PHIPPS

What Does Good Look Like?
Getting the Green Building You Want

Source: Denmarsh Photography, Inc.

Richard V. Piacentini
Executive Director
richard@phipps.conservatory.org

Jason Wirick
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Meghan Scanlon
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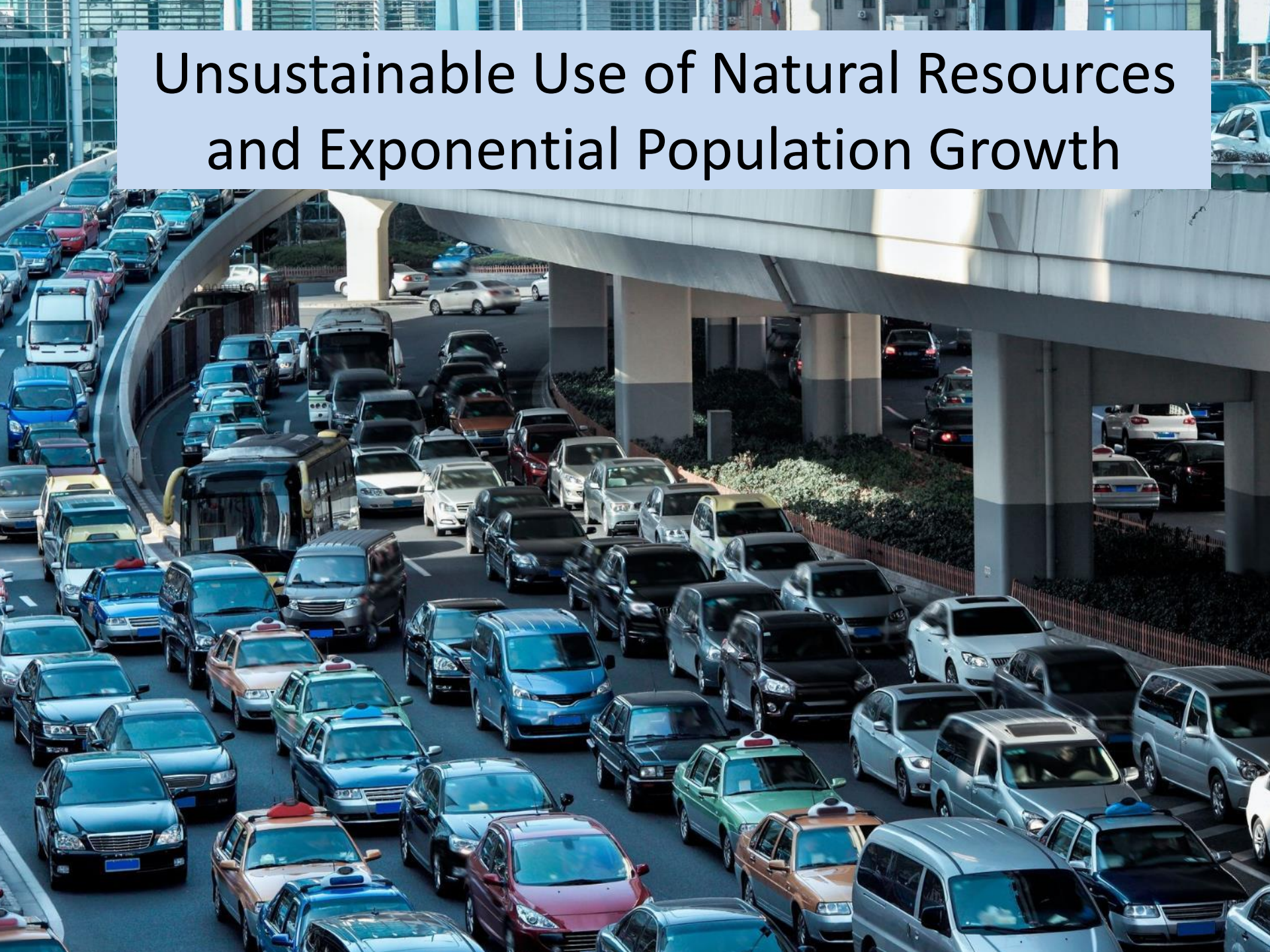
Source: NASA

Source: NASA

Unsustainable Use of Natural Resources and Exponential Population Growth



Climate Change, Habitat Destruction, Loss of Biodiversity

Symptoms Not the Cause

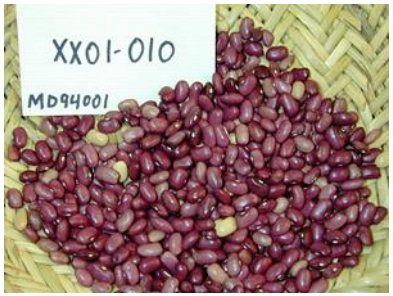
How do we get people to care about the environment?

Source: Alamy

Traditional Botanical Garden Response

Plant Collection

Ethnobotany



Seed Banks

in situ

ex situ

Educational Programs


PROTECTED
WILDLIFE
HABITAT

Source: Chris Jordan/Flickr

It is a Life Style Issue

The Western Way

Source: Genpak, LLC

Equity and Social Justice

Source: NASA

Shift Thinking – Outcome to Values

Sources: Annie O'Neill
Denmarsh Photography, Inc.
Renee Rosensteel


Why Buildings?
The Typical Building – Health and Environment are an Afterthought
90%

Many Environmental, Human Health, Social Justice and Equity Issues can be Addressed in the Built Environment


Source: Paul g. Wiegman


Source: andyde/Flickr

Source: Tar Sands Blockade

Can the Rating Systems Help?

Turn Values Into Goals

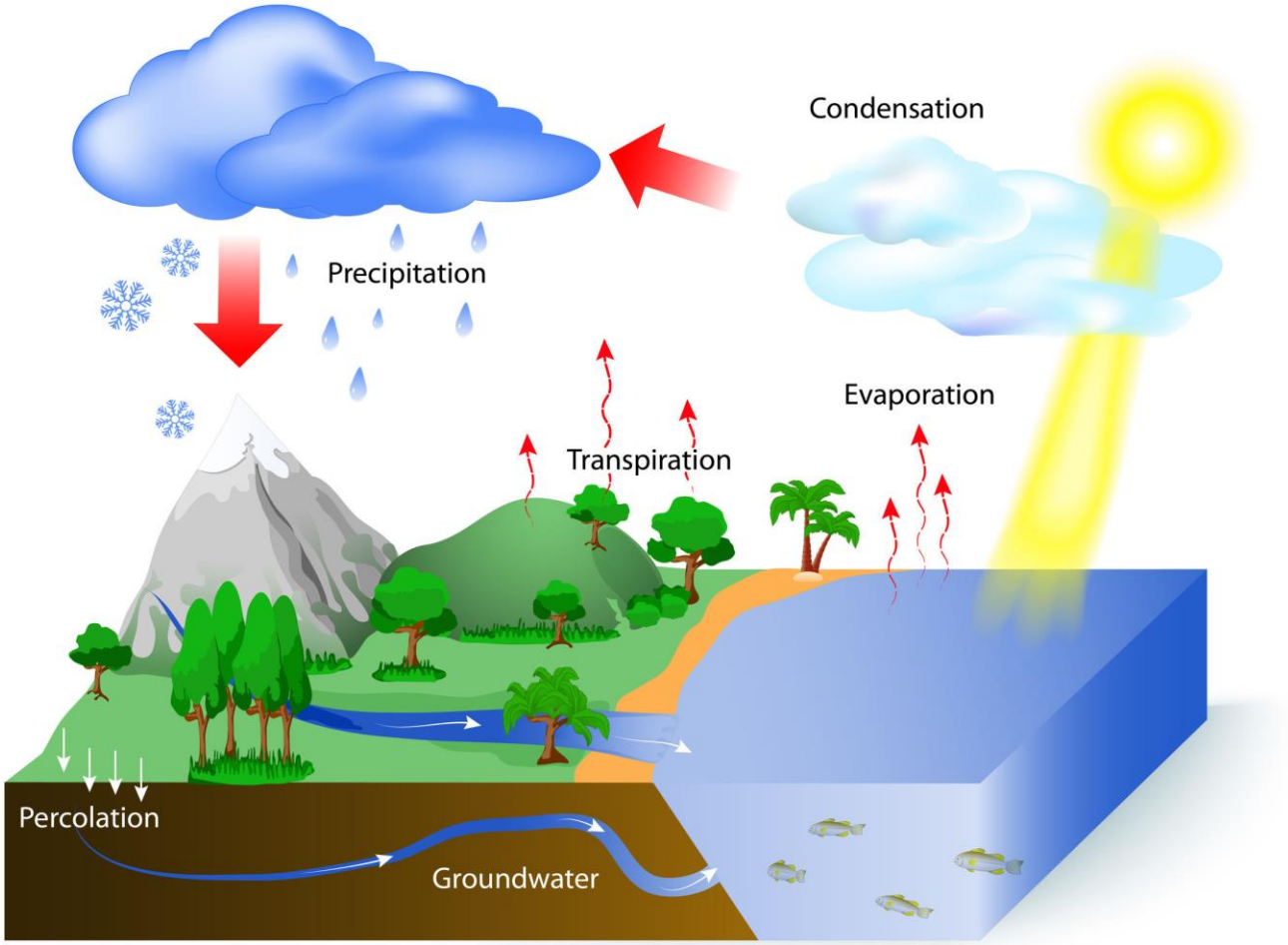
- ✓ Living Building Challenge
- ✓ Certified Net-Zero Energy
- ✓ LEED
- ✓ Sustainable SITES
- ✓ WELL Building

Four Different Paradigms for Interacting with the World

Extractive	Less Bad	Do Good	Regenerative
About Me	About Us Inter-connected	About Us Reciprocity	About Us System
Fragments	Fragments Stabilize them	Fragments Improve them	Whole

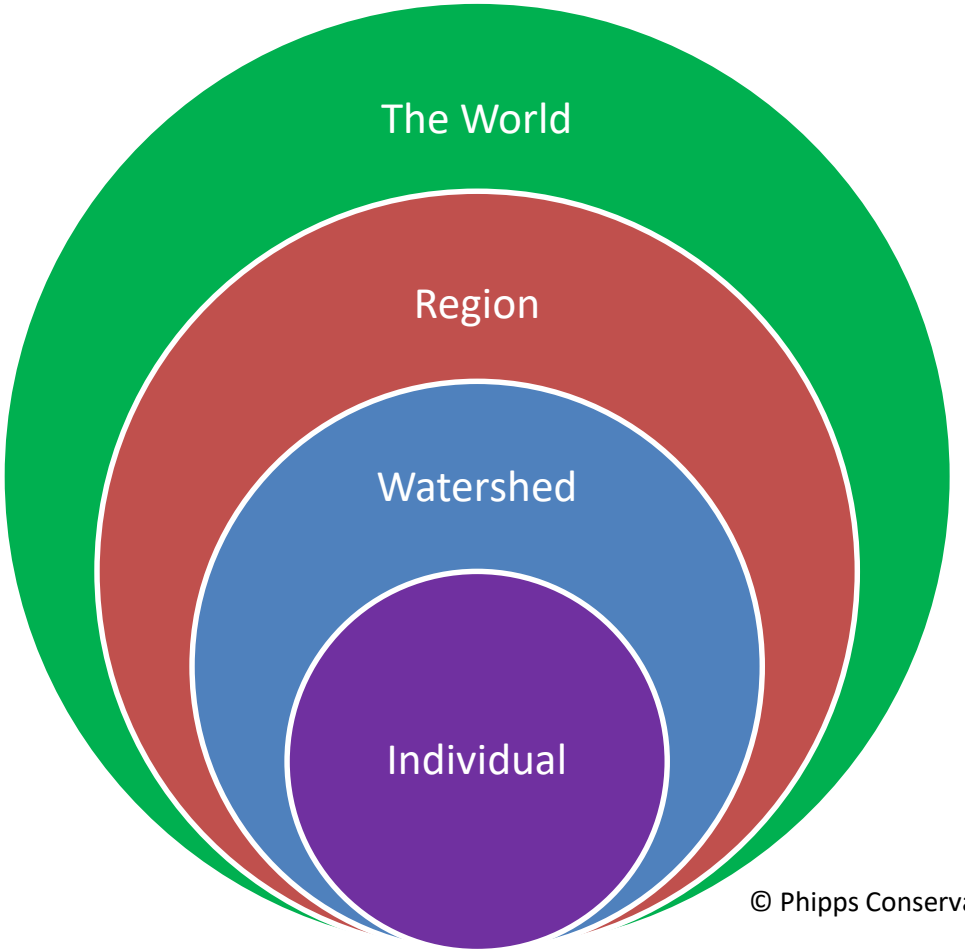
Source: Carol Sanford

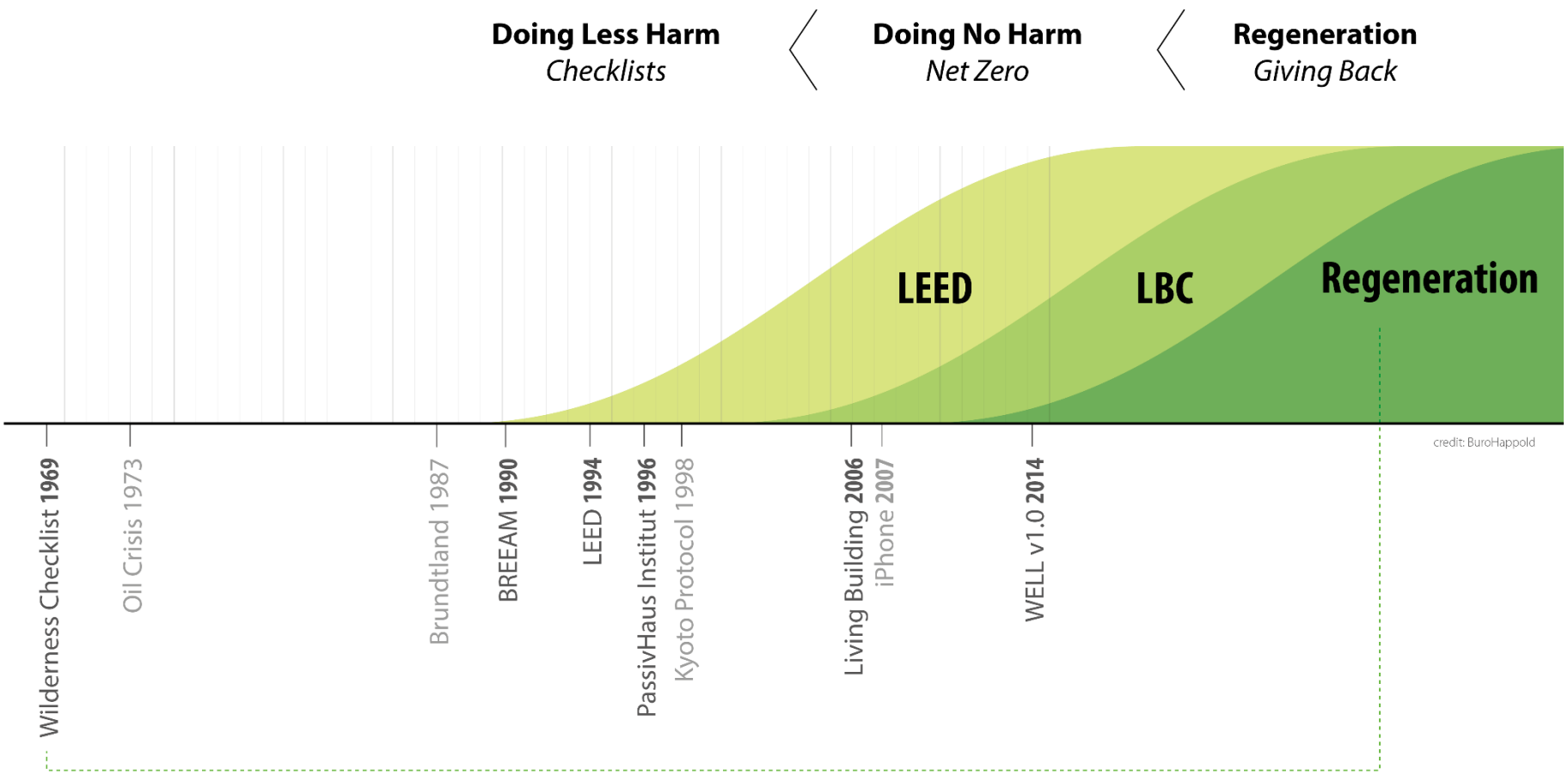
Nature Works in Systems



Focus on Human – Nested Systems

Focus on Natural - Nested Systems





Source: BuroHappold


Phipps Conservatory, Schenley Park, Pittsburg, Pa.
1893

Source: thempfa.org

Source: Hawkeye Aerial Photography

First LEED Visitor Center in a Public Garden

A Conservatory with no Greenhouse Effect

First LEED Greenhouses (Platinum EBOM)

Center for Sustainable Landscapes

Source: Denmarsh Photography, Inc.

LIVING BUILDING CHALLENGE℠ 2.1

INTERNATIONAL LIVING FUTURE INSTITUTE™

U.S. GREEN BUILDING COUNCIL LEED PLATINUM

WELL BUILDING STANDARD WELL CERTIFIED PILOT & MEMBER

SITES CERTIFIED

SUSTAINABLE SITES INITIATIVE™

NETZERO ENERGY BUILDING CERTIFICATION

INTERNATIONAL LIVING FUTURE INSTITUTE™

Turn Values Into Goals

Environment

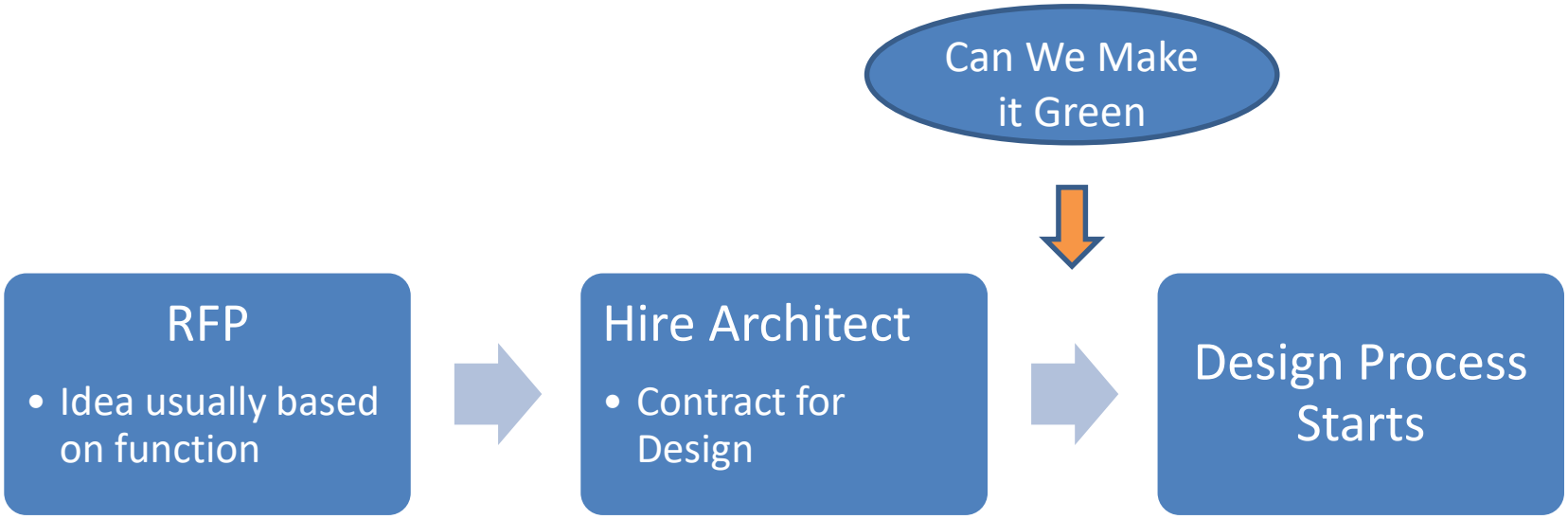
Human Health

Social Justice and Equity

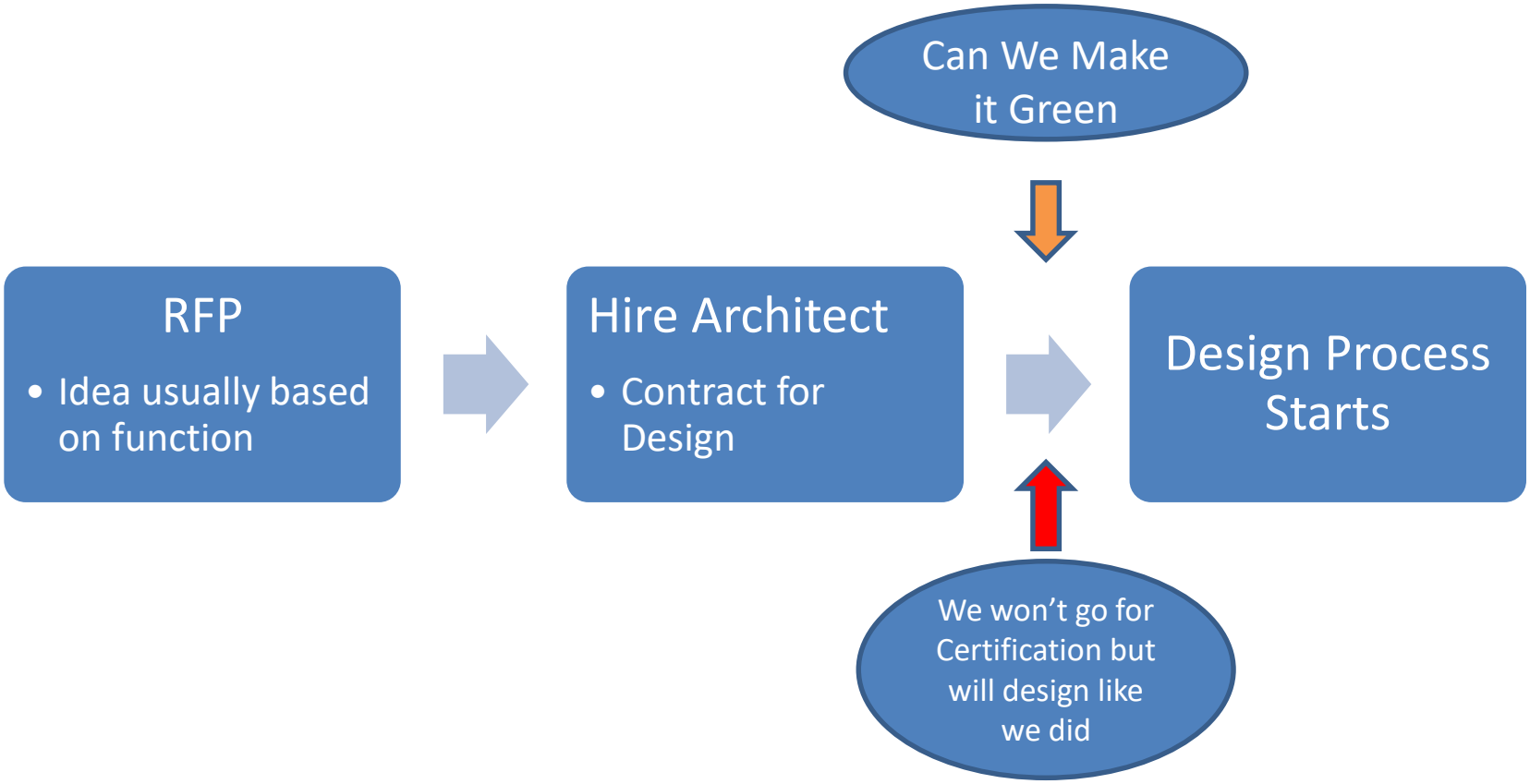
Contract for Success

Typical Design Process – Designed to Fail

Typical Design Process – Designed to Fail



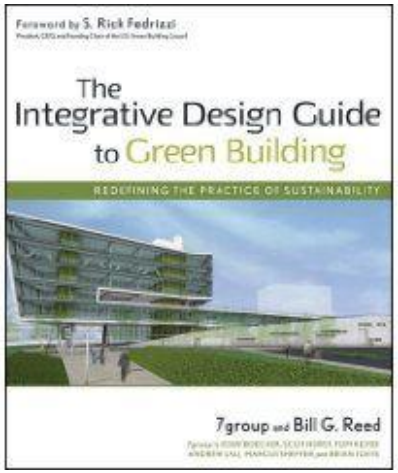
Typical Design Process – Designed to Fail



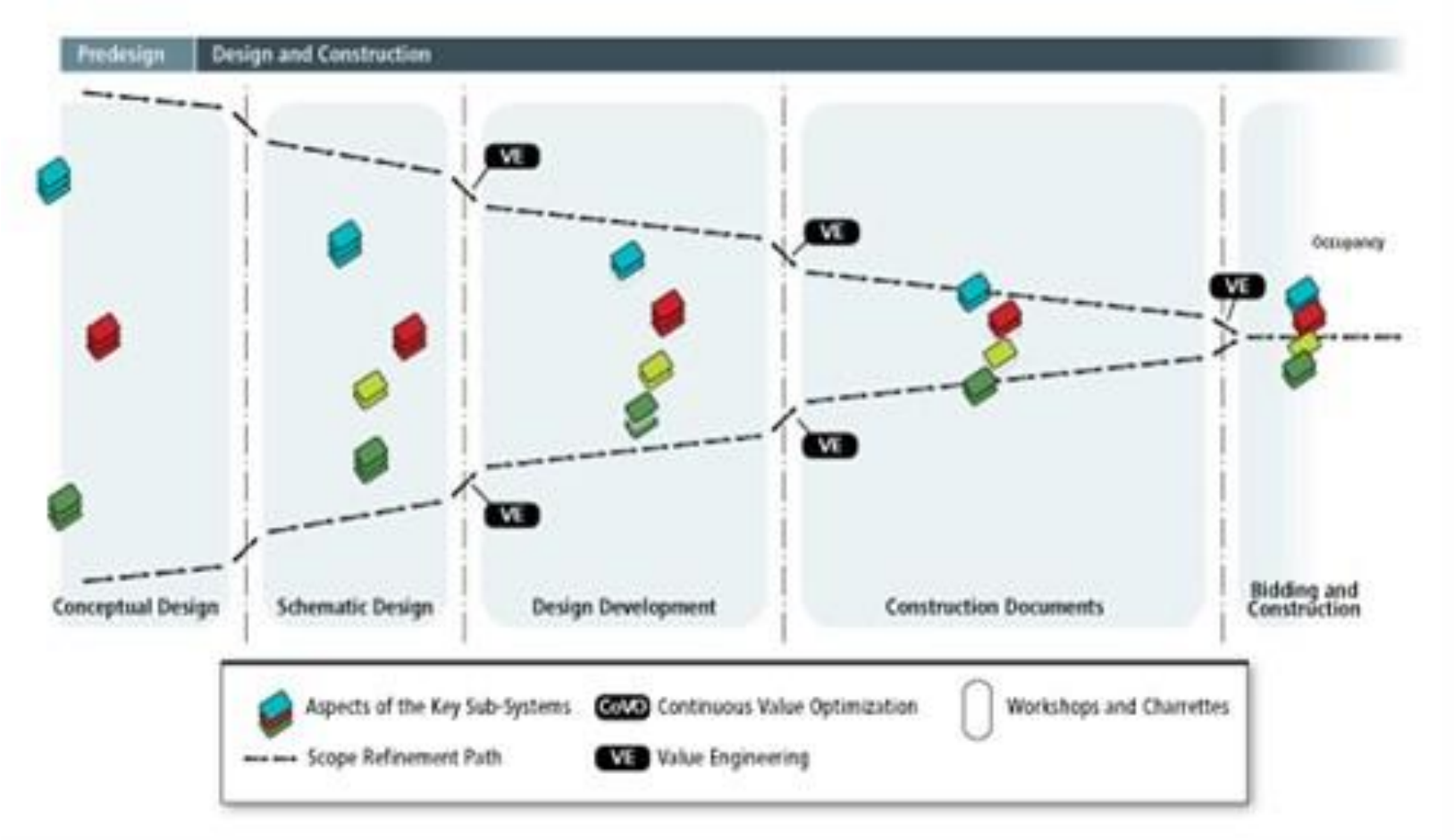
Ideal Design Process – Designed to Succeed

An **integrated design process** (IDP) involves a holistic approach to high performance building, design, and construction. It relies upon every member of the project team sharing a vision of sustainability, and working collaboratively to implement sustainability goals.

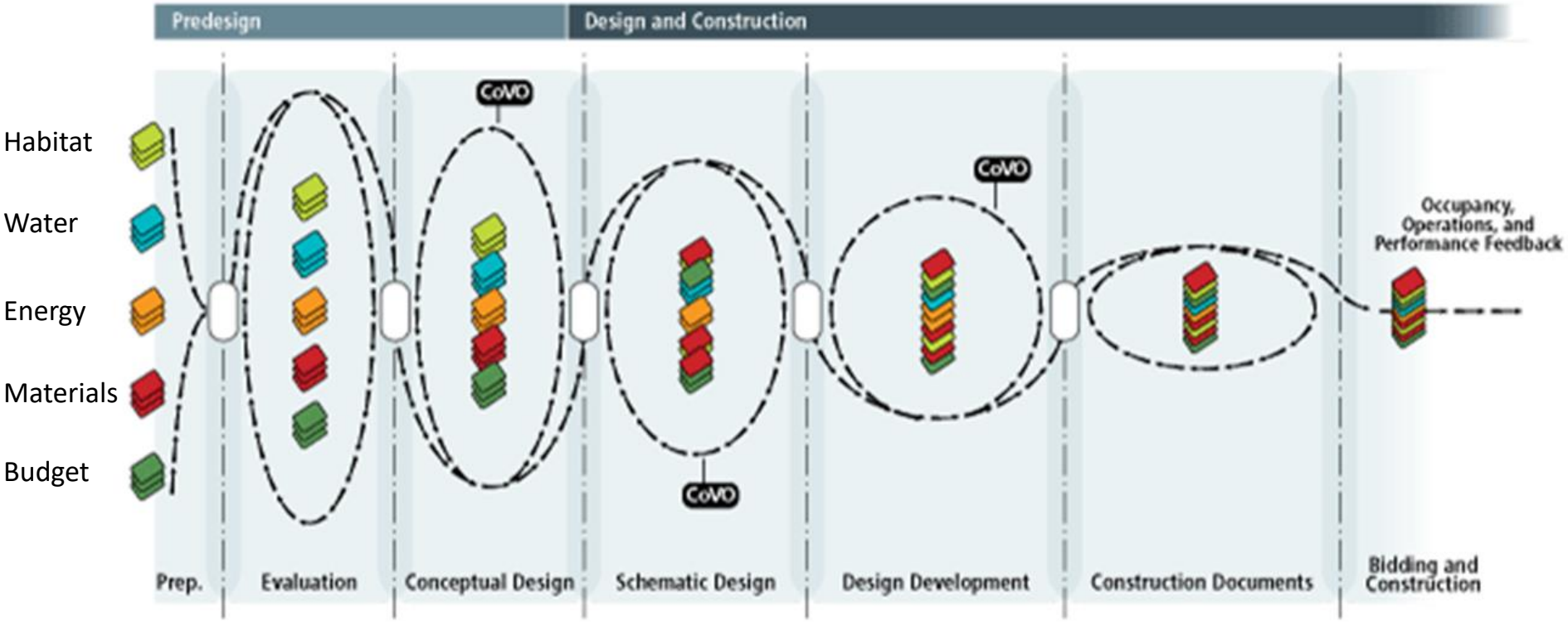

Source: Joshua Franzos



The Integrative Design Guide to Green Building: Redefining the Practice of Sustainability **by 7group and Bill Reed**



Source: © 2009 7group and Bill Reed



Source: © 2009 7group and Bill Reed

GREEN BUILDING STANDARDS

Rating Systems are Worth the Cost

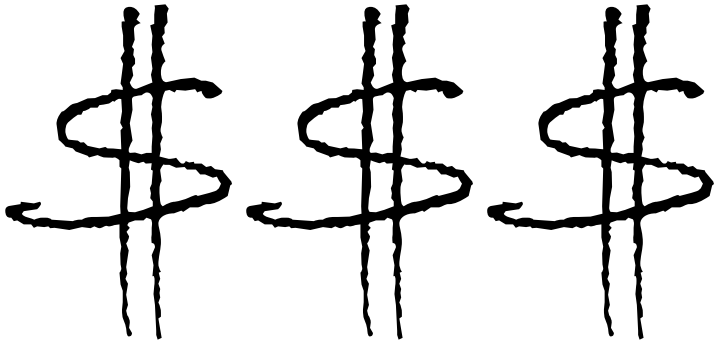
Institutional Thinking
Long Term Value vs. Short Term Costs

Your Mission

Your Aspirations

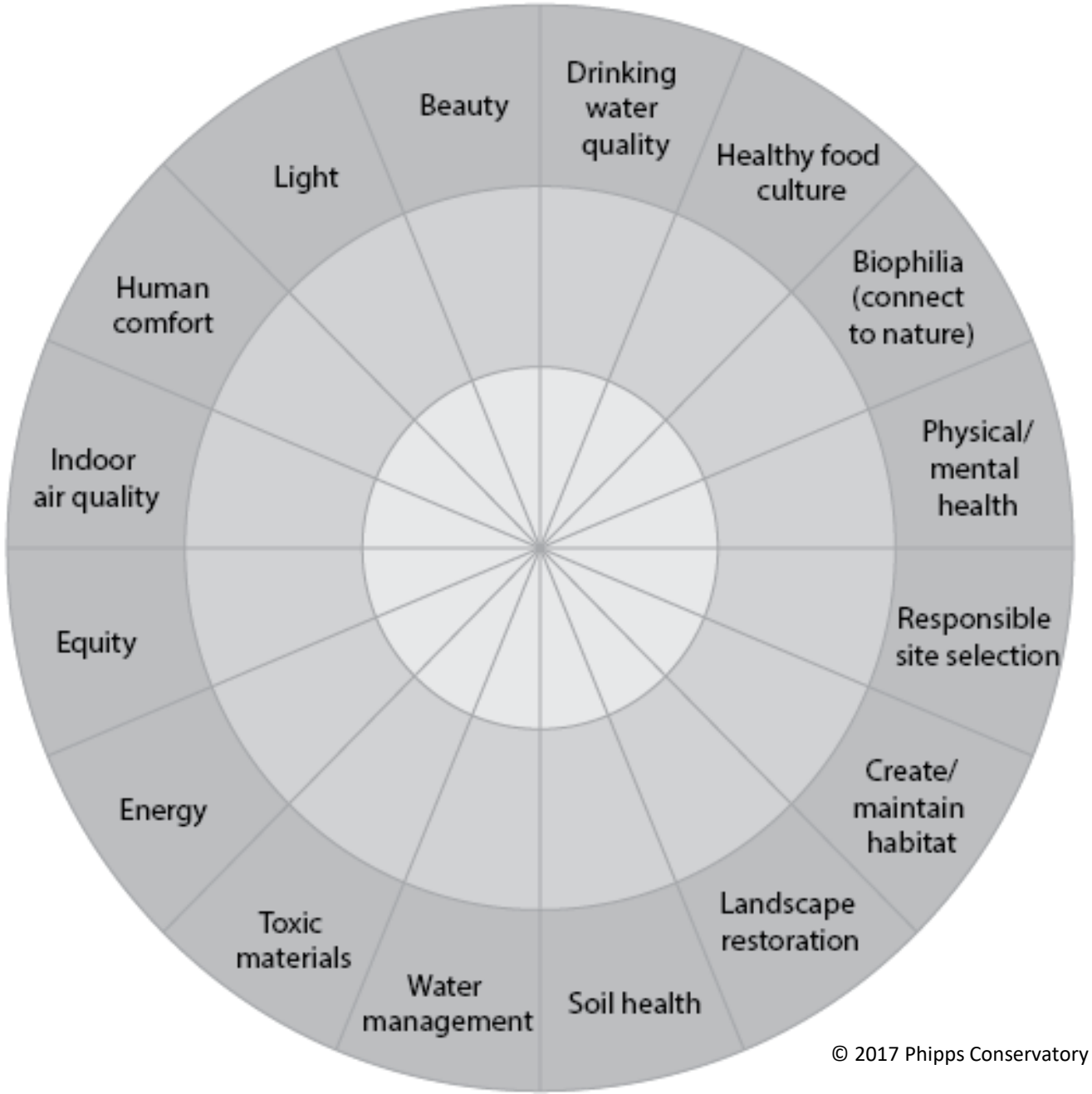
Your Role in the Community

Your Role in the World



What is the Long Term Costs of Operating the Building Over the Next 100 Years

How important is _____ in your project?



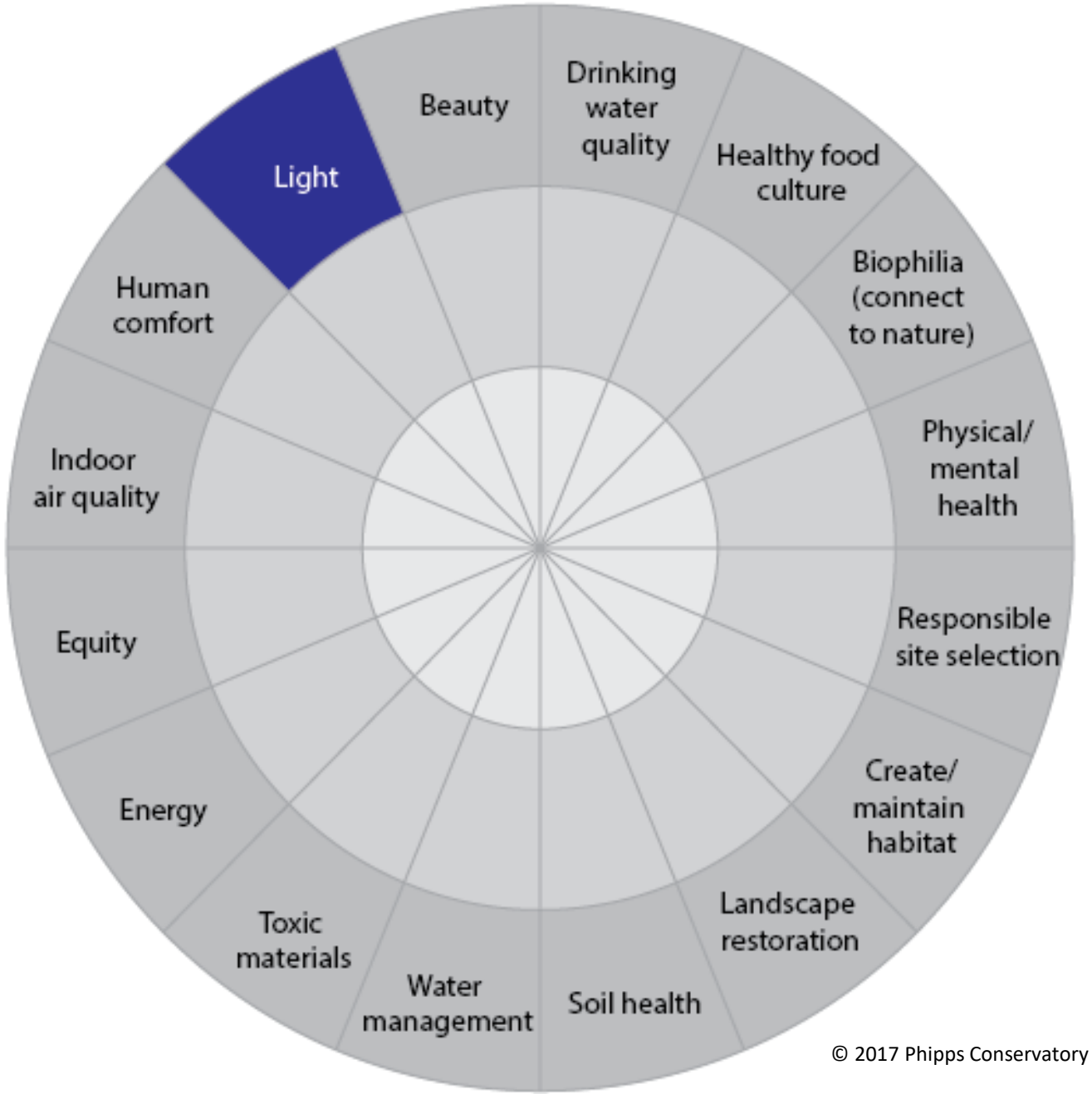
Very important

Important

A little important

Not important? Leave blank.

How important is _____ in your project?



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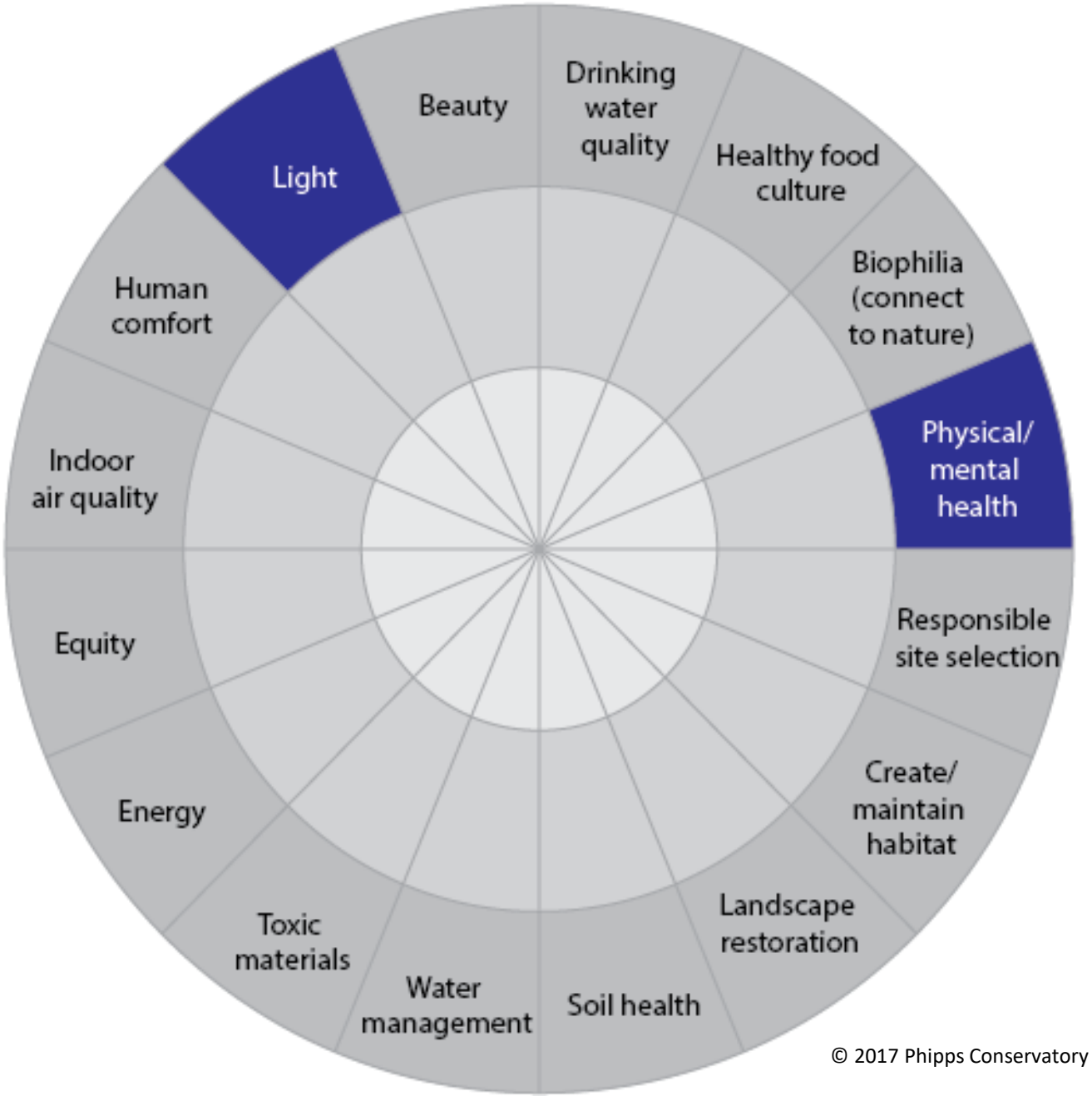

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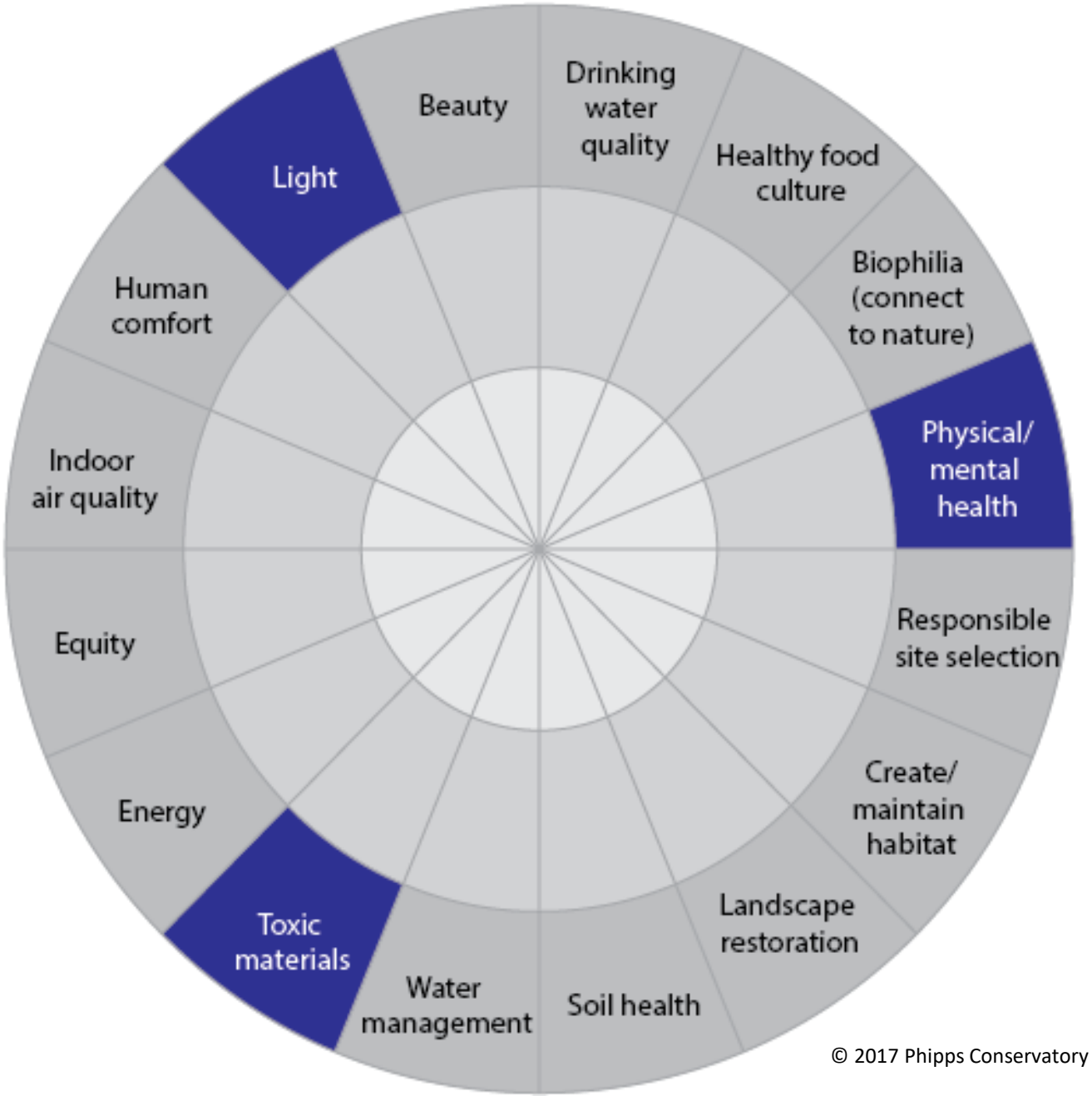

Very important

Important

A little important

Not important? Leave blank.

How important is _____ in your project?

Very important

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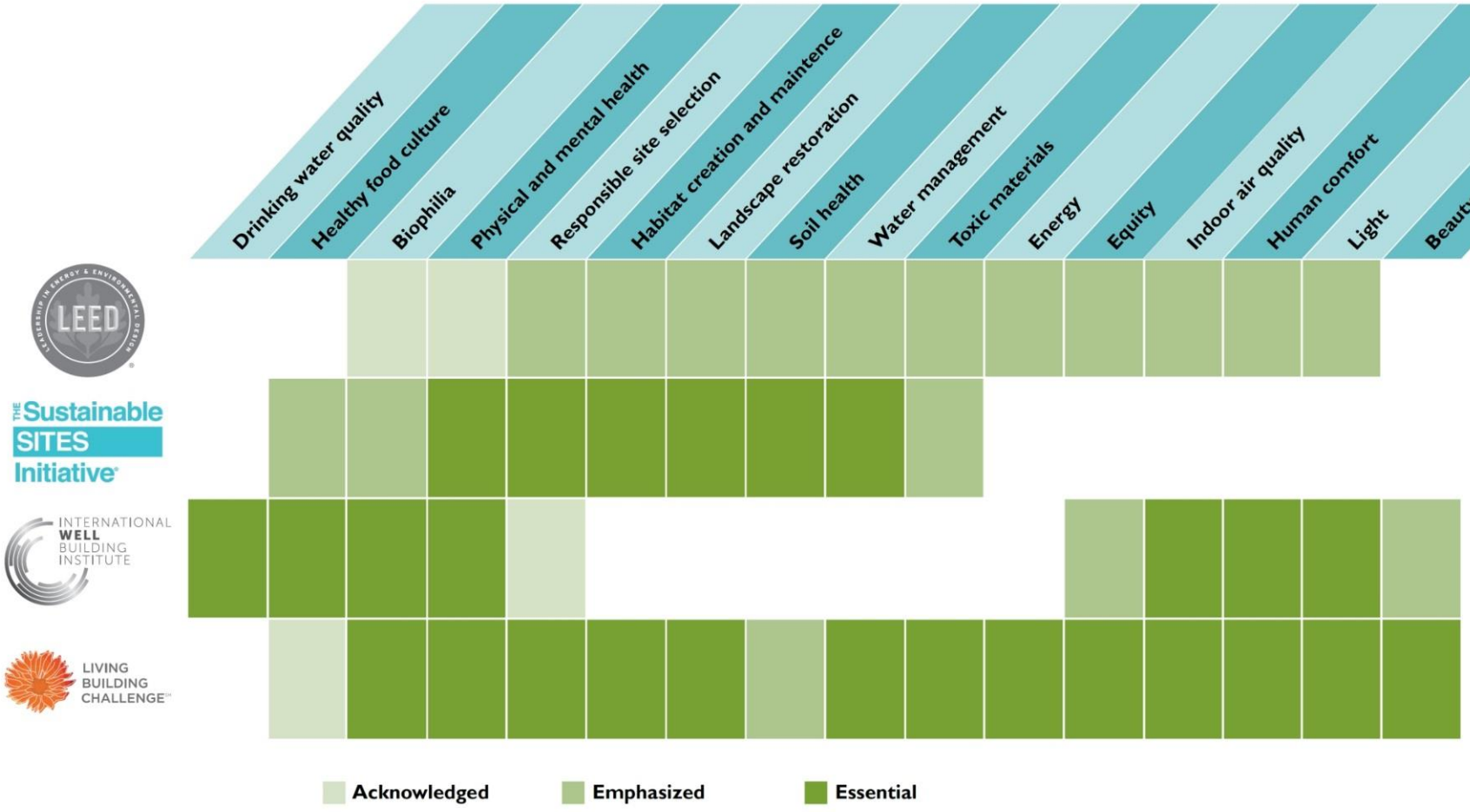
A little important

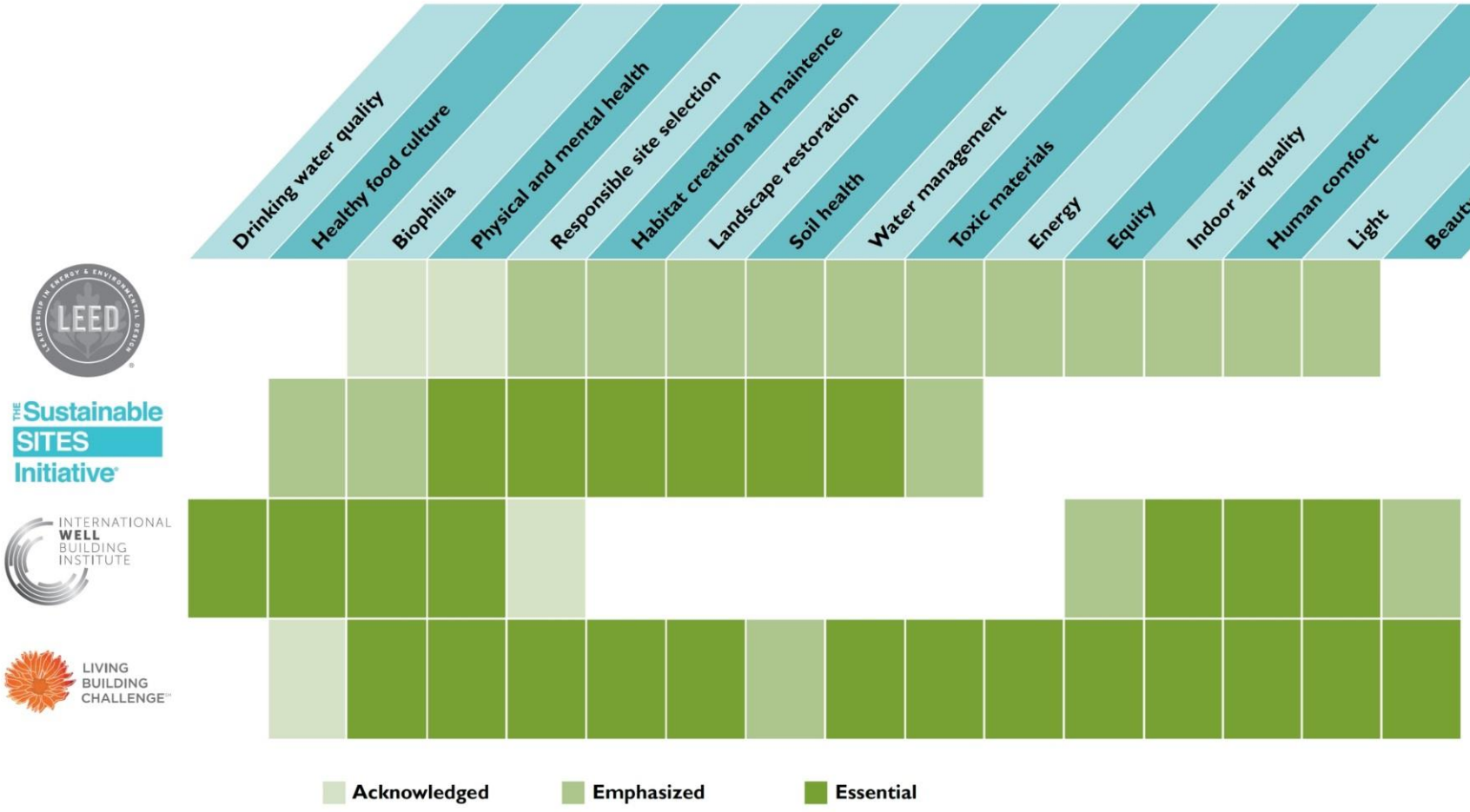
Not important? Leave blank.

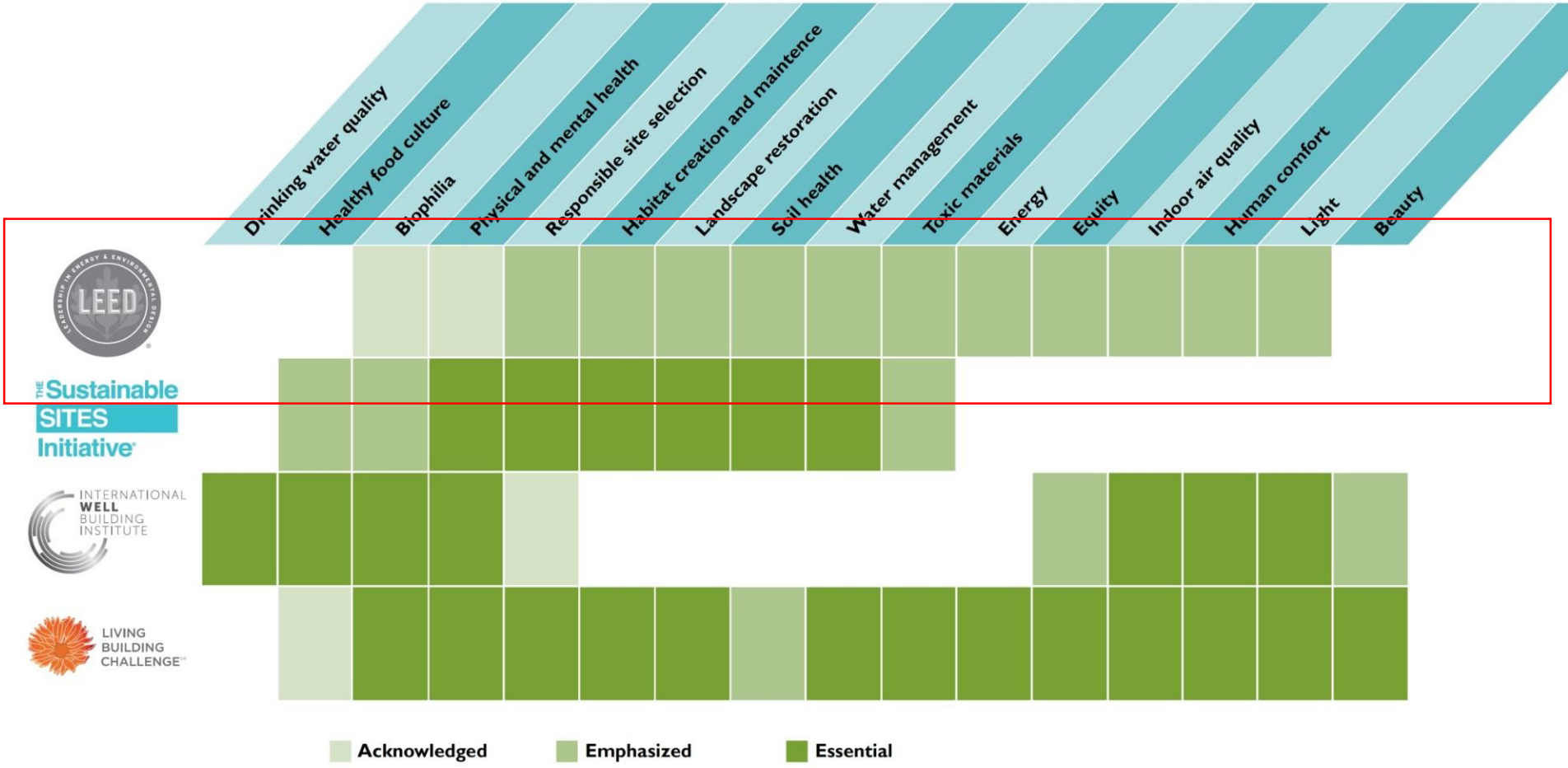
THE Sustainable SITES Initiative®

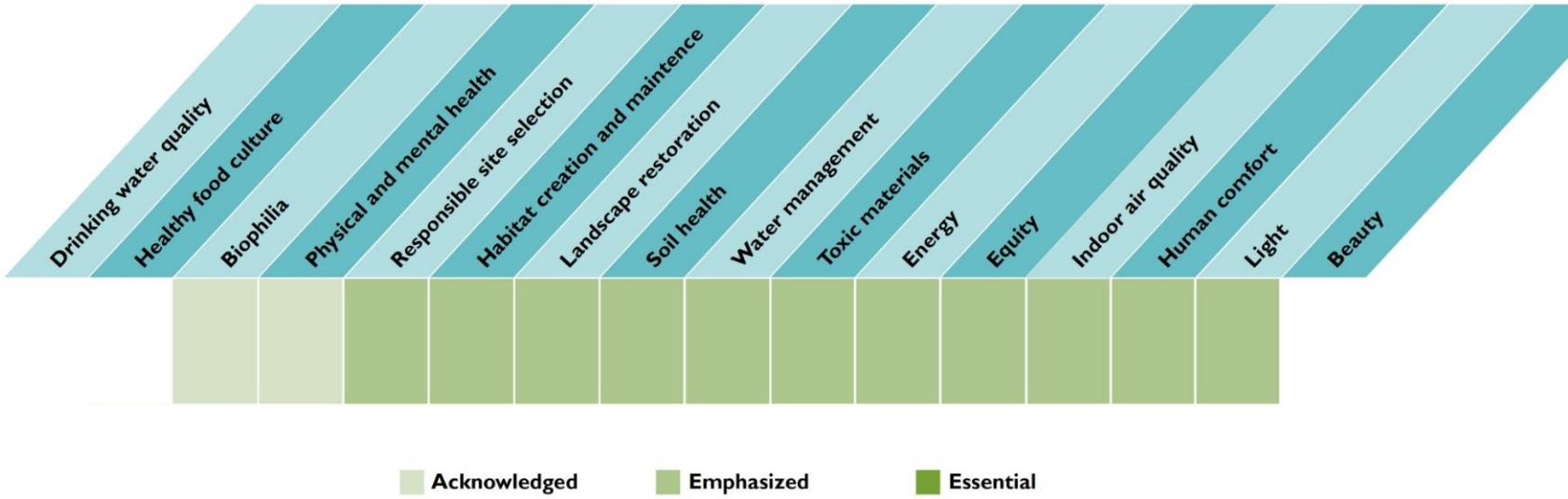
ZERO ENERGY CERTIFICATION

LIVING BUILDING CHALLENGE℠

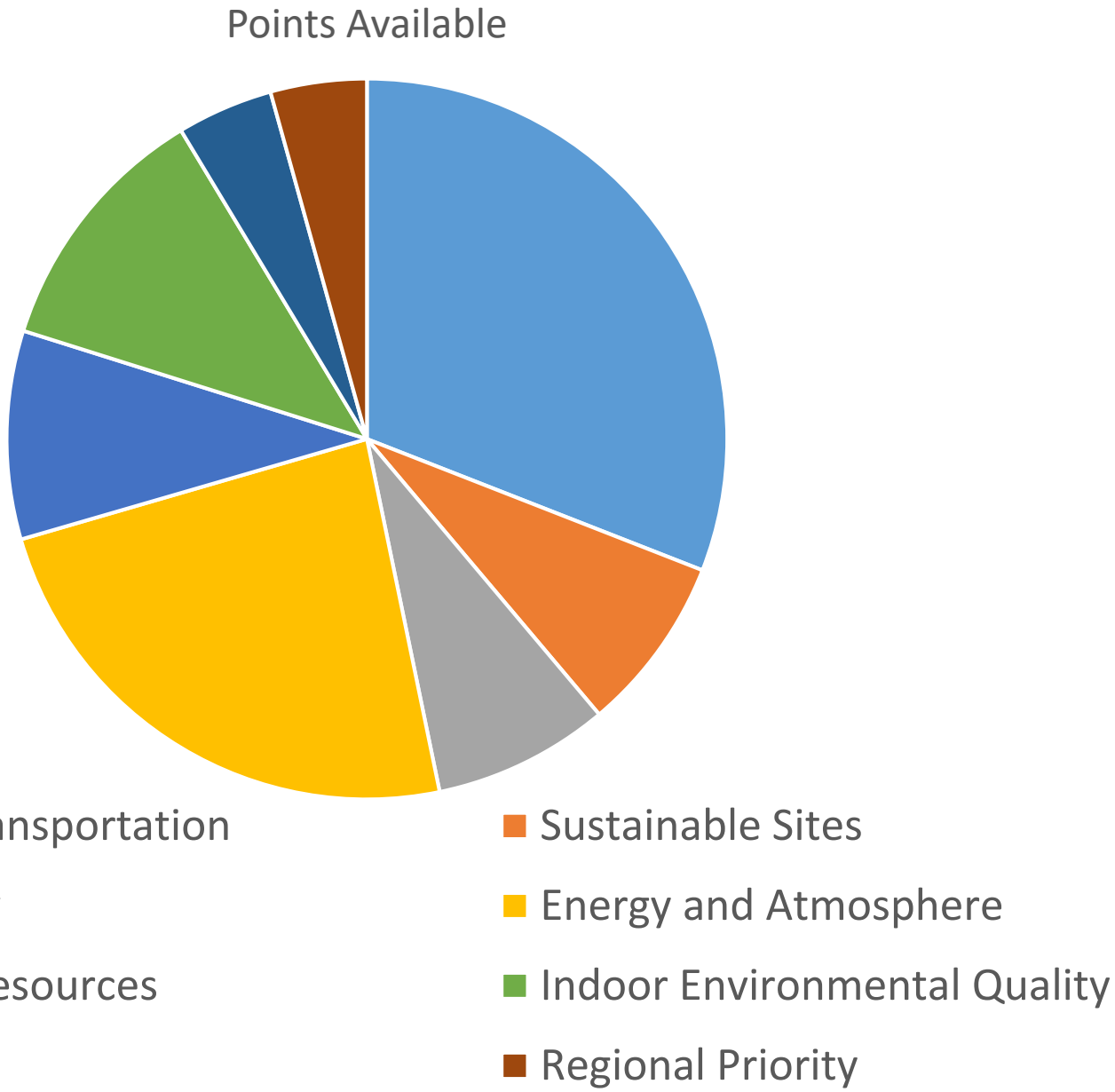








LEED Credits



Location and Transportation

- Alternative transportation
- Site context and density

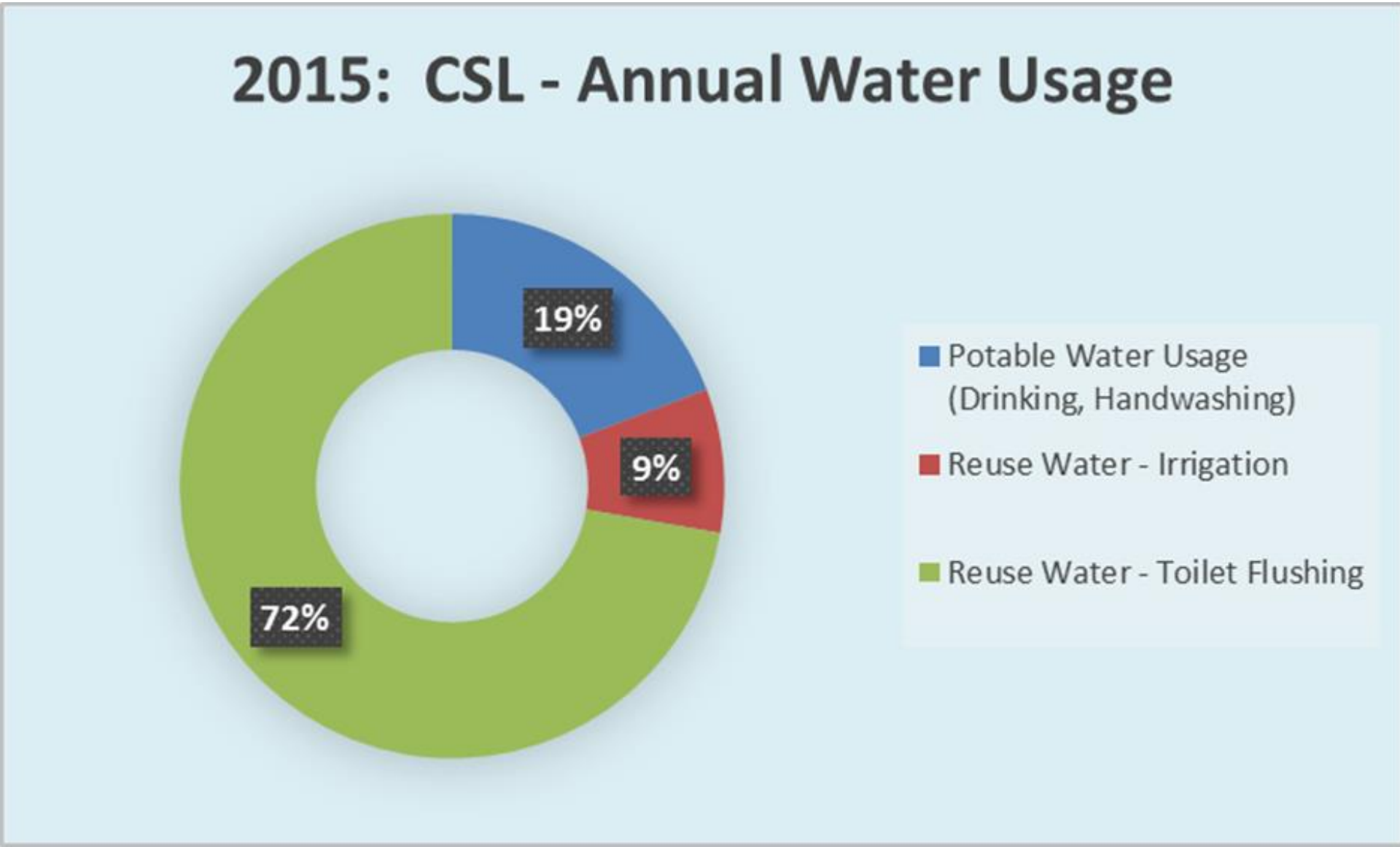
Energy and Atmosphere

- Energy efficiency
- Renewable power
- Performance verification

U.S. Green Building Council

LEED at the CSL

LEED at the CSL



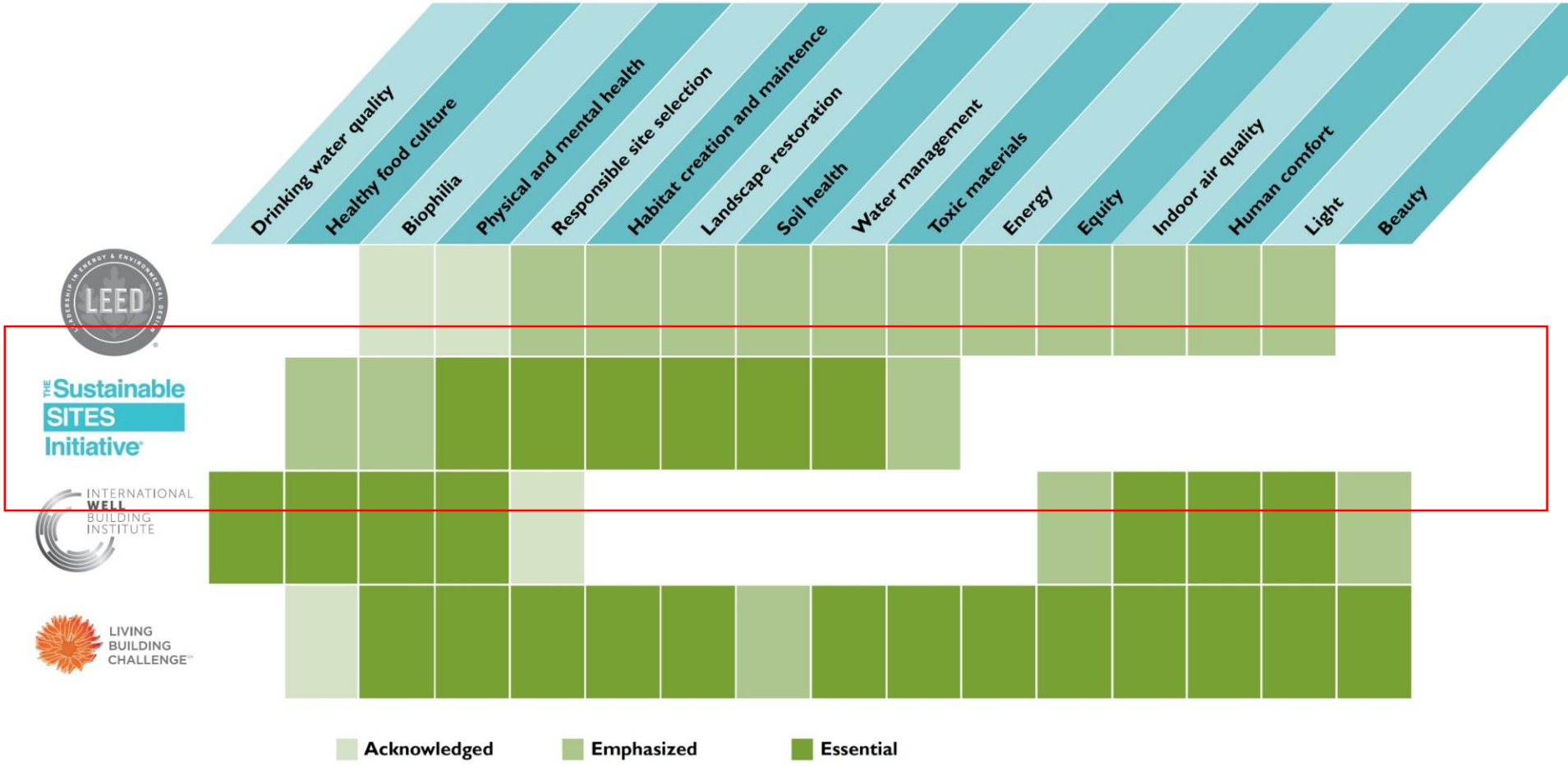
LEED at the CSL

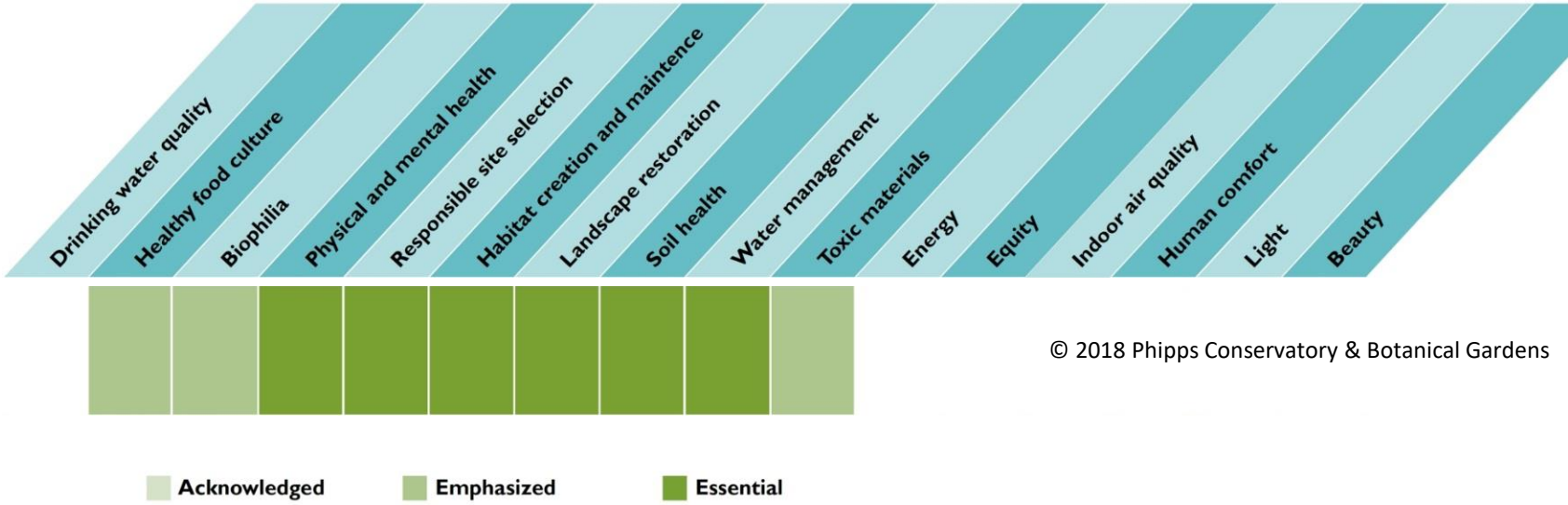
Year 1		Year 2	
Renewables	133,301 kwh	Renewables	133,891 kwh
Building Usage	129,876 kwh	Building Usage	122,706 kwh
Net	+3,425 kwh	Net	+11,185 kwh
EUI	**20 kbtu/sf/yr**	**EUI**	**19 kbtu/sf/yr**

LEED:
Resource efficiency + high performance

Source: Paul g. Wiegman

www.usgbc.org/leed





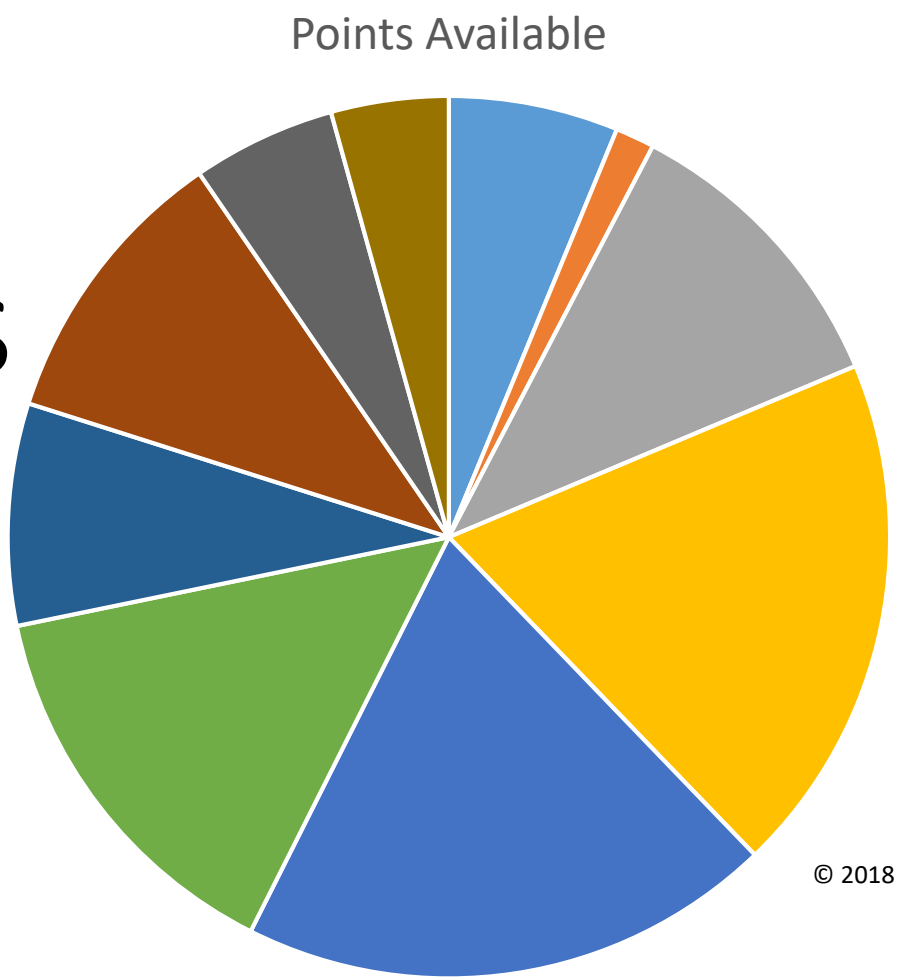
The Sustainable SITES Initiative

AMERICAN SOCIETY OF LANDSCAPE ARCHITECTS
ASLA Library & Education Advocacy Fund

Lady Bird Johnson Wildflowercenter
THE UNIVERSITY OF TEXAS AT AUSTIN

United States Botanic Garden

SITES Credits

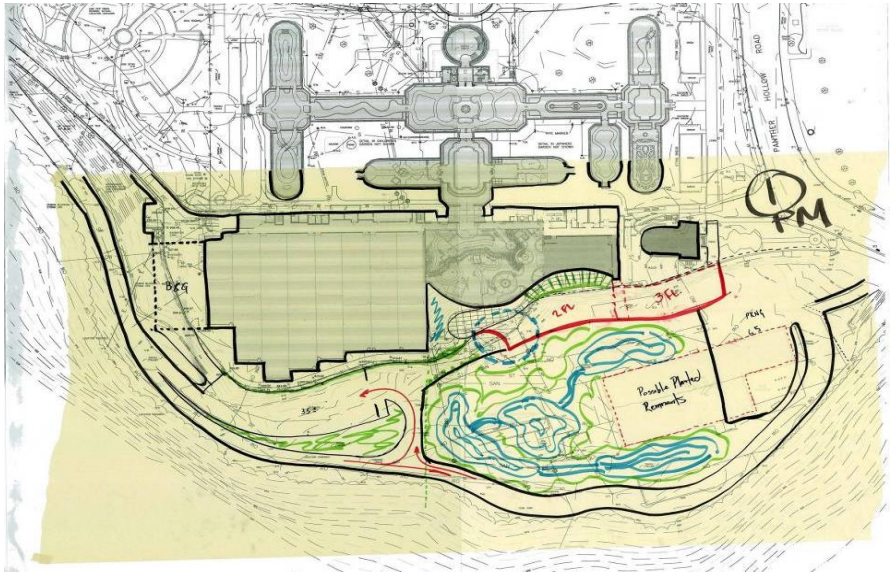


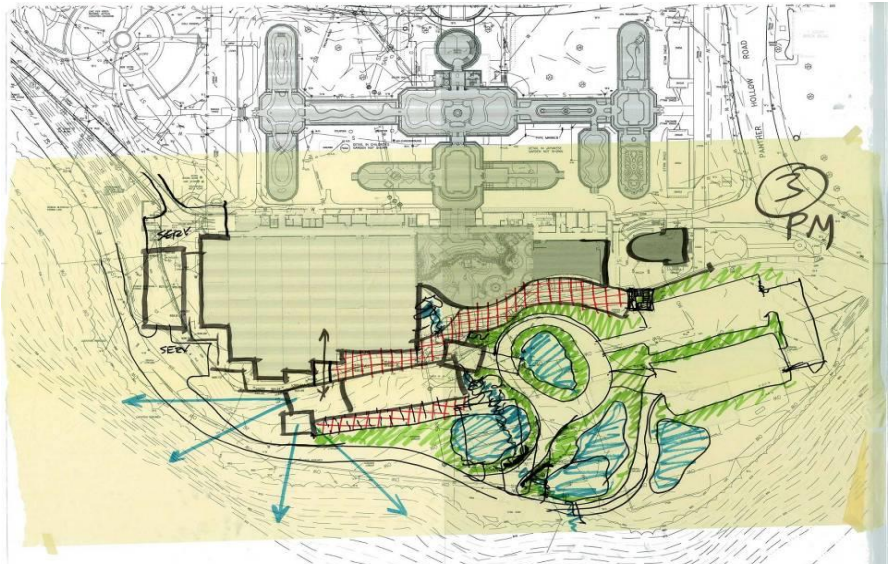
- Site context
- Pre-design assessment + planning
- Site design - water
- Site design - soil + vegetation
- Site design - materials selection
- Site design - human health + well-being
- Construction
- Operations + maintenance
- Education + performance monitoring
- Innovation or exemplary performance

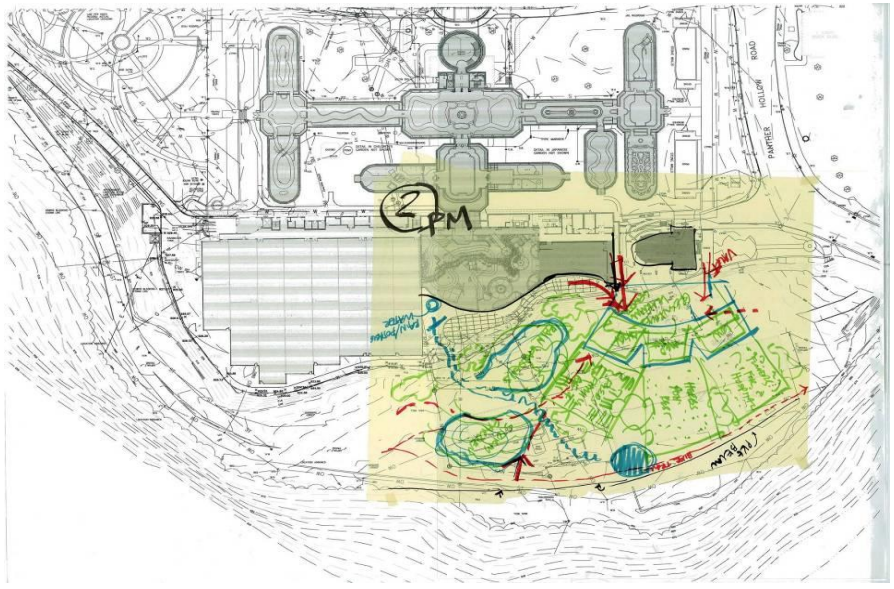
Every project holds the potential to conserve, restore and create the benefits provided by **healthy ecosystems**.

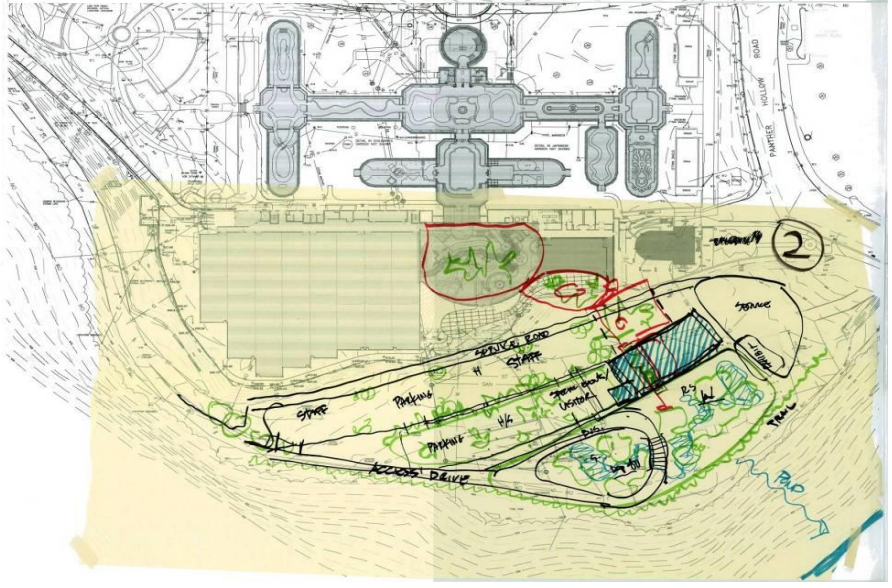
Source: SITES Client Deck, Green Building Certification Inc.

Uses systems oriented approach to problem solving

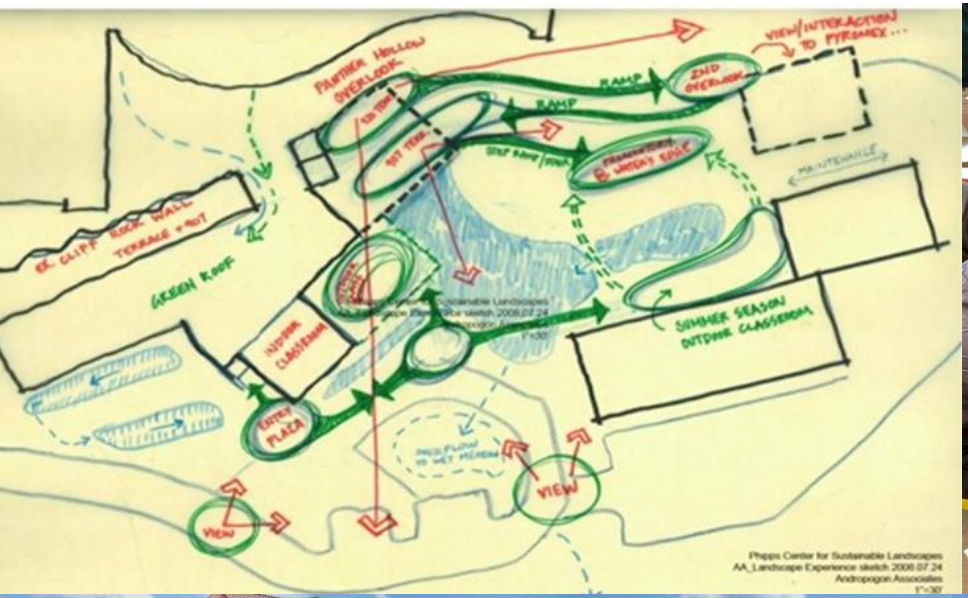


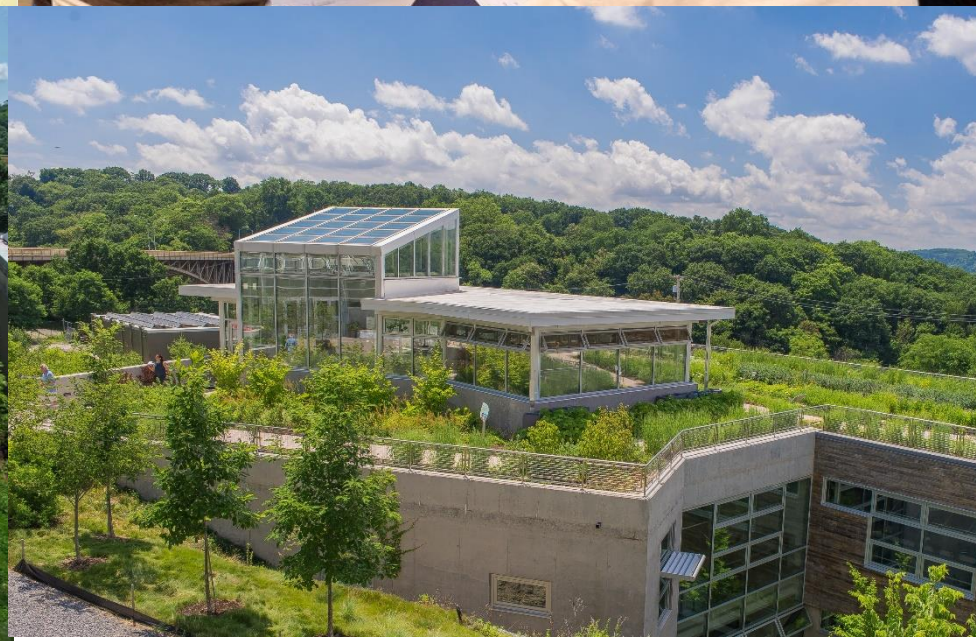






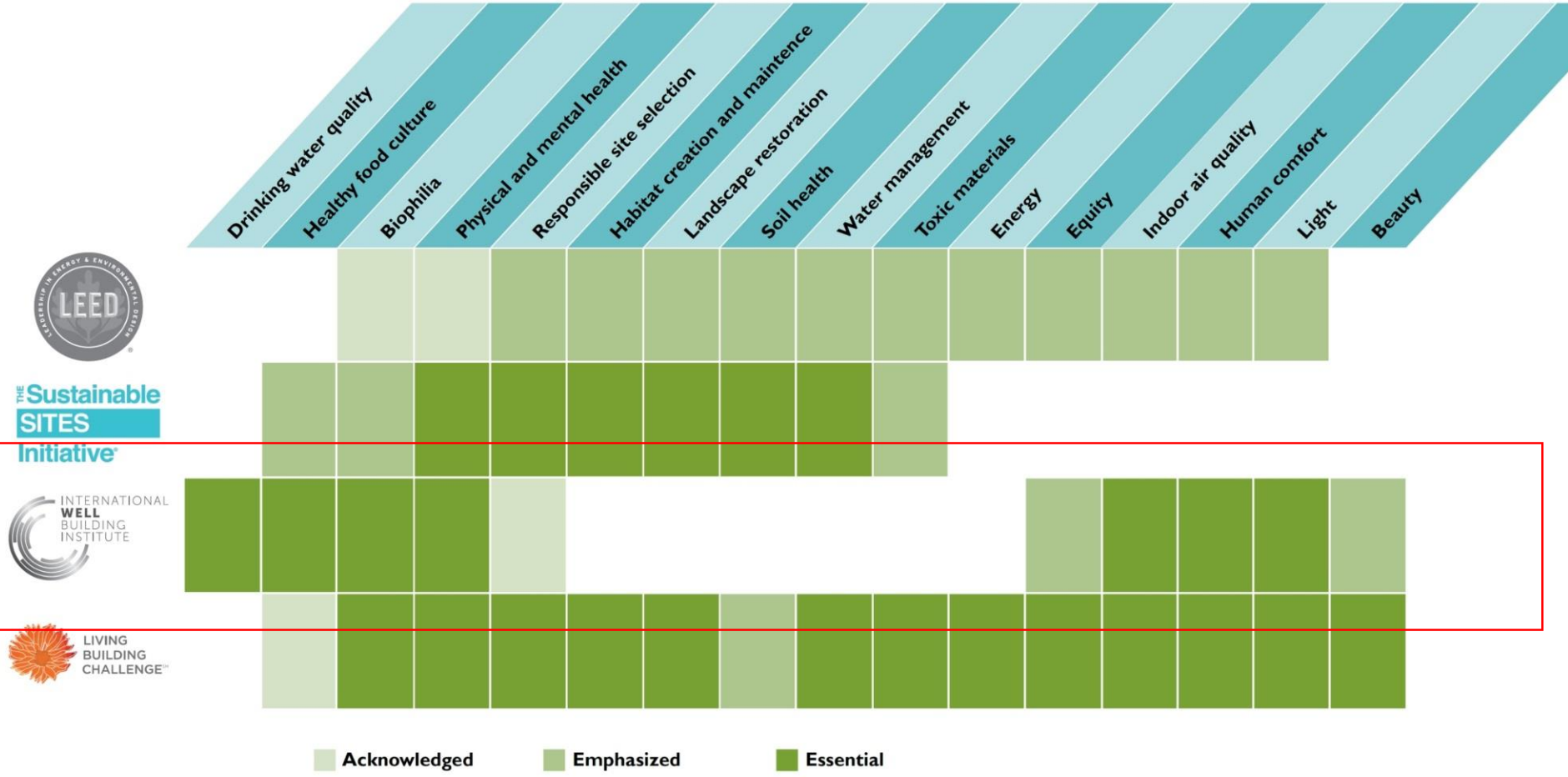
SITES at the CSL

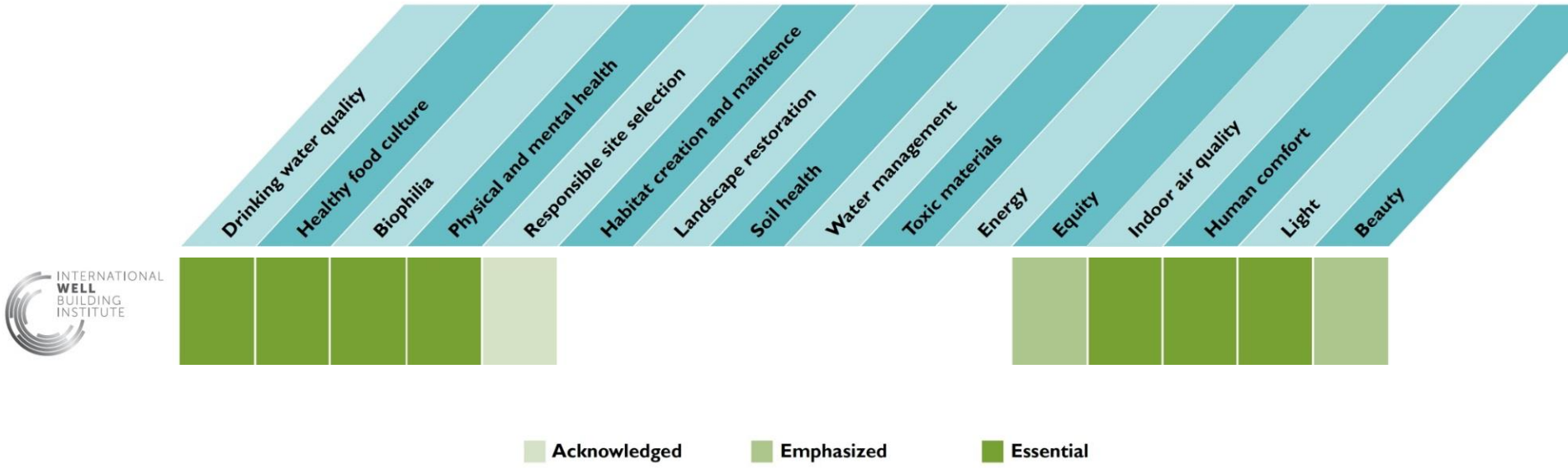




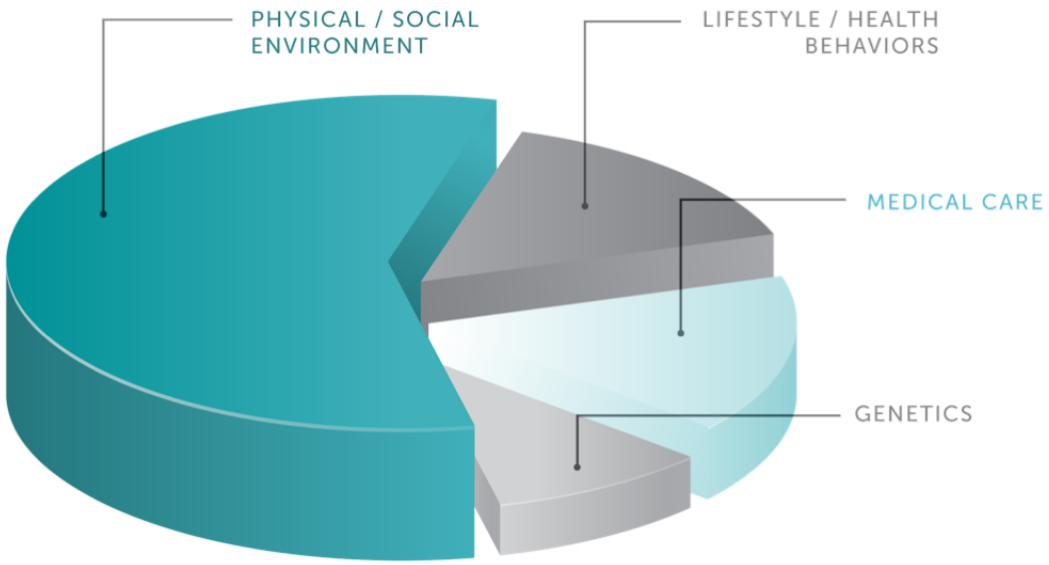

Source: Paul g. Wiegman


SITES:
Ecosystem health
http://www.sustainablesites.org/
Source: Paul g. Wiegman



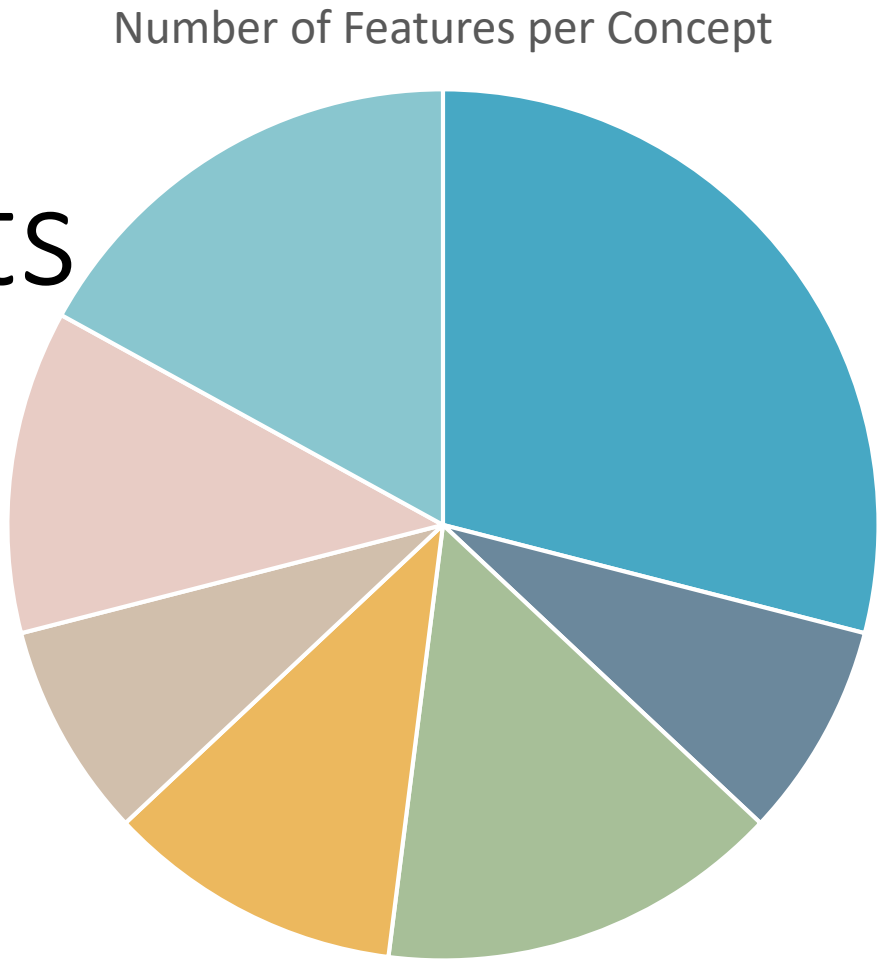


WHAT DETERMINES THE STATE OF HEALTH?



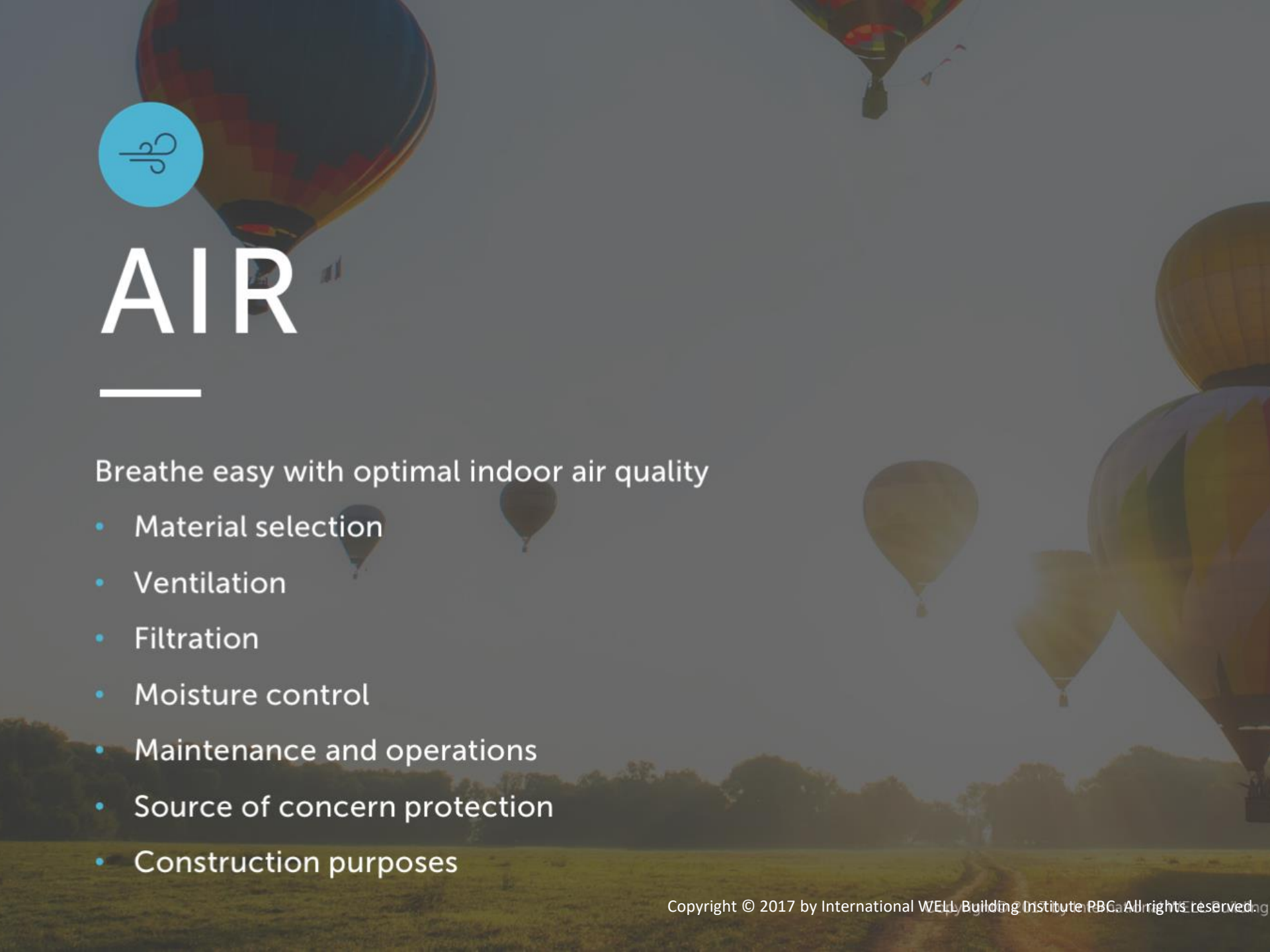
Source: Centers for Disease Control and Protection. Frequently Asked Questions. 2014. Available online at: http://www.cdc.gov/nchhstp/socialdeterminants/faq.html

WELL Concepts



AIR WATER NOURISHMENT LIGHT FITNESS COMFORT MIND

Source: International WELL Building Institute



AIR

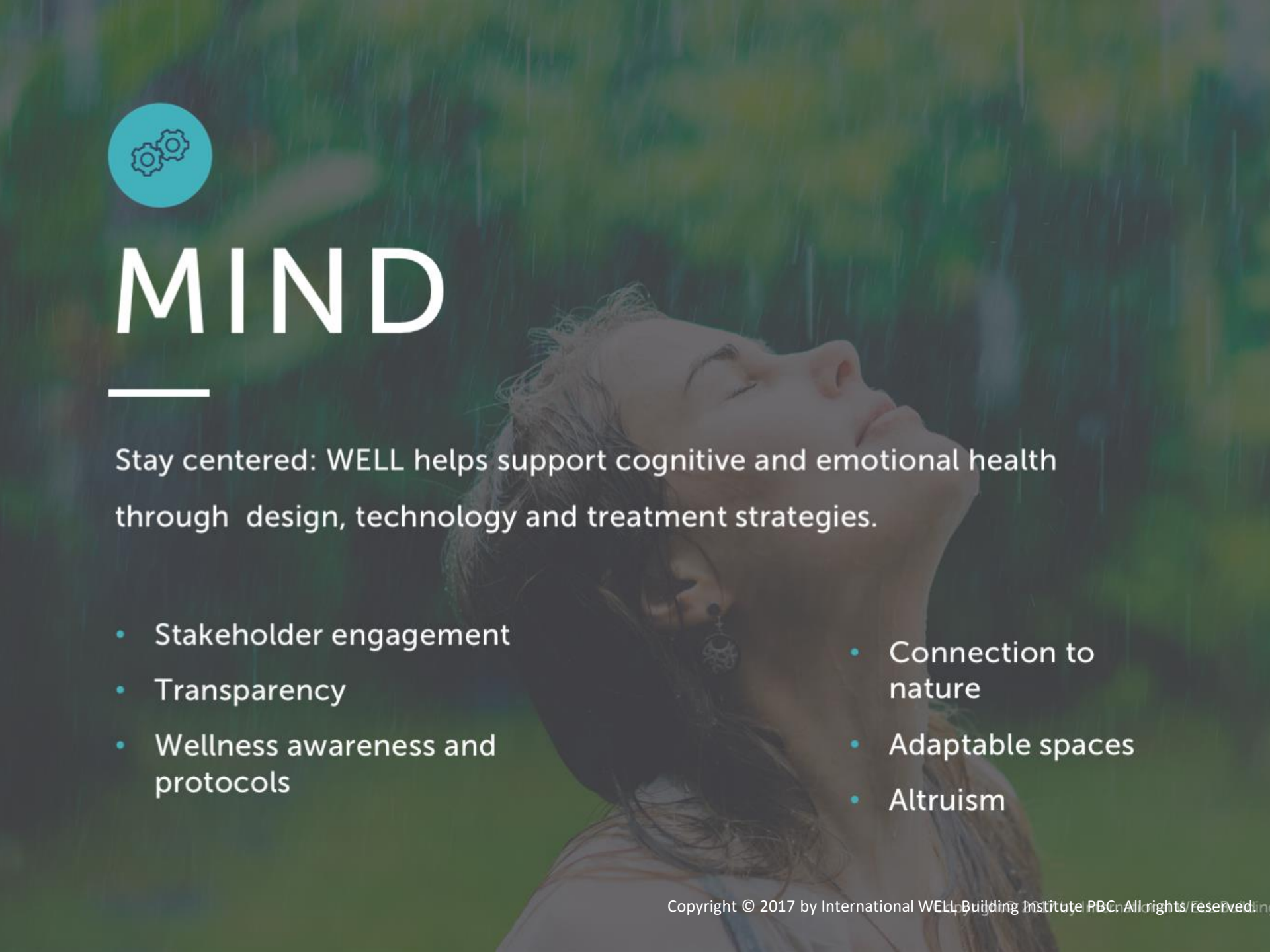
Breathe easy with optimal indoor air quality

- Material selection
- Ventilation
- Filtration
- Moisture control
- Maintenance and operations
- Source of concern protection
- Construction purposes

NOURISHMENT

Dig in to wholesome foods. WELL Certified™ buildings limit the presence of unhealthy ingredients and can encourage better eating habits.

- Healthy portions
- Mindful eating
- Food production
- Access to healthy foods
- Food preparation
- Allergies and alternatives
- Transparency
- Environmental Cues and influencers



MIND

Stay centered: WELL helps support cognitive and emotional health through design, technology and treatment strategies.

- Stakeholder engagement
- Transparency
- Wellness awareness and protocols
- Connection to nature
- Adaptable spaces
- Altruism

WELL at the CSL


Photo credit: Denmarsh Photography, Inc

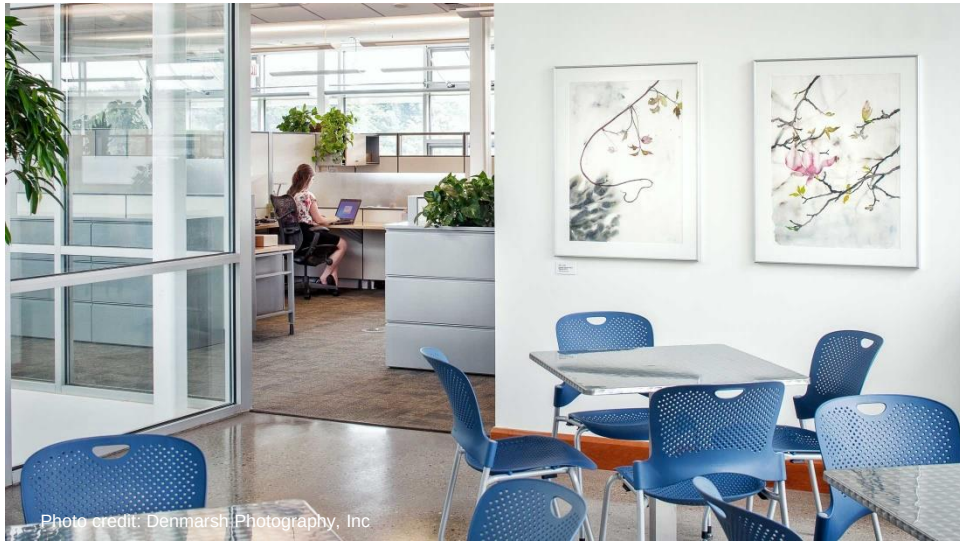


Photo credit: Denmarsh Photography, Inc


Photo credit: Denmarsh Photography, Inc


Photo credit: Paul g. Wiegman

Building Costs

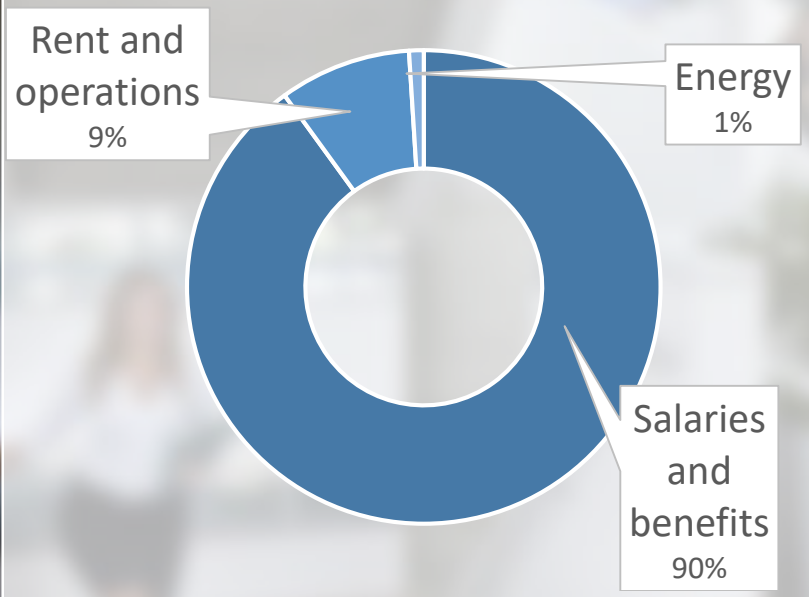
First costs
(one time)

+

Operations Costs
(ongoing)

WELL is healthy + happy + productive

Operating Expenses



Cost of WELL Certification

$1-4/sf one time cost

Benefit of WELL Certification

1% reduction in turnover

$1.50-$2.50/sf per year

2% reduction in absenteeism

$1-2/sf per year

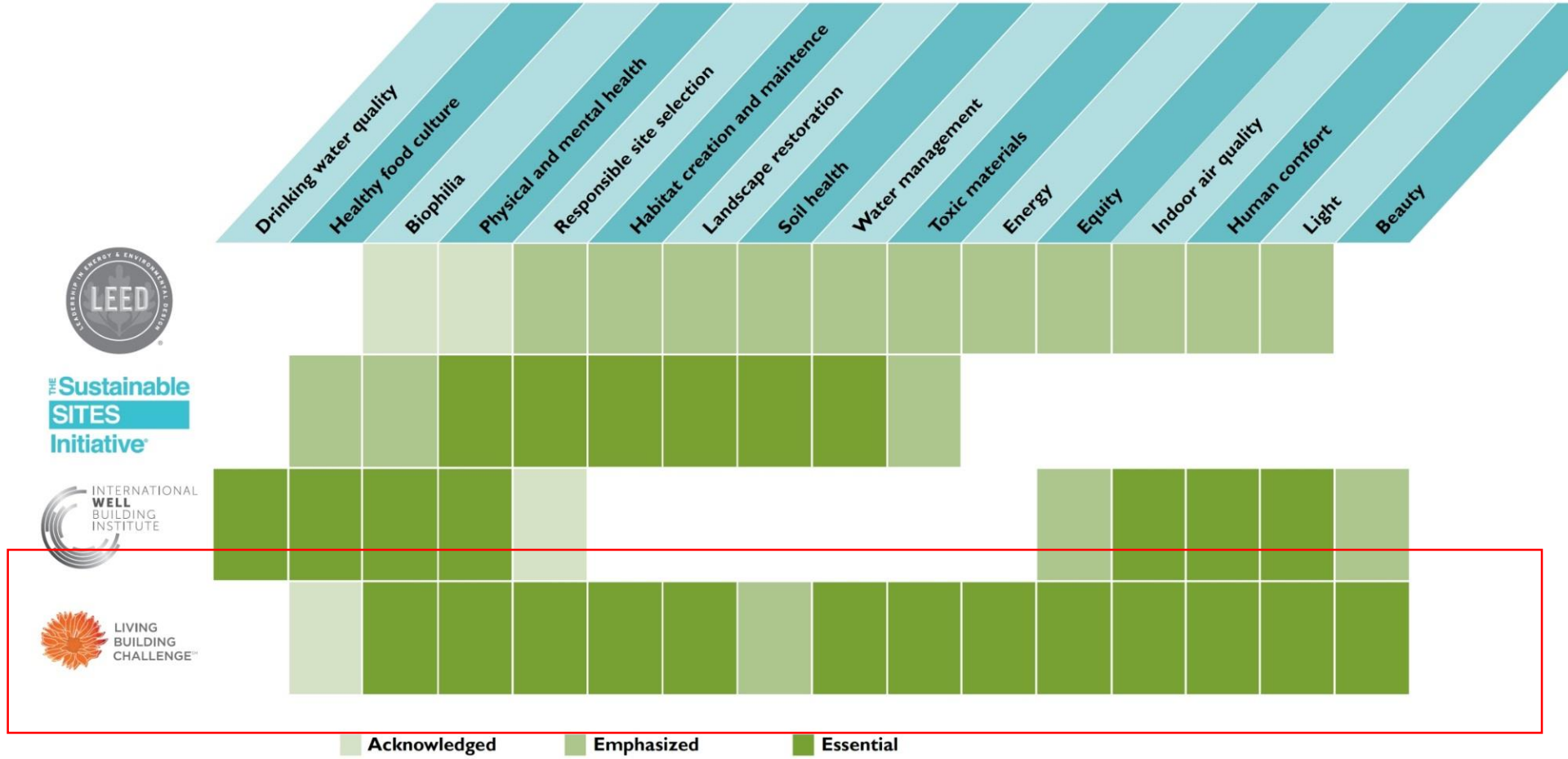
Sources: Urban Land "Making the Case for Health: Insights from the First WELL Projects" 2017
Knoll Workplace Research "What's Good for People, Moving from Wellness to Well-Being" 2014

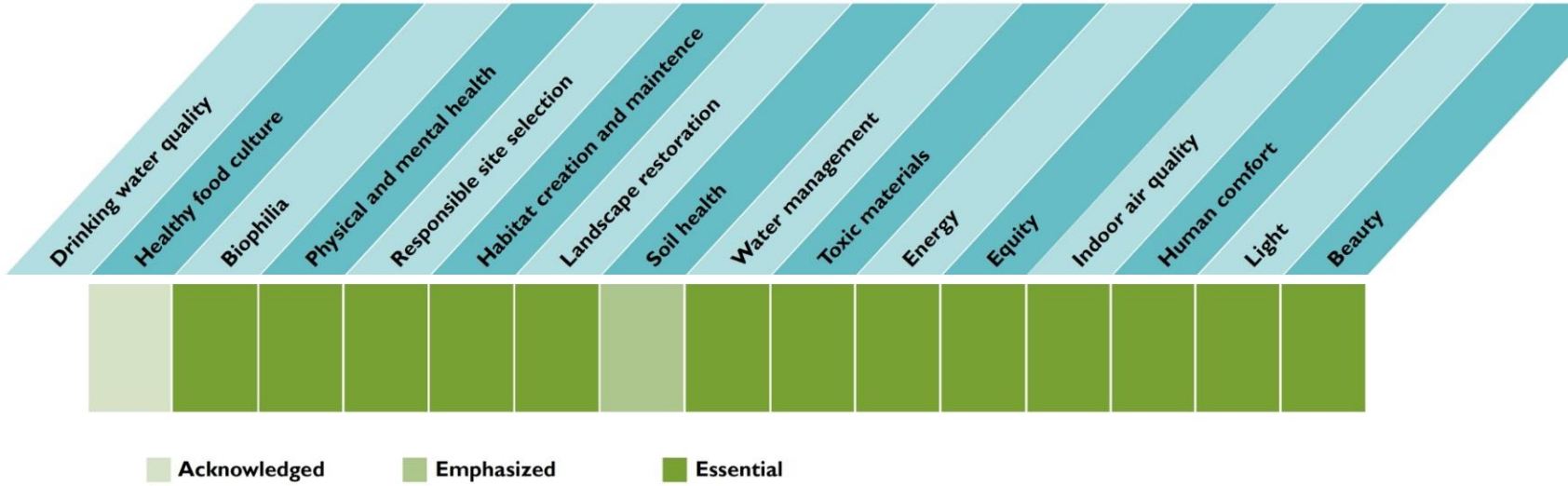
Photo credit: Denmarsh Photography, Inc

WELL:
Human health

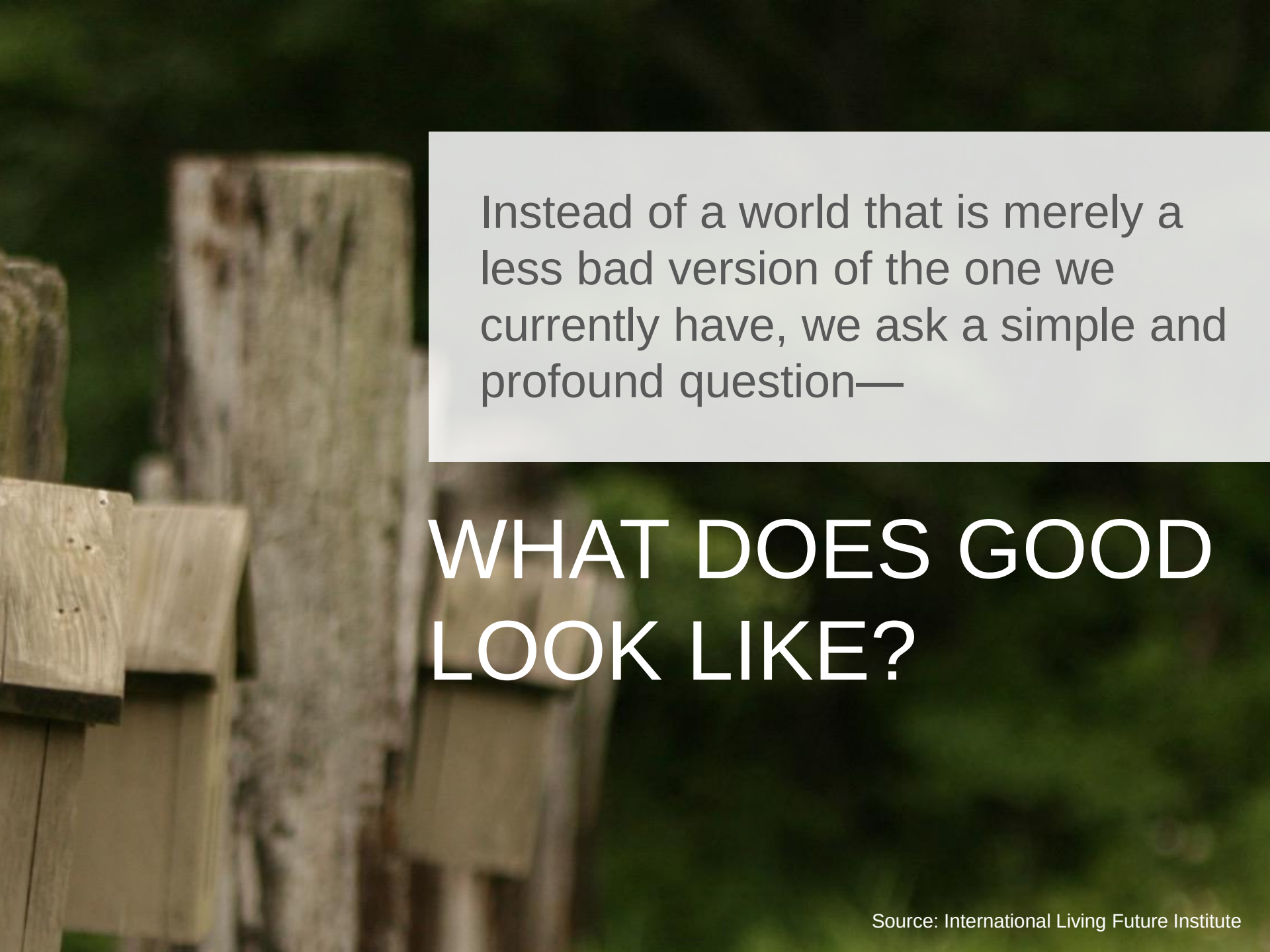
www.wellcertified.org

Photo credit: Denmarsh Photography, Inc





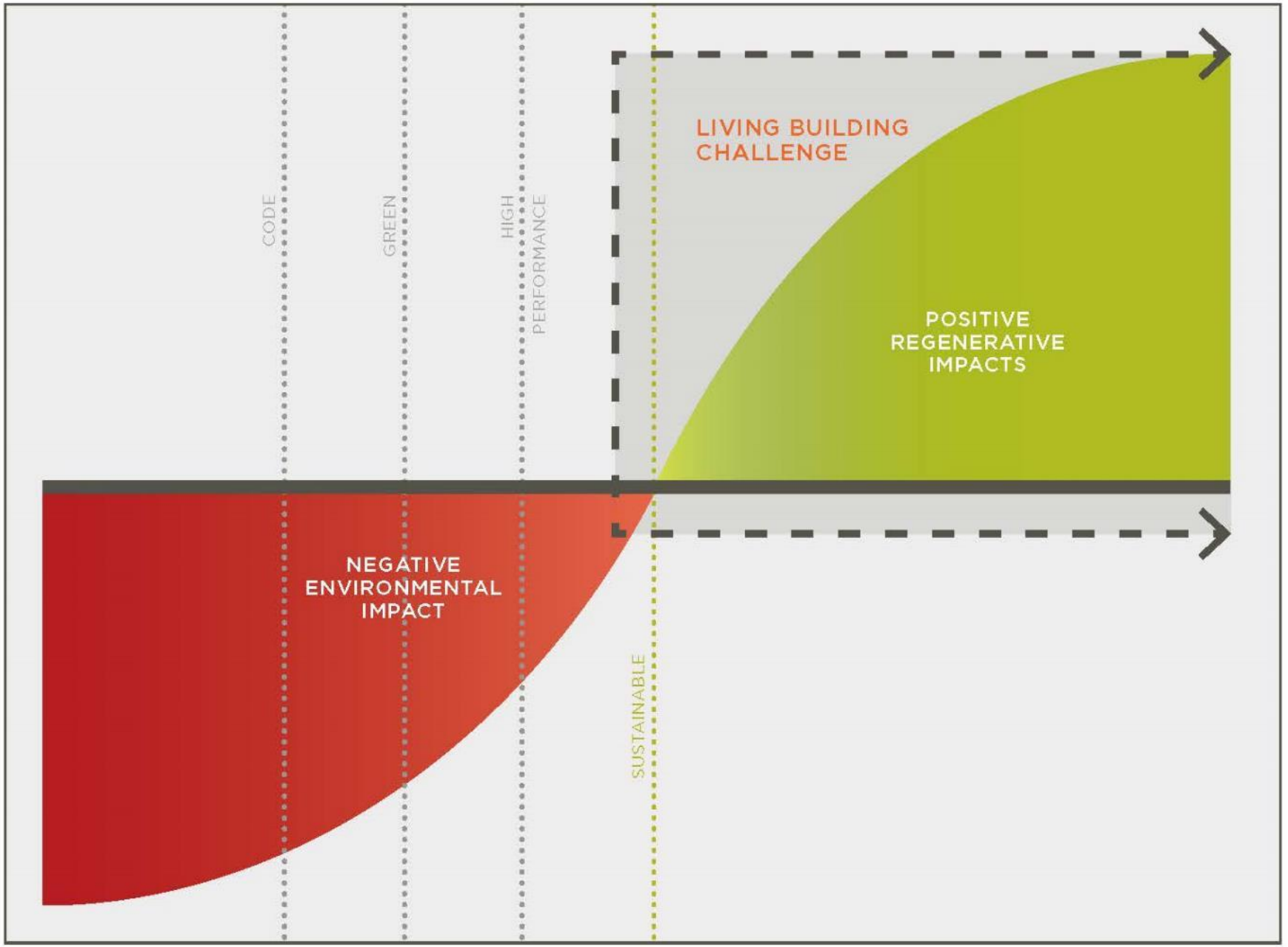
LIVING BUILDING CHALLENGE™



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?

Source: International Living Future Institute



Source: International Living Future Institute

Living Building Challenge

Envisions a Society that is Culturally Rich, Socially Just, and is Ecologically Restorative

IMPERATIVES

LIMITS TO GROWTH

URBAN AGRICULTURE

HABITAT EXCHANGE

HUMAN POWERED LIVING

NET POSITIVE WATER

NET POSITIVE ENERGY

CIVILIZED ENVIRONMENT

HEALTHY INTERIOR ENVIRONMENT

BIOPHILIC ENVIRONMENT

RED LIST

EMBODIED CARBON FOOTPRINT

RESPONSIBLE INDUSTRY

LIVING ECONOMY SOURCING

NET POSTIVE WASTE

HUMAN SCALE + HUMANE PLACES

UNIVERSAL ACCESS TO NATURE + PLACE

EQUITABLE INVESTMENT

JUST ORGANIZAITONS

BEAUTY + SPIRIT

INSPIRATION + EDUCATION

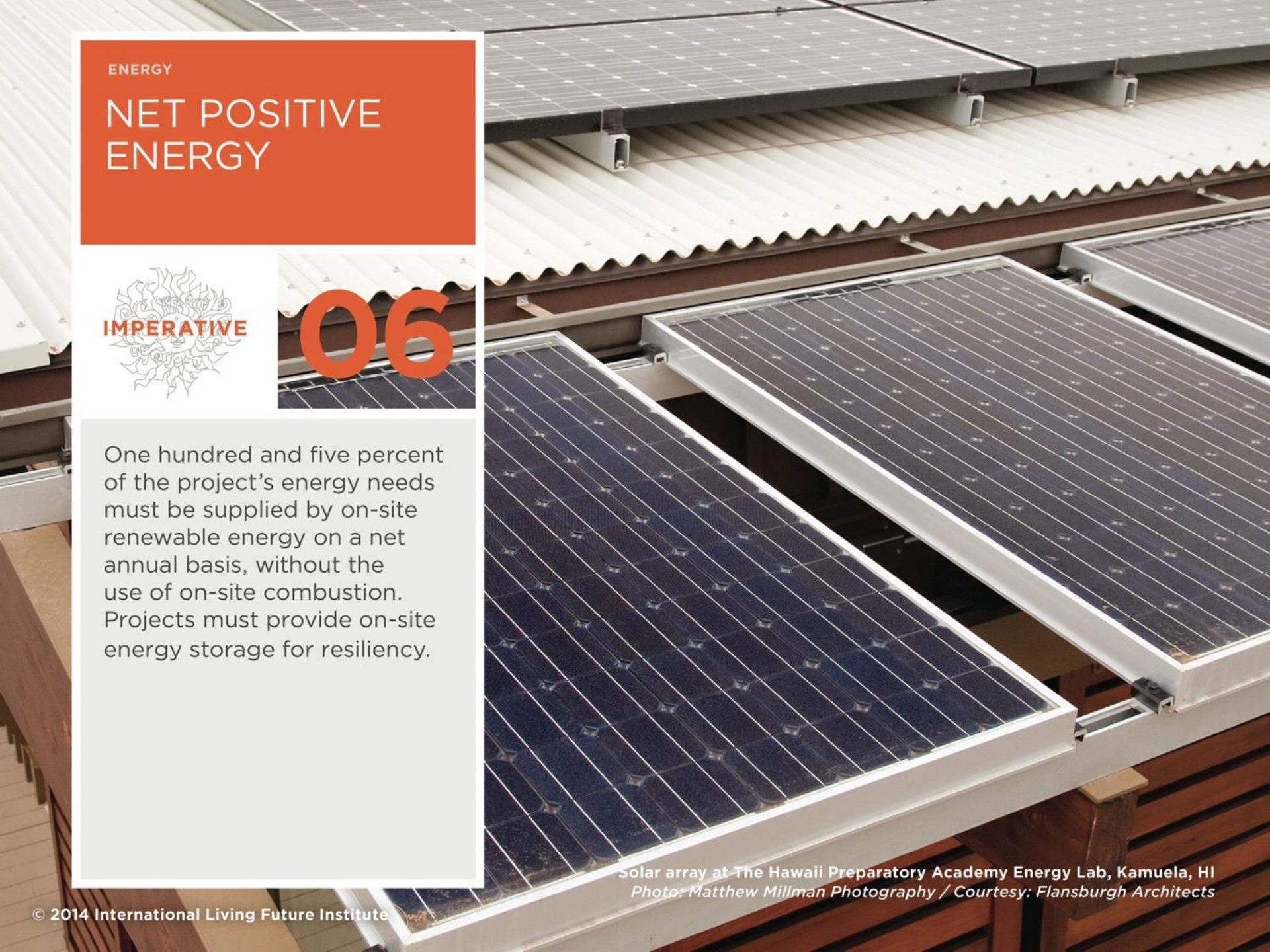
Source: International Living Future Institute

ENERGY

NET POSITIVE ENERGY

IMPERATIVE 06

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



Solar array at The Hawaii Preparatory Academy Energy Lab, Kamuela, HI
Photo: Matthew Millman Photography / Courtesy: Flansburgh Architects

WATER IN HARMONY WITH SITE

Natural Water Flows

100% On-Site Water

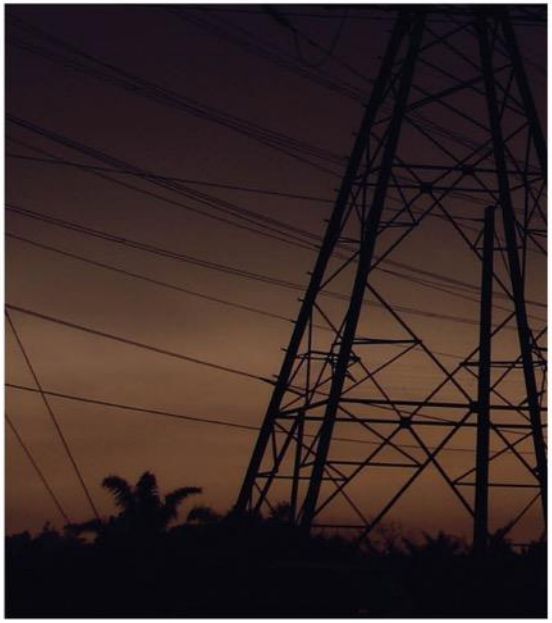
100% On-Site Treatment

Source: International Living Future Institute

MATERIALS

RED LIST

IMPERATIVE 10



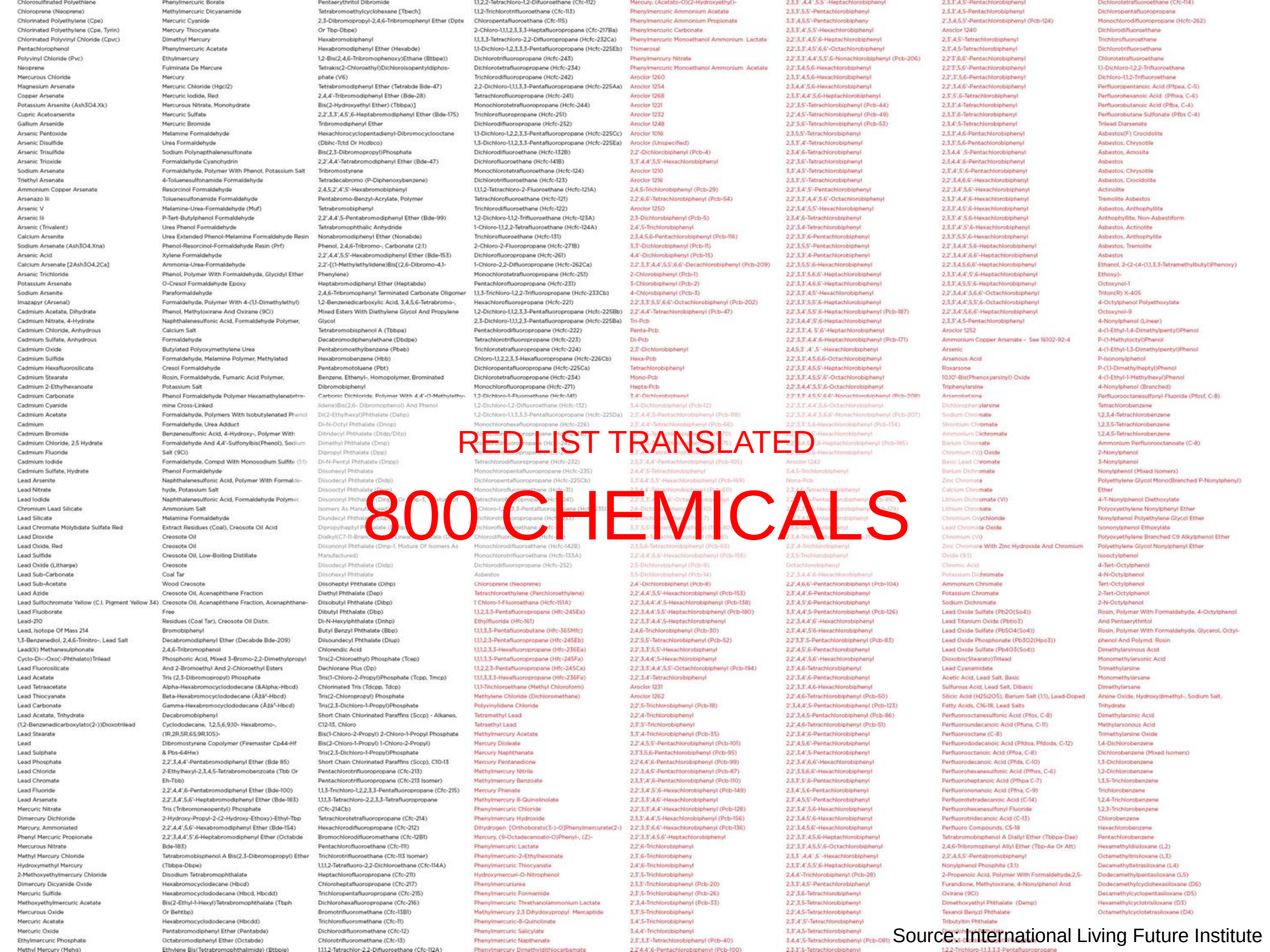
There are temporary exceptions for numerous Red List items due to current limitations in the materials economy. Refer to the v3.1 Materials Petal Handbook for complete and up-to-date listings.

The project cannot contain any of the following Red List materials or chemicals:[23]

- Alkylphenols
- Asbestos
- Bisphenol A (BPA)
- Cadmium
- Chlorinated Polyethylene and Chlorosulfonated Polyethylene
- Chlorobenzenes
- Chlorofluorocarbons (CFCs) and Hydrochlorofluorocarbons (HCFCs)
- Chloroprene (Neoprene)
- Chromium VI
- Chlorinated Polyvinyl Chloride (CPVC)
- Formaldehyde (added)
- Halogenated Flame Retardants (HFRs)
- Lead (added)
- Mercury
- Polychlorinated Biphenyls (PCBs)
- Perfluorinated Compounds (PFCs)
- Phthalates
- Polyvinyl Chloride (PVC)
- Polyvinylidene Chloride (PVDC)
- Short Chain Chlorinated Paraffins
- Wood treatments containing Creosote, Arsenic or Pentachlorophenol
- Volatile Organic Compounds (VOCs) in wet-applied products [24]

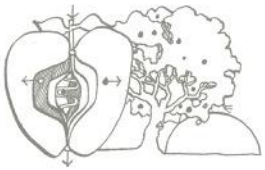
23 A link to the list of CAS registry numbers that correspond with each Red List item is available in the v3.1 Materials Petal Handbook.
24 Wet-applied products (coatings, adhesives, sealants) must not exceed specific VOC levels. Refer to the v3.1 Materials Petal Handbook for details.

Source: International Living Future Institute



Source: International Living Future Institute

HEALTH & HAPPINESS

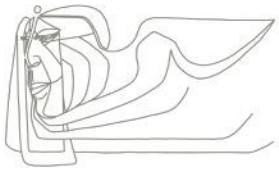


07: CIVILIZED ENVIRONMENT

08: HEALTHY INTERIOR ENVIRONMENT

09: BIOPHILIC ENVIRONMENT

BEAUTY



19: BEAUTY & SPIRIT

20: INSPIRATION & EDUCATION

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

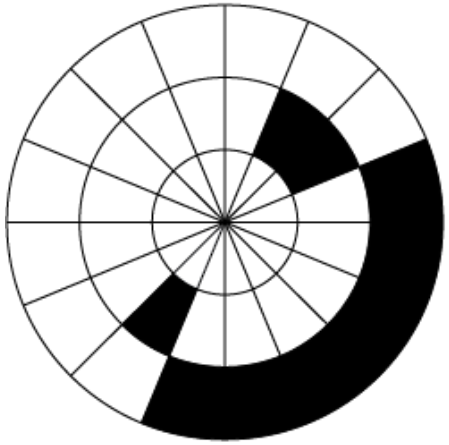
Living Building Challenge:
Regenerative

https://living-future.org/lbc/

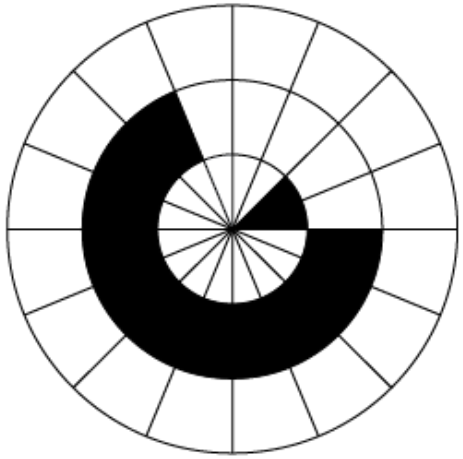
Source: Paul g. Wiegman

Image by Freepik

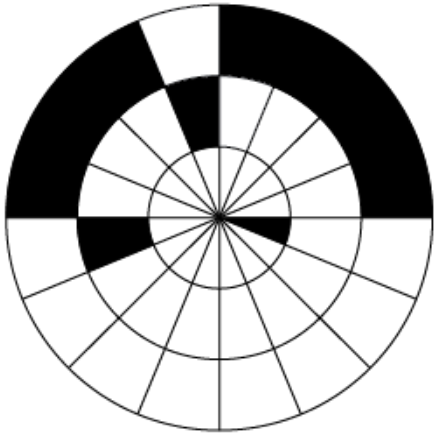
Where are your values focused?



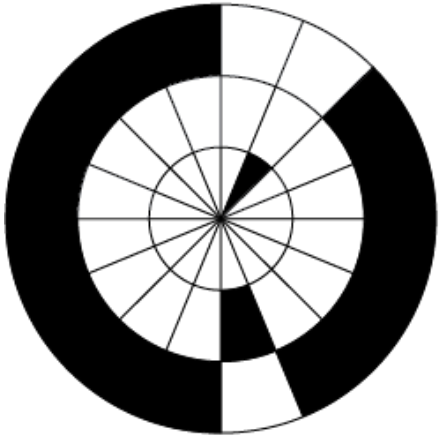
SITES:
bottom right quadrant



LEED:
bottom left quadrant or all over (focused in middle rings)



WELL:
top half



LBC:
all over (focused in outer rings)

PHIPPS LIVING BUILDING PROJECT
EDUCATION/RESEARCH/ADMINISTRATIVE BUILDING
REQUEST FOR PROPOSAL FOR DESIGN SERVICES

REQUEST

We are pleased to offer you the opportunity to submit a proposal for design services for the Phipps Living Building Project. The goal for this ambitious project is a building that not only fits in complete harmony with its site, but functions well and is aesthetically pleasing.

DESIGN SCOPE

The design team, consisting of architect, MEP engineer and other relevant consultants, is to ultimately provide complete construction documents in Spring 2008 for a nine month design schedule. These documents will specify all systems and will be suitable for contractor bidding in the implementation of the Education/Research/Administration Building. These drawings will ultimately be bid upon by qualified construction entities.

The start of project design will feature an integrated design process, with graphic and verbal real-time input from all relevant team members, including architect, primary and secondary consultants and the owner's team. We would like to see this tool used actively. From our experience, this approach in setting the tone for the project will yield the richest results, with the owner taking an active part in the process. Further, given the very ambitious project goals, we see the integrated design process as the only means of success by design. Once the Pre-design activities are complete, the architect, in consultation with his team of sub-consultants, may produce initial graphic suggestions for the project or portions of it. Such suggestions are meant to stimulate thought and discussion, not necessarily to describe the final outcome.

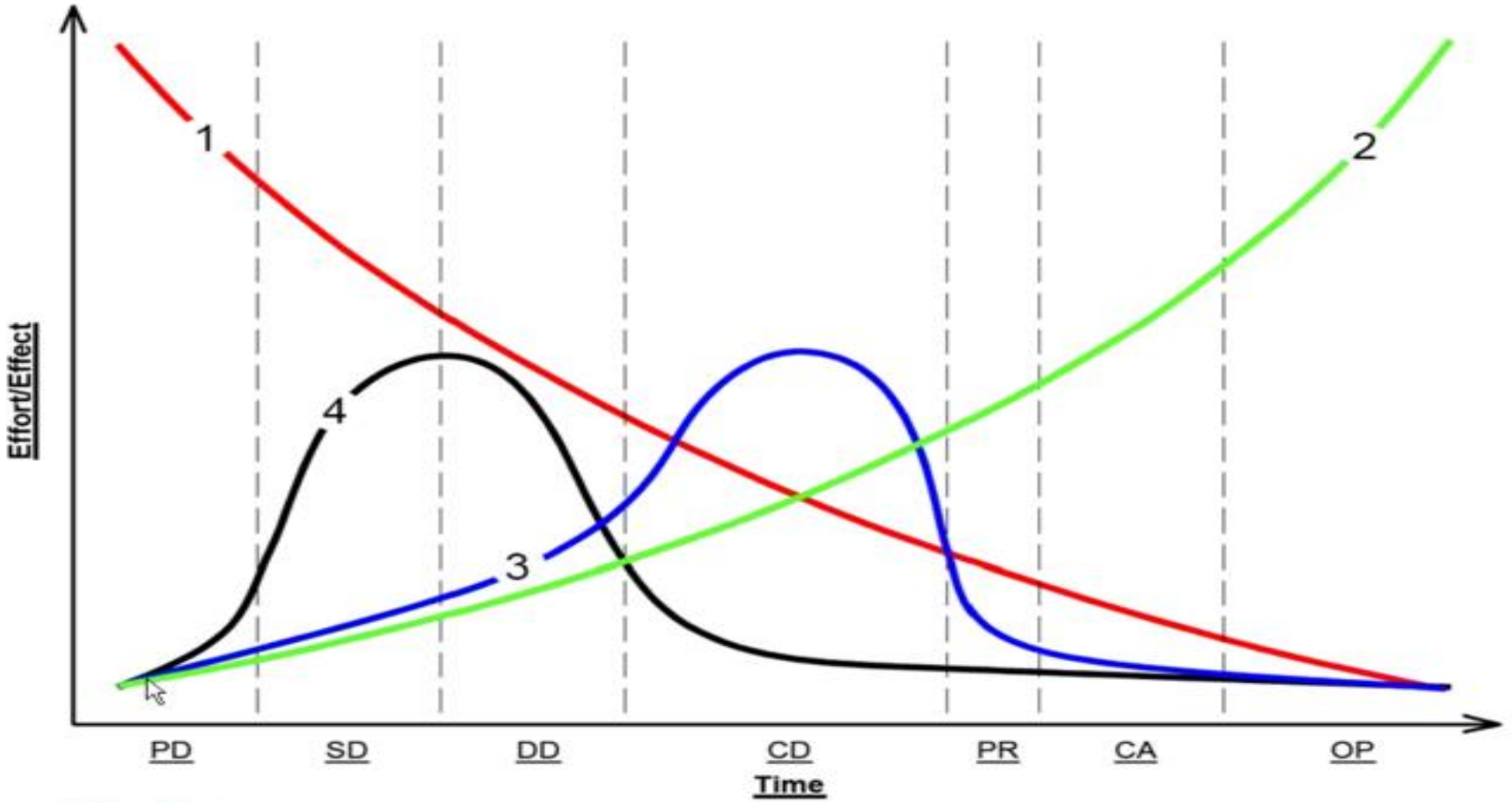
The integrated design process will include at least one **charrette** in the schematic design phase, which the design team may or may not lead, but will certainly play a large part. There will be **five peer reviews** during the design phase, to occur at 50% and 95% of the schematic design phase, at the end of design development, at 60% of the construction document phase, and at the end of the construction document phase. These peer reviews will allow for cross checking and appropriate input for the purposes of systems modeling, commissioning, energy modeling and other opportunities.

Clear Requirements Stated in Contracts

- AIA Forms for Sustainable Projects – Stating Clear Project Team Expectations and Responsibilities
- Adjust Retainage Terms to Coincide with Issuance of Certification Documentation and Process Timetable
- Legal Precedent to Not Just Add Specification Section for Rating System Requirements In Project Manual
- Owner Project Requirements
- Integrated Design Process

Source: Joshua Franzos

Changes and Cost Over Project Timeline



Source: Patrick MacLeamy, FAIA

Setting Yourself Up for Success

Certifications Establish Clear Goals From the Beginning

Project Team Accountable for Green Goals on Project

Require and Use an Integrated Design Process

Protect Your Organizations – Clear Requirements in AIA Form Contracts

Challenge Short Term Financial Paradigms – Re-Frame Value

Source: Paul g. Wiegman

Join Us!

Sustainability Training Workshop
October 9 & 10, Pittsburgh, PA

http://phipps.conservatory.org/workshop

Benefits for You:

- Go beyond the classroom and see the rating systems in action with an immersive exploration of one of the greenest buildings in the world
- Gain firsthand knowledge from the only team to achieve Living Building Challenge, LEED, WELL and Sustainable SITES certifications in one project
- Discover the nature-inspired systems thinking and facilitated integrative design processes which drive sustainable innovation

Source: Paul g. Wiegman

“Be the change you wish to see in the world.”

–Mahatma Gandhi

What Does Good Look Like?
Getting the Green Building You Want

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Building For Sustainability: Sustainability Matrix

Energy

- = 5 Households
- = Energy Consumed by the Building
- = Energy Generated by the Building

Width of Bar = Amount of Energy Required

Height of Bar = % of Energy Obtained from the Grid

Schedules

- = Additional Research
- = Design
- = Construction

Short and Long Term Costs

All of these figures are based on cost estimates created for each conceptual building model. All costs shown have been adjusted from actual cost estimates to reflect a $10 million Market Building as a baseline. The Net Present Values indicated represent 30-, 60- and-100 year cost models that are based on 5% cost of capital, 1-1/2% inflation rate and 5% annual increase in energy costs.

Living Building	Energy to Operate Building	Grid Reliance	Schedule	Construction Cost	Furniture, Fixtures and Equipment	Design and Management Fees	Net Present Value	Living Building
 100 Year Building, 45' Wings, Solar Orientation, Natural Daylighting, Natural Ventilation, Living Machine® **CSL**	89			$12.9 m Living Machine®, 45' Wings, Increase in Photovoltaics (100%), Design For Deconstruction, Reduce Life Cycle Impacts of All Building Materials	$1.7 m	$2.0 m	$18.7 m 30 Year Model $19.6 m 60 Year Model $20.8 m 100 Year Model	
 100 Year Building, 45' Wings, Solar Orientation, Natural Daylightin, Natural Ventilatior, Living Machine® **LEED™ Platinum**	6			$10 m Living Machine®, 45' Wings, Increase in Photovoltaics (100%), Design For Deconstruction, Reduce Life Cycle Impacts of All Building Materials	$329 k	$3.7 m	$12.7 m 30 Year Model $14 m 60 Year Model $16 m 100 Year Model	 **LEED™ Platinum**
 100 Year Building, 45' Wings, Solar Orientation, Natural Daylighting, Natural Ventilation **LEED™ Gold**	89			$12.1 m 100 Year Building, 45' Wings, Increase in Photovoltaics (20%), Additional Window Shading, Additional Concrete Massing	$1.6 m	$1.7 m	$18.3 m 30 Year Model $23.7 m 60 Year Model $62.2 m 100 Year Model	 **LEED™ Gold**
 80 Year Building, 65' Wings, Solar Orientation, Natural Daylighting **LEED™ Silver**	150			$11.5 m 80 Year Building, 65' Wings, Increase in Photovoltaics (10%), Concrete Frame Building, Partially Daylit Parking	$1.6 m	$1.5 m	$18.5 m 30 Year Model $27.8 m 60 Year Model $95.8 m 100 Year Model	 **LEED™ Silver**
 60 Year Building, 90' Wings, Natural Daylighting **Market**	208			$11.3 m 60 Year Building, 90' Foot Wings - 3 Stories, Raised Access Flooring, Sun Shades on South, Photovoltaics (5%)	$1.5 m	$1.5 m	$19.7m 30 Year Model $36.7 m 60 Year Model $166.9 m 100 Year Model	 **Market**
 40 Year Building, 120' Wings, Big Box	461			$10.0 m Typical Class "A" Office Building	$1.3 m	$1.3 m	$22.7 m 30 Year Model $62.9 m 60 Year Model $348.9 m 100 Year Model	

The David and Lucile Packard Foundation Los Altos Project

Modified by Phipps Conservatory and Botanical Gardens