direct input or controls.
- Flexible options for working and learning such as sit/stand options and/or varied sensory experiences for living, working or learning.

Residential projects must provide operable windows for 100% of the project occupants.

²⁵ Testing protocols must be consistent with the United States Environmental Protection Agency Compendium of Methods for the Determination, or international equivalent. Continuous monitoring must address specific pollutants and verification standards. Refer to the v4.0 Health + Happiness Petal Handbook for the exceptions and clarifications.

²⁶ www.epa.gov/dfc; <https://www.osha.gov/dsg/hazcom/global.html>

²⁷ Refer to the v4.0 Health + Happiness Petal Handbook for daylight compliance options.

HEALTH + HAPPINESS

IMPERATIVE

11

ACCESS TO NATURE

The intent of this Imperative is to provide opportunities for project occupants to directly connect to nature, and to assess the success of the Health + Happiness Imperatives.

All projects must connect people and nature through the provision of sufficient and frequent human-nature interactions in both the interior and the exterior of the project to connect the majority of occupants with nature directly.

All projects must request that occupants complete a post-occupancy evaluation that addresses the health benefits of the project including the benefits of daylight, fresh air and access to nature at least once within six to twelve months of occupancy.



CHESAPEAKE BAY BROCK ENVIRONMENTAL CENTER, LIVING CERTIFIED - VIRGINIA BEACH, VA
IMAGE BY DAVE CHANCE, COURTESY OF CHESAPEAKE BAY BROCK ENVIRONMENTAL CENTER

MATERIALS

Building with Products that are Safe for All Species Through Time

- I-12 RESPONSIBLE MATERIALS
- I-13 RED LIST
- I-14 RESPONSIBLE SOURCING
- I-15 LIVING ECONOMY SOURCING
- I-16 NET POSITIVE WASTE

PETAL INTENT

The intent of the Materials Petal is to help create a materials economy that is non-toxic, ecologically restorative, and transparent. 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 to drive business toward a truly responsible materials economy. When impacts can be reduced but not eliminated, there is an obligation not only to offset the damaging consequences associated with the construction process, but also to strive for corrections in the industry itself. Over the past decade, the Red List has transformed the building industry from one where ingredients were held in secret to one where transparency is becoming the new normal.

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. 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.

Declare®, the Institute's ingredients label for building products, is a publicly accessible label and online database and is embedded within the Materials Petal. Not only does Declare provide a clear solution to both transparency and documentation for projects, and a means to verify when exceptions are no longer needed, it also provides a forum for sharing the information compiled by a project team as part of their documentation requirements for certification.

declareproducts.com

MATERIALS



12

RESPONSIBLE MATERIALS

The intent of this Imperative is to set a baseline for transparency, sustainable extraction, support of local industry and waste diversion for all projects.

All projects must positively impact the building products market by meeting the following materials selection criteria:

- The project must contain one Declare label product per 200 sq m of gross building area, or project area, whichever is smaller, up to twenty distinct products from five manufacturers. All other product manufacturers not currently in Declare must, at a minimum, receive a letter requesting they disclose their ingredients and identify any Red List content.²⁸
- All projects (except residential) must incorporate one product certified under the Living Product Challenge.²⁹
- 50% of wood products must be FSC, salvaged, or harvested on site either for the purpose of clearing the area for construction or to restore or maintain the continued ecological function of the site. The remainder must be from low risk sources.³⁰
- 20% or more of the materials construction budget must come from within 500 kilometers of construction site.³¹
- The project must divert 80% of the construction waste material from the landfill and provide dedicated infrastructure for the collection of recyclables and compostable food scraps during occupancy.

When a project is targeting all Materials Imperatives, it is not necessary to document this Imperative, since all requirements are superseded by Imperatives 13-16.

²⁸ www.living-future.org/declare/

²⁹ www.living-future.org/lpc/

³⁰ The Nature, Economy and People Connected tool or equivalent must be used to assess risk: <https://www.nepcon.org/sourcinghub/timber>

³¹ "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 v4.0 Materials Petal Handbook for more information.

OWENS CORNING® ECOTOUCH® PINK® FIBERGLAS™ BATT INSULATION
IMPERATIVE CERTIFIED (LIVING PRODUCT CHALLENGE)
IMAGE COURTESY OF OWENS CORNING

MATERIALS

IMPERATIVE

13

RED LIST

The intent of this Imperative is to foster a transparent materials economy free of toxins and harmful chemicals.

All projects must avoid the following Red List chemical classes in 90% of the project's new materials by cost.³² "In situ" materials do not need to be removed or vetted for Red List chemical classes.³³

- Antimicrobials (marketed with a health claim)
- Alkylphenols and related compounds
- Asbestos compounds
- Bisphenol A (BPA) and structural analogues
- California-banned solvents
- Chlorinated Polymers, including:
 - Chlorinated polyethylene (CPE)
 - Chlorinated polyvinyl chloride (CPVC)
 - Chloroprene (neoprene monomer)
 - Chlorosulfonated polyethylene (CSPE)
 - Polyvinylidene chloride (PVDC)
- Polyvinyl chloride (PVC)
- Chlorobenzenes
- Chlorofluorocarbons (CFC) and hydrochlorofluorocarbons (HCFC)
- Formaldehyde (added)
- Monomeric, polymeric and organophosphate halogenated flame retardants (HFRs)
- Organotin Compounds
- Perfluorinated compounds (PFCs)
- Phthalates (orthophthalates)
- Polychlorinated biphenyls (PCBs)
- Polycyclic aromatic hydrocarbons (PAHs)
- Short-chain and medium-chain chlorinated paraffins
- Toxic heavy metals
 - Arsenic
 - Cadmium
 - Chromium
 - Lead (added)
 - Mercury
- Volatile organic compounds (VOC) (wet-applied products)*
- Wood Treatments containing creosote or pentachlorophenol

*VOCs are limited, not banned. Refer to the v4.0 Materials Petal Handbook for specific reference standard + thresholds.

³² Refer to the v4.0 Materials Petal Handbook for complete and up-to-date listings of the numerous Red List exceptions. For purposes of the Living Building Challenge, "Materials" includes systems furniture and excludes FF&E.

³³ A list of CAS registry numbers that correspond with each Red List item is available and should be projects based on their date of registration. Materials deemed hazardous by a remediation professional must be addressed appropriately.

THE LICHEN COLLECTION BY MOHAWK
PETAL CERTIFIED (LIVING PRODUCT CHALLENGE)
IMAGE COURTESY OF MOHAWK

MATERIALS

IMPERATIVE

14

RESPONSIBLE SOURCING

The intent of this Imperative is to support sustainable extraction of materials and transparent labeling of products.

All projects must advocate for:

- The creation and adoption of third-party certified standards for sustainable resource extraction and fair labor practices for extraction of rock, metal, minerals, and timber.
- Certification under the Natural Stone Council (NSC) 373 Standard by quarries and/or manufacturers of all dimension stone products used within the project.³⁴

All projects must either source 80% or more of all wood, by cost or volume, as Forest Stewardship Council (FSC) certified,³⁵ or as salvaged, or from the intentional harvest of on-site timber for the purpose of clearing the area for construction or restoring/maintaining the continued ecological function of the on-site bionetwork, and the remaining 20% of wood must be from low-risk sources.³⁶ Alternatively, the project may achieve FSC Project Certification.³⁷

All projects must contain two Declare labeled products per 200 sq m of gross building area, or project area, whichever is smaller, up to forty products, and advocate to all manufacturers that are not in Declare that they register their products in the Declare database.³⁸

All projects (except residential) must incorporate one product certified under the Living Product Challenge per 1,000 sq. m of gross building area or project area, whichever is smaller, up to three products.³⁹ Residential projects must incorporate one product certified under the Living Product Challenge.

³⁴ <http://naturalstonecouncil.org/education-training/nsc-initiatives/dimensional-stone-standard/>
³⁵ Refer to the v4.0 Materials Petal Handbook for a full list of exceptions, such as an exception for wood in existing buildings undergoing renovation.
³⁶ The Nature, Economy and People Connected tool or equivalent must be used to assess risk: <https://www.nepcon.org/sourcinghub/timber>
³⁷ See FSC websites by location: e.g., <https://us.fsc.org/en-us/market/green-building/fsc-project-certification>; <https://www.fsc-uk.org/en-uk/business-area/fsc-certificate-types/project-certification>
³⁸ www.living-future.org/declare/
³⁹ www.living-future.org/lpc

Declare.

Product Name
Manufacturer Name
City, State/Province, Country
Life Expectancy: 000 YEARS
End of Life Options: Recyclable (42%), Landfill

Ingredients:
Ingredient One (Location, ST), **The Second Item** (Location, ST), **NextIngredient** (Location, ST), **Living Building Challenge Red List***, **Different Part of the Product**, **Another Component**, **More Stuff**, **US EPA Chemical of Concern**, **Yet Another Item**, **Non-toxic Element**, **Pieceofthewhole**, **Component of Concoction**, **ThirdFromTheEnd**, **ECHA REACH Substance of Very High Concern**, **Last Ingredient**

*LBC Exception Applied III-E1 PVC & Code
XXX-0000 EXP: 12/2010
Certification Status LBC Red List Compliant
 LBC Red List Free
 Declared

INTERNATIONAL LIVING FUTURE INSTITUTE™ www.declare.com
MANUFACTURER IS RESPONSIBLE FOR LABEL ACCURACY

MATERIALS

IMPERATIVE

15

LIVING ECONOMY SOURCING

The intent of this Imperative is to foster local communities and businesses, while minimizing transportation impacts.

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 must adhere to the following restrictions:

- 20% or more of the materials construction budget must come from within 500 kilometers of construction site.⁴⁰
- 30% of the total materials construction budget must come from within 1000 kilometers of the construction site or closer.
- An additional 25% of the materials construction budget must come from within 5000 kilometers of the construction site.
- The remaining 25% of materials may be sourced from any location.

⁴⁰ "Materials construction budget" is defined as all material costs excluding 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 v4.0 Materials Petal Handbook for more information.

MATERIALS

IMPERATIVE

16

NET POSITIVE WASTE

The intent of this Imperative is to integrate waste reduction into all phases of projects and to encourage imaginative reuse of salvaged “waste” materials.

All projects 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 a natural nutrient loop.⁴¹

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.

All projects must create a Materials Conservation Management Plan that explains how the project optimizes materials in each of the following phases:

- Design Phase, including the consideration of deconstruction and appropriate durability in product specifications.
- Construction Phase, including product optimization and collection of waste materials for reuse or recycling.
- Operation Phase, including a collection plan for extra consumables and durables.
- End of Life Phase, including a plan for adaptable reuse and deconstruction.

All projects must divert waste material from the landfill to the following levels (by weight or volume) during construction:

MATERIAL	MINIMUM DIVERSION RATE
Metal	99%
Paper and cardboard	99%
Soil and biomass	100%
Rigid foam, carpet, and insulation	95%
All others - combined weighted average ⁴²	90%
Demolition Waste	80%

All project types must provide dedicated infrastructure for the collection of recyclables and compostable food scraps.

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

⁴¹ Refer to the v4.0 Materials Petal Handbook for calculation details, clarifications, and exceptions.

⁴² Hazardous materials in demolition waste, such as lead-based paint, asbestos, and polychlorinated biphenyls (PCBs), are exempt from percentage calculations.



NATURAL RESOURCES DEFENSE COUNCIL OFFICE, PETAL CERTIFIED - SAN FRANCISCO, CA
IMAGE BY JASPER SANIDAD, COURTESY OF NRDC



EQUITY

Supporting a Just, Equitable World

I-17 UNIVERSAL ACCESS

I-18 INCLUSION



PETAL INTENT

The intent of the Equity Petal is to elevate equity as a project goal, and to transform developments to foster a just and inclusive community that enables all people to participate, prosper, and reach their full potential. It is grounded in the belief that a society that embraces and engages 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.

Disturbing trends toward privatizing infrastructure, externalizing negative social and environmental impacts, and limiting access to nature, which combined with growing income equality exacerbate polarized attitudes of “us” vs. “them”, and limit full participation in community life for all. Only by realizing that we are indeed all in this together can the greatest environmental and social problems be addressed.

Living Buildings are meant to be accessible and welcoming to all people, helping us recognize and celebrate cultural richness, while ensuring equitable access to fresh air, sunlight, and clean water and soil. The process of designing, building and operating Living Buildings should also have a positive impact in creating jobs and opportunities for inclusion of people who have been disadvantaged, excluded, or discriminated against.

JustSM, the Institute’s social justice transparency platform for organizations, is a publicly accessible label and online database, and is a core component of the Equity Petal. Just is a powerful tool to help project teams assess their own organizational equity, and to identify and support other organizations that share the values of a socially just and culturally rich living future.

living-future.org/just

IDEAL CONDITIONS + CURRENT LIMITATIONS

The Living Building Challenge envisions a built environment that is welcoming and accessible, and that enables all people to participate, prosper, and reach their full potential. It is a built environment created by equitable organizations, who lead inclusive design and construction processes.

Current limitations to reaching this ideal stem from ingrained cultural and social attitudes about the rights associated with private ownership and from structural and institutionalized racism and sexism, and widespread discrimination. A clear and concerted effort to address social equity issues is generally absent in most organizations, design objectives, and outcomes, and project stakeholders are usually limited by our ingrained assumptions and attitudes about ownership and rights, further excluding stakeholders in the community who will also be impacted by and could benefit from the project.

continued >>

EQUITY



17

UNIVERSAL ACCESS



The intent of this Imperative is to allow equitable access to, and protections from any negative impacts resulting from the development of, Living Building projects.

All projects must make all primary transportation, roads and non-building infrastructure that are considered externally focused (e.g. plazas, seating or park space) equally accessible 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.⁴³

Projects in Transects L3-L6 (except single-family residences) must provide for and enhance the public realm through design measures and features that are accessible to all members of society, such as street furniture, public art, gardens, and benches.

All projects must safeguard access for those with physical disabilities through designs meeting either the Principles of Universal design (United States Access Board), the Americans with Disabilities Act (ADA), and the Architectural Barriers Act (ABA) Accessibility Guidelines, or international equivalent.⁴⁴

No project may block access to, nor diminish the quality of, fresh air, sunlight, and natural waterways for any member of society or adjacent developments. Projects must also appropriately address any noise audible to the public.

- Fresh Air: Projects 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.

⁴³ Refer to the v4.0 Equity Petal Handbook for exceptions and clarifications regarding access.

⁴⁴ Refer to the v4.0 Equity Petal Handbook for exceptions, such as those for private residences and historic structures. ADA and ABA Accessibility Guidelines are available online: www.access-board.gov/guidelines-and-standards/buildings-and-sites/about-the-ada-standards www.access-board.gov/guidelines-and-standards/buildings-and-sites/about-the-aba-standards/aba-standards

continued >>

EQUITY



17

UNIVERSAL ACCESS



- Sunlight: Projects may not block sunlight to adjacent building façades and rooftops above a maximum height allotted for the Transect.⁴⁵ The project may not shade the roof of an adjacent development, unless the adjoining development was built to a lesser density than acceptable for the Transect.⁴⁶

- Natural Waterways: Projects may not restrict access 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 project.⁴⁷ No project may assume ownership of water contained in these bodies or compromise the quality of water 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.⁴⁸

⁴⁵ Exceptions relating to Transects are in the v4.0 Equity Petal Handbook.

⁴⁶ 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.

⁴⁷ Public access thoroughway 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. For example, a working dock or marina might need to restrict shoreline access for safety reasons. A private residence may not.

⁴⁸ The easement containing the pathway must be at least three meters wide and allow entry to both pedestrians and bicyclists.

EQUITY



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INCLUSION

The intent of this Imperative is to help create stable, safe, and high-paying job opportunities for people in the local community, and support local diverse businesses through hiring, purchasing, and workforce development practices.

All projects must have a Just label for at least two project team organizations that have an integral role in decisions during both design and construction phases, and an additional five organizations involved in the project must complete a self-assessment.⁴⁹

In addition, all projects must either:

include diverse stakeholders from vulnerable or disadvantaged populations in the design, construction and operations and maintenance phases at the following levels:

- 20% of design contract and/or construction contracts, and 10% of maintenance contracts must be with JUST organizations that meet required levels for Diversity category, or are registered Minority, Woman, or Disadvantaged Business Enterprises (MWD BE) organizations, or international equivalent.⁵⁰
- Workforce development/training/community benefits agreements, registered apprentice programs, and similar programs are employed for 10% of the General Contractor's project contracts, and/or project maintenance contracts.

or,

donate 0.1% of total project cost to a regional, community-based nonprofit organization focused on equity and inclusion.

⁴⁹ <https://living-future.org/just>; Just labeled "project team organizations" that are contracted to the owner can also count towards the 20% requirement below.

⁵⁰ Required levels for either the Gender or Ethnic Diversity Indicators: One in Just 1.0, two in Just 2.0.

Just.

Organization Name: ABC Inc.
Organization Type: Service Provider
Headquarters: Washington, D.C.
Office Locations : 10
Number of Employees: 1200

Social Justice Indicators:

Diversity & Inclusion

- Gender Diversity
- Ethnic Diversity
- Inclusion
- Engagement

Employee Benefits

- Health Care
- Retirement Provision
- Family/Medical Leave
- Training/Education

Equity

- Full Time Employment
- Pay-Scale Equity
- Freedom of Association
- Living Wage
- Gender Pay Equity

Stewardship

- Local Communities
- Volunteering
- Animal Welfare
- Charitable Giving
- Positive Products

Employee Health

- Physical Health
- Well-Being

Purchasing & Supply Chain

- Equitable Purchasing
- Supply Chain

THE SOCIAL JUSTICE LABEL 2.0
ABC-001 EXP. 12/30/2020

INTERNATIONAL LIVING FUTURE INSTITUTE™



CAPITAL STUDIOS, AFFORDABLE HOUSING PILOT PROJECT - AUSTIN, TX
IMAGE BY PAUL BARDAGJY, COURTESY OF CAPITAL STUDIOS



BEAUTY

Celebrating Design that Uplifts the Human Spirit

I-19 BEAUTY + BIOPHILIA

I-20 EDUCATION + INSPIRATION

PHIPPS CENTER FOR SUSTAINABLE LANDSCAPES, LIVING CERTIFIED - PITTSBURGH, PA
Image by Brian Cohen, courtesy of Phipps Center for Sustainable Landscapes



PETAL INTENT

The intent of the Beauty Petal is to recognize the need for beauty and the connection to nature 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. The key to creating beautiful buildings is to embrace a biophilic design process that emphasizes that people and nature are connected and the connection to place, climate, culture and community are crucial to creating a beautiful building.

IDEAL CONDITIONS + CURRENT LIMITATIONS

The Living Building Challenge envisions designs that elevate our spirits, connect us to nature and all other living systems and inspire us to be better than we currently are. Mandating beauty is, by definition, an impossible task, which is why we require biophilic design as the process to arrive at a beautiful building. In this Petal, the Imperatives are based on the theory that connecting to nature, place, community and climate will create good design, and that the communication of that design process will allow Biophilic and Living Buildings to be replicated. We do not begin to assume that 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 each Living Building Challenge project.

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

ETSY HEADQUARTERS, PETAL CERTIFIED - BROOKLYN, NY
IMAGE BY EMILY ANDREWS, COURTESY OF ETSY



BEAUTY



19

BEAUTY + BIOPHILIA

The intent of this Imperative is to connect teams and occupants with the benefits of biophilia and incorporate meaningful biophilic design elements into the project.

Projects 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 strategy and implementation ideas for the following:⁵¹

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

The framework should include a record of the exploration day and goals for the project, as well as historical, cultural, ecological, and climatic studies that thoroughly examine the site and context for the project. The plan must contain methods for tracking biophilia at each design phase to ensure sufficient implementation of the framework.

⁵¹ Each of the biophilic design elements is outlined on table 1-1, p. 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.

HAWAII PREP ACADEMY ENERGY LAB, LIVING CERTIFIED - KAMUELA, HI
IMAGE BY MATTHEW MILLMAN PHOTOGRAPHY, COURTESY OF FLANSBURGH ARCHITECTS

BEAUTY



20

EDUCATION + INSPIRATION

The intent of this Imperative is to provide educational materials about the operation and performance of the project to the occupants and the public in order to share successful solutions and catalyze broader change.

All projects must provide:

- A Living Building Challenge Case Study.
- An annual open day for the public.⁵²
- A copy of the Operations and Maintenance Manual.⁵³

All projects (except single-family residential) must:

- Provide a simple brochure describing the design and environmental features of the project.
- Install interpretive signage that teaches visitors and occupants about the project.
- Develop and share an educational website about the project.
- Include one Living Future Accredited Professional on the project team.

⁵² See v4.0 Beauty Petal Handbook for how this requirement applies to residential projects

⁵³ See v4.0 Beauty Petal Handbook for how this requirement applies to residential projects

BULLITT CENTER, LIVING CERTIFIED - SEATTLE, WA
Image by Nic Lehoux, courtesy of the Bullitt Center



ETSY HEADQUARTERS, PETAL CERTIFIED - BROOKLYN, NY
IMAGE BY EMILY ANDREWS, COURTESY OF ETSY



VANDUSEN BOTANICAL GARDEN VISITOR CENTRE, PETAL CERTIFIED - VANCOUVER, B.C., CANADA
COURTESY OF VANDUSEN

RESOURCES

THE LIVING BUILDING CHALLENGE WEBSITE

An online resource for project teams and others, the Living Building Challenge section of Living-future.org provides the Living Building Challenge Standard document and the resources that support the certification process—including fee schedules for certification, detailed case studies of certified projects, and education resources. Additional project team resources are available to registered project teams.

living-future.org/lbc

PETAL HANDBOOKS

The Petal Handbooks are a critical resource for project teams pursuing the Living Building Challenge. They contain the clarifications, exceptions, and definitions needed to fully understand Imperative requirements and compliance options. Because the Living Building Challenge program is continuously informed by the work that project teams are doing on the ground, the handbooks have been developed to clarify and consolidate the rules at a set point in time to provide a unified reference for project teams. They are periodically updated to include all current Dialogue posts. While the Petal Handbooks are an excellent reference tool, they should be used in conjunction with the Dialogue to ensure that the most up-to-date rulings are understood.

MEMBERSHIP

To begin the registration process, the project team leaders contact are is required to have a Premium Membership with the Institute. Once registered and logged in, members are directed to a landing page with links that provide access to the project registration form and allow them to update their account details. Digital versions of the Petal Handbooks are available for purchase to all International Living Future Institute members. A current fee schedule is published on the Institute’s website. living-future.org/membership

THE DIALOGUE

The Dialogue is an online platform for the transparent exchange of ideas between project teams and the Institute—it is the official venue

to request feedback on proposed strategies for meeting the requirements of the Living Building Challenge. The Dialogue allows for current unknowns to be discovered and shared in real time as teams proceed with their projects and research. It provides teams with the flexibility to get information most relevant to their work, such as in-depth commentaries, compliance paths, clarifications, and temporary exceptions.

Organized by the twenty Imperatives and filterable based on specific content, the activity in the Dialogue not only serves as a platform for distributing strategies for success, it also yields modifications to future releases of the Standard itself. In this way, the Dialogue captures the ongoing evolution of the Living Building Challenge and gives credit to the hundreds, if not thousands, of individuals who contribute to the process. Only project team members can post questions to the Dialogue, but responses are available to all ILFI members as searchable articles.

TRIM TAB

Trim Tab is the Institute’s quarterly digital magazine and blog. Trim Tab features provocative articles, interviews, and news about people and designs transforming the built environment. Each digital issue is distributed via ILFI’s full list of newsletter subscribers and archived on the Trim Tab site, which is free to all readers. Jumpstart your learning at living-future.org/trimtab.

RESEARCH

Despite the rigor of the Living Building Challenge, project teams are proving that the strict requirements of the program are very solvable. However, both perceived and real limitations to success still exist that are technical, regulatory, behavioral, or financial—or a combination of these influencing factors. In collaboration with partners in the design and construction field, local and state governments, and other forward-thinking nonprofits, the Institute is spearheading efforts to carry out cutting-edge research and create practical tools.

The latest published reports are posted on the Institute’s website: living-future.org/research.

APPROACH

The International Living Future Institute’s (ILFI’s) Living Building Challenge (LBC) technical assistance is focused on building capacity within project teams to create buildings that are socially just, culturally rich, and ecologically restorative. ILFI staff work with project teams at critical points in the design and development timeline to ensure those teams have the information they need to meet LBC requirements on their current project, and going forward. ILFI staff are not a substitute for any consultant or design team member. We support the project team through inspiration, education, and the review of key project documents and procedures specific to LBC. Technical assistance is customized to help each project team capitalize upon their project’s opportunities, identify and clear their project’s specific hurdles, take advantage of the lessons learned from hundreds of other projects, and set the project on the road to successful certification under the Living Building Challenge.

STANDARD SERVICES

The following services have been found to efficiently and effectively provide benefit to project teams – inspiring, educating and guiding team members to help them develop processes and make decisions that move them towards successful LBC certification. Please see our website for further information about each service: living-future.org/lbc/resources/#technical-assistance

- Feasibility study
- Charrette facilitation
- In-house workshops
- Biophilic design exploration.
- Design phase review
- Materials consulting
- On-going consulting

CUSTOMIZED SERVICES

Every project is unique. Customized consulting is available to help owners and teams navigate specific areas of interest or need. Some examples have included goal setting, RFP assistance, research on operations strategies, solar analysis, ideas for fundraising and funding, education program development, and application of LBC strategies across portfolios or campuses.

Please contact ILFI at LBC.consulting@living-future.org to discuss needs and request a proposal.

The Institute is dedicated to transforming theory and practice in all

sectors of the building industry, and offers several ways to broaden one's knowledge of deep-green building principles and practices, including the following:

IN-PERSON + ONLINE WORKSHOPS, LIVING FUTURE ACCREDITATION (LFA)

The Institute offers in-person and online workshops taught by expert faculty about the Living Building Challenge, other Living Future Challenges and ILFI transparency labels, and related topics. Workshops are continually developed throughout the year and are announced on the website and in our newsletters. On-demand courses (and pre-recorded webinars) are always available on our website.

To encourage the pursuit of this education, the Institute also offers Living Future Accreditation—the LFA is designed to acknowledge the most advanced and progressive-thinking professionals who are working toward a living future. Learn more on our website.

The Institute welcomes suggestions for future workshops and other educational content. Contact Institute staff to discuss options for hosting a workshop locally by emailing education@living-future.org.

LIVING FUTURE UNCONFERENCE

The Institute's four-day Living Future unConference is the flagship annual event for leading minds in the green building movement seeking solutions to the most daunting global issues of our time. Out-of-the-ordinary learning and networking formats deliver innovative design strategies, in-depth case studies, cutting-edge technical information, and much-needed inspiration to achieve progress toward a truly living future. Conference sessions encourage a hopeful approach to the planet's economic, ecological, and social challenges, and offer solutions for sites, infrastructure, buildings, neighborhoods and products.

The Living Future unConference offers project teams the opportunity to interact with other teams with similar project types, climates, or regulatory challenges to help model and scale LBC. Each Living Future hosts a project team summit and several face-to-face gatherings as well as ample networking opportunities.




THE AMBASSADOR NETWORK is a global initiative to encourage the rapid and widespread adoption of restorative principles guided by the Living Building Challenge and the Living Community Challenge. Living Community Ambassadors will soon be added to the Network. Professionals from all walks of life are encouraged to sign up for the Ambassador Network and help us spread the word about a Living Future. The power of the network allows best practices and ideas to be shared globally, harnessing the best of social media and communication tools for rapid interchange. The Network has been designed to support the continued flow of ideas and solutions among participants and the Institute. It presents numerous options for engagement, and the Institute has created a wealth of related training materials and resources. More information about the Ambassador Network and the online applications are available on the Institute's website: living-future.org/ambassador.

AMBASSADOR PRESENTERS: Professionals who wish to shift the focus of green building conversations are trained through the Ambassador Network to deliver one-hour, informal introductory presentations to peers, local organizations, institutions, companies, and community groups. The presentations are delivered by volunteers, with the purpose of raising awareness around the Living Building Challenge. Presentations around the Living Community Challenge will be added soon. Ambassador Presenters help build local capacity for the formation of Living Building Challenge Collaboratives, forums for sustained discussions on restorative principles.

LIVING BUILDING CHALLENGE COLLABORATIVES: In communities all over the world, the principles of the Living Building Challenge are being shared and disseminated by our growing network of Collaboratives. These community-based groups meet in person regularly to share knowledge and create the local conditions that support development of Living Buildings and Communities. Collaboratives are overseen by at least two trained Collaborative Facilitators, who are responsible for cultivating a welcoming environment for grassroots involvement and outreach. Each Living Building Challenge Collaborative has an active social media presence via Facebook and various other outlets. Visit living-future.org/ambassador to locate a Collaborative in your area, or contact us to learn how to start a new Collaborative in your city.

Continued advancement of the Living Building Challenge and Living Community Challenge will require many minds and great ideas. The Institute has established a presence on an array of online communication forums that make it possible to aggregate impressions, suggestions and insights—please reach out to us today to get involved and contribute to a Living Future!

 /livingbuildingchallenge and /livingfutureinstitute

 @livingbuilding and @Living_Future

REGISTER A PROJECT

To register a project, a project team member must have a Premium Membership with the Institute. Visit the membership page on our website to become a member, or contact membership@living-future.org to renew your membership.⁵⁴ Premium Membership grants access to a variety of benefits and allows you to register for any of our programs.

Once the team has a Premium Membership, registration links can be found on the member dashboard. After providing some basic information about your project and paying the registration fee, team members can be added and have immediate access to view and begin uploading the documentation required for certification. Most of the information provided at the time of registration can be updated, if necessary, by logging in to your project dashboard.

⁵⁴ <https://living-future.org/membership-purchase>



SUBMIT FOR CERTIFICATION

When a project team has submitted all documentation required for certification in the project Portal, they are eligible for certification. After the team notifies the Institute that the project is ready by writing to lbc.certification@living-future.org, the team is invoiced for the certification fee. When the certification fee has been paid, the auditor will be given access to begin reviewing documentation.

For more step by step information on the certification process, refer to this article on the ILFI help desk.

Performance Period: All projects require twelve months of occupancy data before they can submit for certification.

LBC Ready Recognition: LBC Ready Recognition is available for projects that wish to have a preliminary ruling that confirms initial efforts and the intent to certify. The LBC Ready audit may take place any time after construction is complete.

An LBC Ready ruling does not constitute certification of the project, but does indicate that the project is on track and the ruling on each Imperative is likely to be carried forward to the certification audit. Although an LBC Ready ruling is based on design predictions for water and energy, certification will still be based on performance, and a site visit by the LBC auditor is required. If teams complete work on the project between the LBC Ready audit and the certification audit that involves the use of new materials or makes other changes relevant to targeted Imperatives, additional documentation, such as a revised materials tracking sheet, must be submitted for review during the certification audit.

Ongoing monitoring of energy and water data, and ILFI access to that data is required for the LBC Ready audit, continuing until the certification audit, to ensure the project is on track. In addition, the time a project can remain LBC Ready without submitting for certification is limited.

For most projects, the same auditor will perform both LBC Ready and certification audits, although this cannot be guaranteed. Only the certification audit will result in a Living Building Challenge Certification.

The following table identifies Imperatives that are eligible for LBC Ready Audit and those that require additional documentation after the twelve-month performance period. Bold Imperatives are Core Imperatives, required for every project under Core, Petal and Living Certifications.

IMPERATIVE	LBC READY AUDIT	CERTIFICATION AUDIT
01: Ecology of Place	X	X
02: Urban Agriculture	X	X
03: Habitat Exchange*	X	
04: Human-Scaled Living	X	
05: Responsible Water Use	X	X
06: Net Positive Water	X	X
07: Energy + Carbon Reduction	X	X
08: Net Positive Energy*	X	X
09: Healthy Interior Environment	X	
10: Healthy Interior Performance	X	X
11: Access to Nature	X	
12: Responsible Materials	X	
13: Red List	X	
14: Responsible Sourcing	X	
15: Living Economy Sourcing	X	
16: Net Positive Waste	X	X
17: Universal Access	X	
18: Inclusion*	X	X
19: Biophilic Design: Beauty + Spirit	X	
20: Inspiration + Education⁵⁵	X	X

Questions? Contact the Institute at lbc.certification@living-future.org.
 * Offset payments to third parties can be delayed until the Certification Audit, but in that case, the project will not be listed as officially LBC Ready on the ILFI website.

⁵⁵ The Case Study needs to be completed for all Imperatives targeted in the current audit. The remaining requirements are typically reviewed in the final audit.

A BRIEF HISTORY OF THE LIVING BUILDING CHALLENGE

The idea for Living Building Challenge emerged in the mid-1990s, during an effort to produce the most advanced sustainable design project in the world: the EpiCenter in Bozeman, Montana. This project was led by Bob Berkebile and Kath Williams and was funded by the National Institute of Standards and Technology. Working with Berkebile at BNIM, Jason F. McLennan guided the research and technology solutions for the EpiCenter—in the process, he also began to conceptualize the requirements for what is now known as a Living Building. Following the EpiCenter, Berkebile and McLennan continued to develop the idea and published several related articles.⁵⁶

In 2000, BNIM was hired by the David and Lucile Packard Foundation to examine the economic and environmental implications of a Living Building alongside the various levels of LEED® certification.⁵⁷ The findings were presented in a document called the Packard Matrix, which demonstrated that a Living Building was the smartest long-term choice economically, although it carried a hefty first-cost premium. (In 2009, the Institute's Living Building Financial Study proved that first-cost premiums have diminished, and certain building types make immediate financial sense.) More recently, real cost data from completed projects has rounded out the picture, proving that the economic argument for Living Buildings is quite compelling and first-cost premiums are modest and diminishing.

In 2005, McLennan began to turn the theoretical idea into a codified standard. He gifted the Living Building Challenge version 1.0 to the Cascadia Green Building Council in August 2006, and three months later the Challenge was formally launched to the public. In 2007, McLennan hired Eden Brukman to direct the ongoing development and international deployment of the Living Building Challenge.

⁵⁶ Refer to the In The News section of the Institute website to download early publications.

⁵⁷ www.bnim.com/work/david-and-lucile-packard-foundation-sustainability-report-and-matrix

Together, they authored Living Building Challenge 2.0, evolving the requirements of the program and demonstrating how to apply the Imperatives to various scales of development and settings.

In response to an increase in global attention and interest, Cascadia founded the International Living Building Institute in 2009 as an umbrella organization for the Living Building Challenge and its auxiliary programs. The Institute certified the first projects in 2010, which changed the green building movement on a fundamental level. Groups around the world reached out to learn more about the Living Building Challenge and to forge formal ties with the Institute, underscoring that people from all parts of the world are looking for hopeful, practical responses to environmental, social, and economic difficulties.

At the beginning of 2011, the Institute was renamed the International Living Future Institute, with a mission to lead the transformation to a world that is socially just, culturally rich and ecologically restorative. In 2012, Amanda Sturgeon, now the Institute CEO, took over as director of the Challenge and has led the process to strengthen tools and ease implementation for projects with great success.

Then ILFI moved into a building pursuing Living Certification—the Bullitt Center in Seattle, Washington—in 2013.

In 2014 the Living Building Challenge 3.0 was released a collaborative effort led by Jason McLennan and Amanda Sturgeon together with input gathered from Living Building Challenge projects and internal program staff and subject matter experts. Many aspects, such as Biophilic Design and Equity, were strengthened and some of the newer program resources such as Declare and Just were incorporated.

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As of 2019, 105 projects have been certified and well over 500 have registered, representing over a dozen building types in nearly every climate zone on the planet. The Challenge has begun to move from proving that Living Buildings are possible to scaling the program to new levels, and to new types and sizes of projects.

Amanda Sturgeon has led, with consultation from Jason McLennan and the staff, a new evolution of the Living Building Challenge. The Living Building Challenge 4.0 is yet another step in the evolution of the Challenge and recognizes the urgent need to scale, providing a Core Green Building Certification that can bridge the gap between mainstream green building certification programs and the aspirations of the Living Building Challenge, and removing many of the barriers that have been highlighted by our project teams to make achieving Living Certification more possible than ever.

As an iterative program, no change is possible to the Living Building Challenge without the feedback from our project teams, who are our “committees” on the ground, and from our third party auditors, who see firsthand where the opportunities and barriers lie. For them, and for the ground breaking work they have put in to put the Challenge into Action, we are grateful.

Adaptive reuse

The process of reusing a structure or building for a purpose other than the original purpose for which it was built or designed.

Blackwater

Discharged water containing solid and liquid human wastes from toilets and urinals.

Business as usual (BAU)

Business as usual is the baseline reference point for handprinting. In simplest terms, BAU refers to a repeat of last year. More formally, it refers to: responding to this year’s external forces with last year’s approach. For companies that sell goods or services, BAU is: responding to this year’s demand, with last year’s products and processes. For projects, BAU is addressing current demands based on typical fixtures, materials or processes.

Chemical Abstracts Service (CAS) number

A unique numerical identifier for nearly every known chemical, compound, or organic substance.

Closed-loop water systems

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

Combustion

Any burning or combustion of fossil fuels or wood products.

Consumables

Non-durable goods that are likely to be used up or depleted quickly. Examples include office supplies, packaging and containers, paper and paper products, batteries, and cleaning products.

Deconstruction

The systematic removal of materials from a building or project for the purposes of salvage, reuse, and/or recycling.

Diverted waste

All items removed from the project that are then recycled, reused, salvaged, composted, or otherwise diverted from landfills or incineration.

Durables

Goods that have utility over time rather than being depleted quickly through use. Examples include appliances, electronic equipment, mobile phones, and furniture.

Energy needs

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

Floor Area Ratio (FAR)

$FAR = \frac{\text{Gross Building Area}}{\text{Total Project Area}}$

Forest Stewardship Council (FSC)

An independent, non-profit, membership-led organization that protects forests for future generations and sets standards under which forests

and companies are certified. Membership consists of three equally weighted chambers—environmental, economic, and social—to ensure the balance and the highest level of integrity.

Furniture, Fixtures and Equipment (FF&E)

Furniture, fixtures, or other equipment that has no permanent connection to the structure of a building or utilities and is not part of the systems furniture.

Greenfield

Land that was not previously developed or polluted.

Greywater

Water discharged from sinks, showers, laundry, drinking fountains, etc., but not including water discharged from toilets and urinals.

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Halogenated flame retardants (HFRs)

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

Handprints

Handprints are positive impacts, or beneficial changes, on footprint-related impact categories, measured in footprint-related units (e.g., kg CO2-equivalent, for carbon handprints). An actor can get credit for a handprint if the actor is a cause of the change, and if the handprint is voluntarily caused by the actor. Changes which are required (e.g. by law) do not count as handprints; they are considered “business-as-usual” (BAU). The actor does not need to be the only cause of the change. Credit for the handprint is shared equally and fully among all parties who jointly cause the change.

Hazardous Material

Materials that have been deemed dangerous or carcinogenic for humans or the environment and require specific measures for disposal, such as asbestos, lead paint, or materials producing ionizing radiation.

Land trust

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

Manufacturer location

The final point of fabrication or manufacture of an assembly or building material.

Materials Construction Budget

All the material costs delivered to the site, excluding labor, soft costs, and land.

On-site landscape

The planted area not used to comply with the requirements of Imperative 02: Urban

Agriculture. The strategies implemented for each Imperative are not required to be mutually exclusive or physically separated.

Potable water

Water that is fit for human consumption.

Primary Materials

Materials that make up the majority of the structural components, foundation and envelope of projects; often predominantly concrete, steel and/or wood.

Prime farmland

Land that has been used for agricultural production at some time during the four years prior to the relevant Important Farmland Map date, or in the five years prior to the project, and where the soil meets the physical and chemical criteria for Prime Farmland or Farmland of Statewide Importance as determined by the USDA Natural Resources Conservation Service (NRCS).

Pristine greenfield

Land that has not been impacted by humans and maintains thriving viable habitat. Land that has not been developed, but has been altered and degraded through ranching, monoculture agriculture, crowding, pollution or other means is not considered pristine greenfield for the purposes of I-01 Ecology of Place.

Project Area

The entire scope of the project and all areas disturbed by the project work including areas of construction, staging and conveyance, which is typically, but not necessarily, all land within the property line. Project Area must be consistent across all Imperatives.

Project water discharge

All water leaving the building including stormwater, greywater, and blackwater.

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Renewable energy

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

Salvaged materials

Used building materials that can be repurposed wholly in their current form or with slight refurbishment or alterations.

Sensitive ecological habitat

Habitat that is threatened, endangered, or particularly vulnerable to changes in the local ecology. Examples include, but are not limited to, wetlands, dunes, old growth forests, and native prairies.

Stormwater

Precipitation that falls on the ground surfaces of a property.

Systems furniture

A modular furniture system that might include work surfaces, cabinetry, file systems, flexible partitions, and desk chairs

used to create or furnish a series of offices workspaces. .

Wetland

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



R.W. KERN CENTER, LIVING CERTIFIED - AMHERST, MA
 IMAGE BY ROBERT BENSON, COURTESY OF THE R.W. KERN CENTER



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