CT AIA
Proudly Presents:

Beyond LEED
Wellness & the Urban Office
Our Panel

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Agenda

• Introduction

• WHY  Scientific & Economic Benefits of Biophilia
• WHAT  WELL, IWBI & Healthy Buildings
• HOW  Case Study – COOKFOX HQ

• Panel Discussion
Look Out For…

- Implementing Biophilia throughout design…
- Tools for unpacking evidence-based approaches…
- How has the research evolved; where is it going…
- What are hidden “Easter Eggs” within WELL…
- Where is demand highest; greater opportunity…
- What areas are most critical for future research…
- What, where, when, and how much biophilia…
What is Biophilia?
BIOPHILIC DESIGN
Underlying Science and Economic Benefits
GREEN HELPS PEOPLE HEAL
ULRICH STUDY, 1984

A view to nature equals...
- Shorter hospital stays
- Fewer negative comments
- Fewer strong analgesics

THE SCIENCE OF BIOPHILIA

Translational research for design application
**VISUAL RESPONSE**
**KAHN ET AL. STUDY, 2008**

Kahn et al. found that...
- Views to nature through a glass window lowered blood pressure faster than a view to fake nature via a digital window (video/plasma) or no window at all.
- Views to fake nature (artwork) are more beneficial than no view.

**Physiological benefits to viewing real nature are greater than the benefits of viewing simulated nature.**
SHINRIN-YOKU
“FOREST BATHING”
BUM PARK, 2010 & QING LI, 2010

In natural environments compared to urban environments, subjects had...
- reduced pulse rate
- reduced systolic blood pressure
- reduced cortisol levels
- increased immune function

The Science of Biophilia

Translational research for design application
GREEN SPACES AND COGNITIVE DEVELOPMENT IN PRIMARY SCHOOLCHILDREN
DADVAND ET AL., 2015

- 2593 schoolchildren from 36 schools in grades 2-4
- Looked at greeness in surrounding home, community, and school
- Beneficial association of greenspace and cognitive development

**Figure**: Twelve-month progress in superior working memory for participants with the first and third tertiles of greenness within the school boundaries.

THE SCIENCE OF BIOPHILIA

Translational research for design application
BIOPHILIC DESIGN

Improving Health and Well-Being in the Built Environment
PHYSIOLOGICAL AND COGNITIVE PERFORMANCE OF EXPOSURE TO BIOPHILIC INDOOR ENVIRONMENT
YIN ET AL., 2018

Physical and virtual exposure to biophilic vs. non-biophilic indoor environments

**Significant Findings**
- Lower blood pressure
- Lower skin conductance level
- Improved short-term memory
- Decreased negative emotions & increased positive emotions reported

**Similar effects for both physical and virtual exposure**

*Figure.* Test environments and physical vs. virtual exposure. A: biophilic environment with physical exposure; B: biophilic environment with virtual exposure; C: non-biophilic environment with physical exposure; D: non-biophilic environment with virtual exposure.
“...the enjoyment of scenery employs the mind without fatigue and yet exercises it, tranquilizes it and yet enlivens it;

and thus, through the influence of the mind over the body, gives the effect of refreshing rest and reinvigoration to the whole system.

Frederick Law Olmsted, 1865
Introduction to Yosemite and the Mariposa Grove: A Preliminary Report
THE RESTORATIVE BENEFITS OF NATURE: TOWARD AN INTEGRATIVE FRAMEWORK
S. KAPLAN, 1995

“Directed attention fatigue” limits ability to focus on a task at hand.

Time spent viewing Nature can reduce mental fatigue and improve concentration.

THE SCIENCE OF BIOPHILIA
Attention Restoration Theory
Figure. Boxplot of the median and variance of moment-to-moment response variability (reported as power). Participants viewed a concrete (orange boxes) or green (green boxes) roof. Data shown for the 1st and 2nd half baseline task, and the 1st and 2nd half post-treatment task indicates a significant difference between participants viewing a concrete and green roof. Source: Lee et al. 40-second green roof views sustain attention: The role of micro-breaks in attention restoration. *Journal of Environmental Psychology 42(2015):182–189.*
BIOPHILIA IN THE WORKPLACE
HESCHONG, 2003; LOFTNESS, 2008

Increased productivity at the Sacramento Municipal Utility District call center resulted in a 299% return on investment.
BIOPHILIA IN THE WORKPLACE
PRIVATE SECTOR OPERATING COSTS

Productivity costs are
87 times greater
than energy costs for private
sector operating budgets

Improving productivity
by 1% would account for
the annual energy budget

© 2012 Terrapin Bright Green LLC
DATA SOURCES: US DEPARTMENT OF
LABOR 2010, BLS 2011; BOMA 2010
MEASUREMENT AND SUBJECTIVE ASSESSMENT OF WATER GENERATED SOUNDS
WATTS ET AL., 2009

The perception of a water sound as natural was significantly correlated with improving tranquility.

Figure. Average tranquility ratings based on all 4 experiments together with fraction categorised as natural and man-made.
River sound with video was most effective at restoring energy and motivation after 2hr. working session.

Figure. Self-rating of lack of energy and low motivation before and after 7 minute rest in each restorative condition

Photo Courtesy of Bill Browning

Translational research for design application
BIOPHILIC DESIGN

Improving Health and Well-Being in the Built Environment
14 PATTERNS OF BIOPHILIC DESIGN

Nature In The Space
1. Visual Connection with Nature
2. Non-Visual Connection with Nature
3. Non-Rhythmic Sensory Stimuli
4. Thermal & Airflow Variability
5. Presence of Water
6. Dynamic & Diffuse Light
7. Connection With Natural Systems

Natural Analogues
8. Biomorphic Forms & Patterns
9. Material Connection with Nature
10. Complexity & Order

Nature Of The Space
11. Prospect
12. Refuge
13. Mystery
14. Risk

NY TIMES BIRCH GARDEN © Hubert J. Steed

BIOPHILIC DESIGN
Improving Health and Well-Being in the Built Environment
<table>
<thead>
<tr>
<th>14 PATTERNS</th>
<th>STRESS REDUCTION</th>
<th>COGNITIVE PERFORMANCE</th>
<th>EMOTION, MOOD &amp; PREFERENCE</th>
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</thead>
<tbody>
<tr>
<td>Visual Connection w/ Nature</td>
<td>Lowered blood pressure and heart rate</td>
<td>Improved mental engagement/attentiveness</td>
<td>Positively impacted attitude and overall happiness</td>
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<tr>
<td>Non-Visual Connection w/ Nature</td>
<td>Reduced systolic blood pressure and stress hormones</td>
<td>Positively impacted cognitive performance</td>
<td>Perceived improvements in mental health and tranquility</td>
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<tr>
<td>Non-Rhythmic Sensory Stimuli</td>
<td>Positively impacted heart rate, systolic blood pressure and sympathetic nervous system activity</td>
<td>Observed and quantified behavioral measures of attention and exploration</td>
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<tr>
<td>Thermal &amp; Airflow Variability</td>
<td>Positively impacted comfort, well-being and productivity</td>
<td>Positively impacted concentration</td>
<td>Improved perception of temporal and spatial pleasure (alliesthesia)</td>
</tr>
<tr>
<td>Presence of Water</td>
<td>Reduced stress, increased feelings of tranquility, lower heart rate and blood pressure</td>
<td>Improved concentration and memory restoration; Enhanced perception and psychological responsiveness</td>
<td>Observed preferences and positive emotional responses</td>
</tr>
<tr>
<td>Dynamic &amp; Diffuse Light</td>
<td>Positively impacted circadian system functioning; Increased visual comfort</td>
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<tr>
<td>Connection w/ Natural Systems</td>
<td></td>
<td></td>
<td>Enhanced positive health responses; Shifted perception of environment</td>
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<tr>
<td>Biomorphic Forms &amp; Patterns</td>
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<tr>
<td>Material Connection w/ Nature</td>
<td>Decreased diastolic blood pressure; Improved creative performance</td>
<td></td>
<td>Observation of view preference</td>
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<tr>
<td>Complexity &amp; Order</td>
<td>Positively impacted perceptual and physiological stress responses</td>
<td></td>
<td>Observation of view preference</td>
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<tr>
<td>Prospect</td>
<td>Reduced stress</td>
<td>Reduced boredom, irritation, fatigue</td>
<td>Improved comfort and perceived safety</td>
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<tr>
<td>Refuge</td>
<td></td>
<td>Improved concentration, attention and perception of safety</td>
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<tr>
<td>Mystery</td>
<td></td>
<td>Induced strong pleasure response</td>
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<tr>
<td>Risk/Peril</td>
<td></td>
<td>Resulted in strong dopamine or pleasure responses</td>
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OBSERVATIONAL STUDY
USER TRENDS

Observational study of user trends in biophilic and comparable conventional hotel lobbies

- Sample of 6 hotels in Midtown Manhattan
- All guests present were counted as either active or passive users, or transient
- All lobbies were observed at morning, midday, and evening

On average, biophilic lobbies saw a 36% use rate while conventional hotels saw only 25%

Source: Use trends in Biophilic and Conventional Hotel Lobbies © 2016 Terrapin Bright Green
GUEST EXPERIENCE OBSERVATIONAL STUDIES
DATA BASED ON PROPERTY DESCRIPTIONS FROM 6 HOTELS WEBSITES AND 10 MOST RECENT TRIPADVISOR REVIEWS FOR EACH HOTEL

MARKETING OF BIOPHILIC HOTELS MATCHED REPORTED GUEST EXPERIENCE.

SOURCE: HUMAN SPACES 2.0: BIOPHILIC DESIGN IN HOSPITALITY (2017)
Demonstrating the devices used to track brain wave activity. © Bil Browning.
COOKFOX STUDIO
CHELSEA, NEW YORK, NY

- **12,121** sf architecture office
- **3,600** sf greenroof
- Completed in 2006
- LEED Commercial Interior

Main Biophilic Patterns
- [P1] **Visual Connection w/ Nature**
- [P3] Non-Rhythmic Sensory Stimuli
- [P6] Biomorphic Forms & Patterns
- [P8] Prospect
EVALUATION
POST-OCCUPANCY SURVEY

- 98% reported that it is important or highly important that their company show concern for the environment
- 86% desired views of the outdoors
- Many reported having “views of long distance vistas”
- 45% cited the green roof as one of their favorite parts of the office
- 42% reported being highly unsatisfied with available “space to unwind”

Workspaces with the **lowest visual connection with nature** reported the **highest work-related stress**

### HEALTH

**REPORTED CONDITIONS**

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<th>Condition</th>
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<td>Excess Stress</td>
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<tr>
<td>Tension, Irritability or Nervousness</td>
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<tr>
<td>Tired or Strained Eyes</td>
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<td></td>
</tr>
<tr>
<td>Dry, Itchy or Irritated Eyes</td>
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<tr>
<td>Unusual Tiredness, Fatigue or Drowsiness</td>
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### WELL-BEING

**VIEW SATISFACTION**

<table>
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<tr>
<th>View</th>
<th>Disagree</th>
<th>Agree</th>
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<tr>
<td>Views of green space</td>
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<td></td>
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<tr>
<td>Views of water</td>
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<td></td>
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<tr>
<td>Long distance vistas</td>
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### SPATIAL SATISFACTION

<table>
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<tr>
<th>Space to unwind</th>
<th>Disagree</th>
<th>Agree</th>
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<tbody>
<tr>
<td>Space to think and analyze</td>
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THE WELL BUILDING STANDARD
WELL IS FOR PEOPLE
HEALTH IS A STATE OF COMPLETE PHYSICAL, MENTAL, AND SOCIAL WELL-BEING, AND NOT MERELY THE ABSENCE OF DISEASE OR INFirmITY.

THE WORLD HEALTH ORGANIZATION
WHAT DETERMINES THE STATE OF HEALTH?

WE SPEND ABOUT 90% OF OUR TIME INDOORS.
BETTER BUILDINGS

WELL positions building design and operations as agents of public health.

WELL measures, verifies and monitors building features that impact health and well-being.
THE GLOBAL WELL MOVEMENT

1272 WELL PROJECTS
265M+ SQUARE FEET (43 COUNTRIES)
3900+ WELL APS
WELL IS HOLISTIC
VERIFIED PERFORMANCE

WELL prioritizes accountability through a data-driven performance review and on-site environmental assessment.

ONSITE TESTING
+
PERFORMANCE REVIEW
= PERFORMANCE VERIFICATION
A COMPREHENSIVE APPROACH TO WELL-BEING

The WELL Building Standard is made up of features that address ten concepts:
SILVER, GOLD OR PLATINUM

WELL PLATINUM 2018

WELL GOLD 2018

WELL SILVER 2018
WELL CORE: POINTS-BASED SCORING

- WELL Certified Core Platinum: 80 - 100 pts
- WELL Certified Core Gold: 60 - 79 pts
- WELL Certified Core Silver: 50 - 59 pts
- WELL Certified Core: 40 - 49 pts

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PEOPLE + PLANET

WELL works in conjunction with global green building rating systems to enhance building performance for human health and our environment.
IWBI + GBCI

Green Business Certification Inc. (GBCI), the same organization that administers LEED certification, provides third-party certification for WELL.
START YOUR PROJECT

Register your project to leverage WELL’s flexible framework for improving human experience in buildings and communities across the world.

V2.WELLCERTIFIED.COM
DYNAMIC SCORECARD

- Leverage the WELL v2 digital platform to create a custom scorecard.

- Enter your project details and browse a selection of suggested features tailored to help you achieve your project’s unique goals.
WE ARE WELL

WELLCERTIFIED.COM

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INTRODUCTION
MOTORING departs from the commonplace and becomes something when a big car is equipped with Fisk Flat Tread Cord. The improved riding, sure to be the envy of those stanch tires is amazing. There is no other tire like theirs—there is none that will hold up a basis for comparison. Tested by more than 1,000,000 miles of service before they were generally offered to the public, these car tires have outrun the most remarkable records ever made by any tire. However, to compare them otherwise—thicker rubber in the sole, the tread is a solid piece and proving constant due to the heat, heat which simply adheres to the Fisk Flat Tread Cord in a manner—see the marked success.

Ask your dealer to show you why.

AUTOMOBILE ROW
3 TERRACES CONNECTED BY STUDIO SPACE

STUDIO CULTURE
OUTDOOR AS INDOOR SPACE
DESIGN STRATEGIES
“At COOKFOX, we set out to design buildings that were better for the environment, but what we discovered was that we were designing buildings that were healthy for people.”
HEALTHY & CALM INTERIOR ENVIRONMENT
CONNECTION BETWEEN INTERIOR & EXTERIOR LANDSCAPES
14 PATTERNS OF BIOPHILIC DESIGN: PATTERN 1
VISUAL CONNECTION WITH NATURE
CONNECTION WITH NATURAL SYSTEMS
14 PATTERNS OF BIOPHILIC DESIGN: PATTERN 8
BIOMORPHIC FORMS & PATTERNS
14 PATTERNS OF BIOPHILIC DESIGN: PATTERN 9
MATERIAL CONNECTION WITH NATURE
14 PATTERNS OF BIOPHILIC DESIGN: PATTERNS 11 & 12
PROSPECT & REFUGE
WHY WELL?
### WELL Building Standard v1: New and Existing Interiors Certification Matrix

**Project:** COOKFOX Office  
**Location:** 250 West 57th Street NY NY 10107  
**Updated By:** Z Craun  
**Date:** 02/16/17

#### Optimizations (67 possible)

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#### Preconditions (36 possible)

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#### Certifications

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**Water**

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**Nourishment**

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**Comfort**

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**Mind**

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**Fitness**

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**Summary**

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**Requirements**  
- Must meet all preconditions.  
- 0 needed for Silver, 25 for Gold, 50 for Platinum.

**Optimizations**  
- Pending onsite post-occupancy Performance Verification testing.

---

**Current status:** Gold

---

**Note:**  
- Current status: Gold
- Preconditions satisfied.
FEATURE 9: CLEANING PROTOCOL

PART 1: CLEANING PLAN FOR OCCUPANTS

To achieve sufficient and regular removal of debris and pathogens, a cleaning plan is created in accordance with Table A4 in Appendix C and presented during staff trainings that includes the following elements:

a. A list of high-touch and low-touch surfaces in the space (see Table A1 in Appendix C).

b. A schedule that specifies, for each high-touch and low-touch surface and entrance, walk-off mats (if applicable), the extent and frequency (e.g., daily, weekly) that a surface be cleaned, sanitized, or disinfected.
FEATURE 52: MINDFUL EATING

PART 1: EATING SPACES
Eating spaces for employees adhere to the following requirements:

a. Contain tables and chairs to accommodate at least 25% of total employees at a given time. 100 OCCUPANTS/31 CHAIRS = 31%  
b. Are located within 60 ft [20 m] of at least 90% of all occupants. YES

PART 2: BREAK AREA FURNISHINGS
Eating spaces for employees contain all of the following:

a. Refrigerator: device for re-heating food (such as microwave or toaster oven), and sink. YES
b. Amenities for dish washing. YES
c. At least one cabinet or storage unit available for employee use. YES
d. Eating utensils, including spoons, forks, knives and microwave-safe plates and cups. YES
FEATURE 61: RIGHT TO LIGHT

PART 1: LEASE DEPTH
The following requirement is met:
A. 75% of the area of all regularly occupied spaces is within 7.5m (25 ft) of view windows. YES - 93%

PART 2: WINDOW ACCESS
The following conditions are met:
A. 75% of all workstations are within 7.5m (25 ft) of an aisle or a window with views to the exterior. YES - 93%
B. 95% of all workstations are within 12.5m (41 ft) of an aisle or a window with views to the exterior. YES - 100%

HATCHED AREA = Workstations
BLUE AREA = Regularly occupied spaces and workstations

WELL BUILDING STANDARD IMPLEMENTATION
FEATURE 99: BEAUTY & DESIGN II

PART 2: ARTWORK
Integration of artwork into interior spaces adds complexity to the visual field. A plan is developed that includes a description of how the project incorporates meaningfully integrated artwork in:

a. Entrances and lobbies: YES
b. All regularly occupied space greater than 28m² [300 ft²]: YES

PART 3: SPATIAL FAMILIARITY
Design elements can be used to establish way-finding, aid in orientation and provide spatial familiarity. A plan is developed that includes a description of how the project incorporates way-finding elements in projects with floor plates 929 m² [10,000 ft²] or larger through use of the following elements:

a. Artwork that is distinct in shape and color: YES. Workstations have been grouped into pods that are easily identifiable through the placement of distinct architectural elements which have been carefully curated and placed at the front and in the center of the pods.

b. Visually grouped zones or areas that use the following unifying design components:
   - Lighting: YES. The open studio is uniformly lit by a consistent lighting scheme in the open ceiling as well as distinct groupings of workstations. Corridors adjacent to the workstations are clearly defined by a distinct carpet pattern that differs from the pattern under the workstations. Private offices have dropped ceilings with recessed lighting and the same carpet patterns as the studio to signify work areas.
   - Corridors over 9 m [30 ft] in length and in artwork or a view window to the interior with a sill height no taller than 0.6 m [2 ft] from the floor and with at least a 30 m [100 ft] vista: YES. A large framed photograph is located at the end of the entry halfway to studi0 exit in the PAVILION office. The 30 ft corridor is continued to the rear of the office.
MATERIAL TRANSPARENCY

Intentionally simple in scope. By focusing on product ingredients, we hope to ‘level the playing field’ and create a platform for constructive conversations about the human health and ecological impacts of the decisions we make.

Options: Take back program; Salvageable or reusable; Recyclable (%); Landfill; Hazardous waste (%).

Raw Material and Final Assembly locations assist project teams in meeting the Appropriate Sourcing Imperative, intended to support the growth of regional economies rooted in sustainable practices, products and services.

All constituent parts of a product.

Items are color coded to communicate potential hazards:

- Living Building Challenge Red List
- US EPA Chemical of Concern Action Plan Published
- ECHA REACH Substance of Very High Concern Candidate
- Not referenced in any of the three programs noted above

Temporary Red List chemical exceptions applied for specific product types.

Declare identifier for company + product

Valid for 12 months, starting with the date of issue

- CSI MasterFormat 2010 classification
- Verification that a product complies with the Living Building Challenge Red List.
MATERIAL TRANSPARENCY

FLAME RETARDANT CHEMICALS

1970s > 2003 > 2018

PBBs > PBDEs > TRIS

(embryo development interference) > (hormone disruption & thyroid disease) > (reproductive development interference)

WHERE FLAME RETARDANTS ARE FOUND

Source: EPA, Tribune Reporting

PERCENT OF CANADIANS TESTED WHO HAD FLAME RETARDANTS IN THEIR BODIES

Source: EPA, Tribune Reporting

CHEMICALS WITH SIMILAR STRUCTURES CAN BEHAVE SIMILARLY

Source: EPA, Tribune Reporting

WELL BUILDING STANDARD IMPLEMENTATION
MATERIAL TRANSPARENCY

CUSTOM MILLWORK
PEARLS OF WISDOM