The Material World: Beyond Transparency

By: Rami Vagal, WELL AP, LEED AP BD+C, Senior Manager, Sustainability

Learning Objectives:

- Define the relationship between material chemistry, healthy interiors & the environment using the lenses of green building rating systems LEED v4.1 BD+C, LBC, & WELL v2.
- Understand the synergies across LEED v4.1 BD+C, LBC, & WELL v2 building standard.
- Explain how to use material transparency and optimization to advise product selection.
- Learn how to bring change in the mindsets & habits of organizations relating to products.

What is Transparency? - The state in which all relevant information is fully and freely available to the public. Push the industry for disclosure and accountability that will help designers, specifiers, and end-users make informed purchasing decisions.

> "Transparency is a change in philosophy. It takes time to accomplish."

Why Material Transparency is Important

- The average person spends 90% of his/her life indoors in the U.S. and Europe. (EPA)
- Indoor pollutant levels may be 2 to 5 times higher than outdoor levels.
- Identifies chemicals & particles that can contaminate through off-gassing & contribute to negative health effects.
- Allows us to assess ingredient potential impacts on humans and the environment
- Allows us to make informed decisions of what materials should be placed in our buildings.

Material Impacts on Health

- Adverse effects during the manufacturing, use, or disposal phase of a product.
- A person breathes about 15,000 liters of air a day.
- Some carcinogenic and/or disrupt endocrine, respiratory, and neurological systems.
- Lead and asbestos are now consistently avoided materials although decades passed between health risks proven and action to regulate.
- High temperatures & high indoor humidity can increase indoor pollutant concentration.
- Minimizing VOC emissions can improve cognitive function.
- Eliminating formaldehyde reduces asthma symptoms.
- Alleviates the healthcare industry.
- Specifying safe materials during building is more cost-effective than treatment for illness.
- Frameworks are emerging to ease building professionals and find solutions

The Living Building Challenge (LBC)

A philosophy, advocacy tool, and certification program that addresses development at all scales, with the core underlying principle that buildings should mimic nature and natural systems. Toxic materials (Red List Chemicals) are not permitted on projects and LBC aims to eliminate their use. A flower metaphor is used to illustrate all elements of the built environment are rooted in place:

- Harvests all energy + water
- Adapted to climate and site
- Operates pollution-free
- Comprised of integrated systems
- Is beautiful

Seven Petals of LBC - The LBC is arranged into seven Petals, drawing on the flower metaphor: **Place, Water, Energy, Health + Happiness, Materials, Equity & Beauty.** The Petals encompass the project focus areas, interact with one another, and each Petal has specific Imperatives. Each Imperative consists of requirements with clear goals that must be achieved to demonstrate compliance. Living Buildings must achieve every Imperative, in every Petal. Petal Certified projects must achieve all ten Core Imperatives + all Water, Energy, or Materials Imperatives.

A. MATERIALS PETAL – With the broadest and farthest-reaching impacts that deeply influence the other LBC Petals, Materials also has the most Imperatives. The Precautionary Principle is the guiding theory that an action or policy should not be taken if it might cause severe or irreversible harm to the public or environment, and that there's no scientific consensus that it isn't harmful.

- Imperative 12 (CORE) – Responsible Materials: Baseline for adherence to material disclosure, responsible material extraction of stone, rock, metals, minerals, and timber, as well as efficient landfill diversion.
- Imperative 13 – Red List: Foster transparent materials economy free of toxins and harmful chemicals, working towards the elimination of Red List chemicals. All projects must avoid these worst-in-class chemicals in 90% of new materials by cost.
- Imperative 14 – Responsible Sourcing: Responsible material extraction and transparency labeling, guided by the Declare ingredients label and product database. At least 80% of wood must be Forest Stewardship Council certified, salvaged, or harvested from the site.
- Imperative 15 – Living Economy Sourcing: Decreasing carbon by sourcing building materials and services close to the project, as well as supporting local economies through manufacturing.
- Imperative 16 – Net Positive Waste: Integrate waste reduction into all phases of projects and encourage a natural closed-loop system that emulates natural flows. Project teams must consider impacts during the design, construction, operation, and end-of-life phases of a development by formulating a Material Conservation Management Plan.

Declare Label - The Ingredient Label for Building Products

Created by the International Living Future Institute to facilitate identification of Red List-free materials and establish a transparency-driven ingredients label and product database called Declare. A Declare Label is a "nutrition label" for the building industry to identify the ingredients contained in a product.

Case Study – Light Lab/Design Center

Savannah College of Art and Design (SCAD) students participated in a class competition and the winning project was titled Light Lab, which would involve the renovation of an empty showroom into a commercial design center for the manufacturer. The product selection team wanted to use Red List-free products & register with the LBC, working toward Petal Recognition. They used:

- 3D lanterns from a maker village
- Cabinet knobs made from recycled PET bottles
- Reclaimed wood used for interior finishes and birdhouses
- Existing plumbing
- Salvaged wood from tufting creels
- Recovered artwork from old facilities

"Integrated approach, early planning & determining goals is the key to successful LBC Materials Petal completion. Transparency documentation is equally important."

LEED v4.1 BD+C (beta)

Fostering Material Sourcing & Transparency through Building Product Disclosure & Optimization credits aimed at increasing market transparency concerning the sourcing & contents of materials:

- Environmental Product Declarations (1-2 points)
- Sourcing of Raw Materials (1-2 points)
- Material Ingredients (1-2 points)

I. Materials & Resources - Building Products Disclosure and Optimization MR Credits offer incentives for projects that specify products from manufacturers who provide full transparency of a product's life cycle impacts through environmental product declaration platforms:

Requirements Achieve one or more of the options below, for a maximum of 2 points.

Option 1: Environmental Product Declaration (1 Point) - Use at least 20 different permanently installed products sourced from at least five different manufacturers that meet one of the following:

- LCA and EPD
- EPD conforms with ISO ISO14025 and has cradle to gate scope
- Other USGBC approved program

Option 2: Multi-Attribute Optimization (1 Point) - Use products that comply with one of the criteria below for 10%, by cost, of the total value of permanently installed products in the project OR use 10 permanently installed products sourced from at least 3 different manufacturers. Products will be valued as below:

- Life Cycle Reduction Action Plan- The manufacturer has produced a product-specific LCA using EN 15804 or ISO 21930 for the product and has provided a publicly available action plan to mitigate or reduce life cycle impacts.
- Life cycle impact reductions in Embodied Carbon
- USGBC approved Program

II. Sourcing of Raw Materials – Building Products Disclosure and Optimization MR Credits encourage the use of products and materials with available life cycle information and have preferred social, environmental, and economic impacts. It rewards project teams for selecting products verified to be extracted or sourced responsibly.

Achieve 1 Point If: Use products sourced from at least 3 different manufacturers that meet at least 1 of the responsible sourcing and extraction criteria choices for at least 20%, by cost, of the total value of permanently installed building products in the project.

Achieve 2 Points If: Use products sourced from at least 5 different manufacturers that meet at least 1 of the responsible sourcing and extraction criteria choices for at least 40%, by cost, of total value of permanently installed building products in the project:

*Products must meet 1 or more: Extended producer responsibility, Bio-based materials, FSC-certified wood, Materials reuse, Recycled content, USGBC approved program.

III. Material Ingredients – Building product disclosure and optimization MR Credits reward project teams for selecting products with inventoried chemical ingredients using accepted methodology and products verified to minimize the use and generation of harmful substances.

Option 1: Material Ingredient Reporting (1 point) - Use at least 20 different permanently installed products from at least 5 different manufacturers that use a program to demonstrate chemical inventory of at least 1000 ppm. Program choices for requirements:

- Public Manufacturer Inventory
- Health Product Declaration
- Declare Label
- Certified Cradle to Cradle
- ANSI/BIFMA
- Product Lens Certification
- USGBC approved program

Option 2: Material Ingredient Optimization (1 point) - 3 different permanently installed products of manufacturers who document material ingredient optimization using:

- International Alternative Compliance Path – REACH Optimization
- Products screened to 1000 ppm, provided public inventory & detailed action plan
- Advanced inventory and assessment – value 100% by cost or 1 product
- Material Ingredient Optimization using one of the following programs:
  - Manufacture inventory or HPD
  - Cradle to Cradle v3
  - International Alternative Compliance path
  - USGBC approved program

THE WELL BUILDING STANDARD v2 (pilot) - Evidence-based system for measuring, certifying, and monitoring the performance of building features that impact health and wellbeing, also the world's first building standard focused exclusively on human health and wellness. The standard is divided into 10 concepts: Air, Water, Nourishment, Light, Movement, Thermal Comfort, Sound, Materials (specifically deals with material transparency), Mind, and Community.

Transparency Documentation includes Mindful Materials, Health Product Declaration & Declare:

1. Mindful Materials – Open-source platform with product info regarding human and environmental effects from manufacturers. The online Mindful Materials library is easily accessible and searchable with transparency information for building products designed to build sustainably and access documentation needed for certification compliance with.
2. Health Product Declaration – Open standard supported by the Health Product Declaration Collaborative (HPDC), a coalition of A&D professionals, specifiers, manufacturers, researchers, contractors, and NGOs. This voluntary disclosure documents the health impacts that a product could potentially have after extensive exposure, specifically the contents, chemical hazards, emissions, and health effects of products, and can assist product selection, innovation, or obtain credits within various rating systems.
3. Living Product Challenge - Green-rating platform from International Living Future Institute that has 7 Performance Petals, 20 Imperatives, and focuses on creating positive effects over negative ones. The imperatives address product life and encourage products that are free of toxins, socially responsible, beneficial to people, as well as the environment. The LPC challenges us to create and measure handprints, the positive impacts of a product life such as beneficial societal and environmental impacts.

"Mohawk became the first flooring manufacturer to achieve Living Product Challenge Petal Certification. Mohawk achieved Water, Health & Happiness, and Place petals in addition to other imperatives from Materials and Beauty petals."