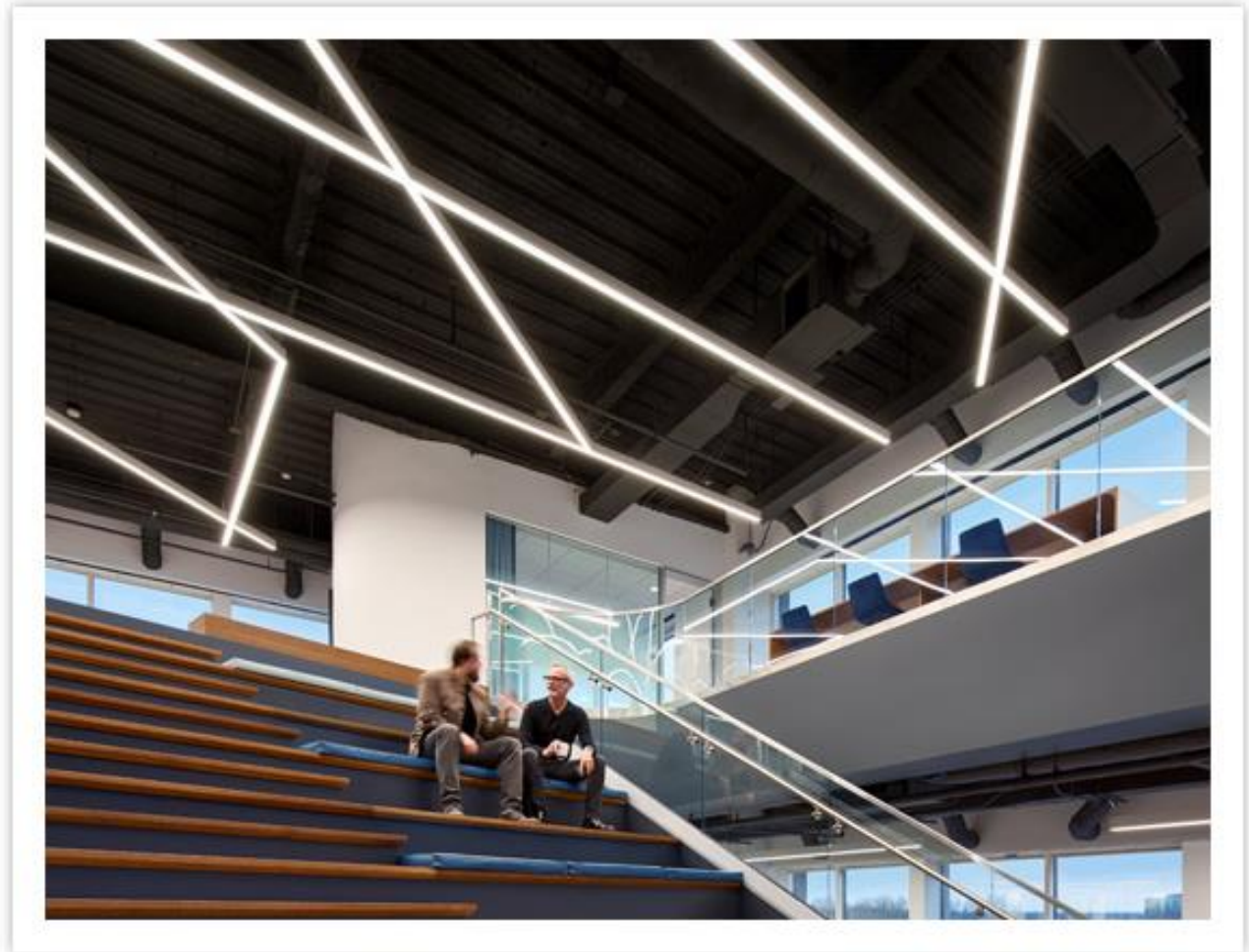


Sustainable Manufacturing

Presented by Aaron Smith
VP of Technology and R&D

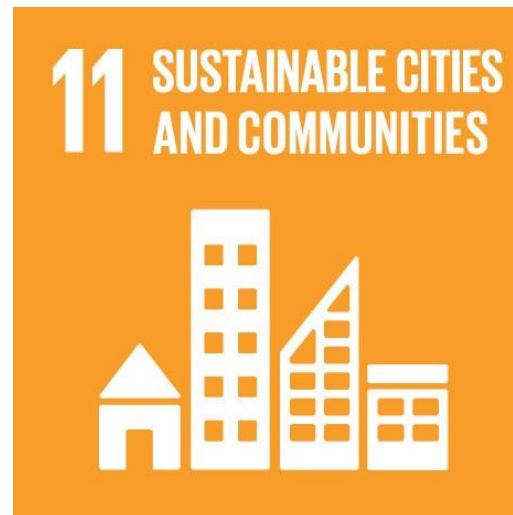
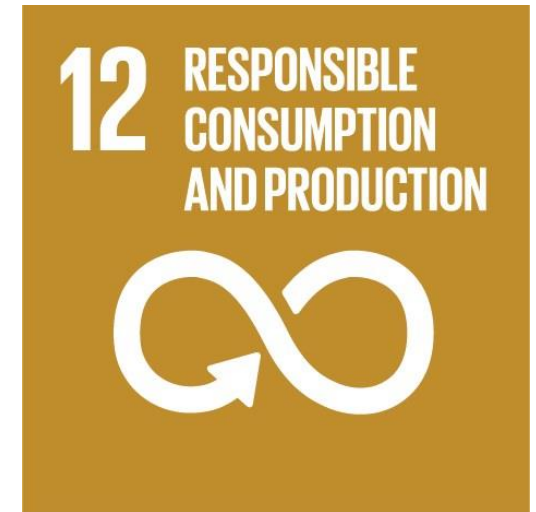
Why Sustainable Manufacturing?

- Stakes
 - Climate change
 - Wellbeing
- Creates Value
 - Property Value
 - Employee retention
- Supporting organizations
 - Well Building
 - Healthy design
 - LEED
 - Energy efficient design
 - Living Building Institute
 - Transparency & Red List



Who Cares?

- Customers
 - Many are starting sustainability programs of their own
- Manufactures
 - Corporate social responsibility
 - Audited process
- Architects and Engineers
 - LP50



Manufacturers, Architects & Engineers



<https://living-future.org/lp50/>

What do we care about?

- Human Health
 - Foster life, Eliminate Hazardous substances
- Climate Health
 - Reduce and reverse carbon emissions
- Ecosystem Health
 - Support and regenerate life
- Social Health and Equity
 - Human rights, positive impacts people and communities
- Circular Economy
 - Reuse, material efficiency, long life, perpetual cycling



Action Items

- Material transparency
- Recover resources
- Deconstruct differently
- Build differently
- Jump start new approaches



Material Transparency

- Report life cycle impact.
- Eliminate unsafe chemicals from every component.
- Red List – more than 800 chemicals listed as hazardous to the environment or human health.

FINELITE[®]
Better Lighting

Declare.

Finelite Tailored Lighting - Aluminum Luminares - RLA Finelite, Inc.

Final Assembly Locations are collectively represented on a single label.

Embodied Carbon (optional) discloses the cradle-to-gate impacts of manufacturing the product as reported by manufacturer-specific Type III Environmental Product Declarations.

End-of-life options: take back programs; salvageable or reusable in its entirety; biodegradable/compostable (%); recyclable (%); landfill (%); hazardous waste.

Ingredients are reported by component. Ingredients without restriction appear in grey; **Red List chemicals** appear in dark orange; **Watch List Priority for restriction chemicals** appear in light orange.

LBC Temporary Exceptions recognize specific market limitations and provide a compliance pathway for products to obtain LBC Compliance recognition.

Declare Identifier for company and product, valid for 12 months. **Original Issue Date** indicates how long a product has been a registered product in the program.

LBC Criteria Compliance demonstrates compliance with all Imperatives applicable to the selection of building products within the Living Building Challenge. If a product meets the requirements for all applicable Imperatives, the product is considered fully compliant with the Living Building Challenge, and will be noted as such on the Declare label graphic itself.

I-13 Red List requires that manufacturers disclose the ingredients and VOC content (if applicable) in their products to ensure that they are free of Red List chemicals.

I-10 Interior Performance requires compliance with the California Department of Public Health (CDPH) Standard Method v11-2010 (or international equivalent) for all interior building products that have the potential to emit Volatile Organic Compounds (VOCs). The Declare label confirms a product's compliance with CDPH or an equivalent emissions standard.

I-14 Responsible Sourcing requires that manufacturers of wood products demonstrate sustainable extraction through certification with the Forest Stewardship Council, by meeting ILFI's definition of low risk or salvaged wood, or through the use of a formal LBC Exception.

Third Party Verified

Living Building Challenge Criteria: Compliant

I-13 Red List:
 LBC Red List Free % Disclosed: 100% at 100ppm
 LBC Red List Approved VOC Content: Not Applicable
 Declared

I-10 Interior Performance: Not Applicable
I-14 Responsible Sourcing: Not Applicable

FIN-0003
 EXP: 01 JUL 2021
 Original Issue Date: 2020

INTERNATIONAL LIVING FUTURE INSTITUTE™ livingfuture.org/declare

A brand of **legrand**[®]

Environmental Product Declarations, or EPDs, are based on the Life Cycle Assessment (LCA) of a particular product. The EPD details the life cycle impact of that product and its environmental impacts, taking into consideration recycled content, service life, water and soil pollution, global warming potential, ozone depletion and smog creation.

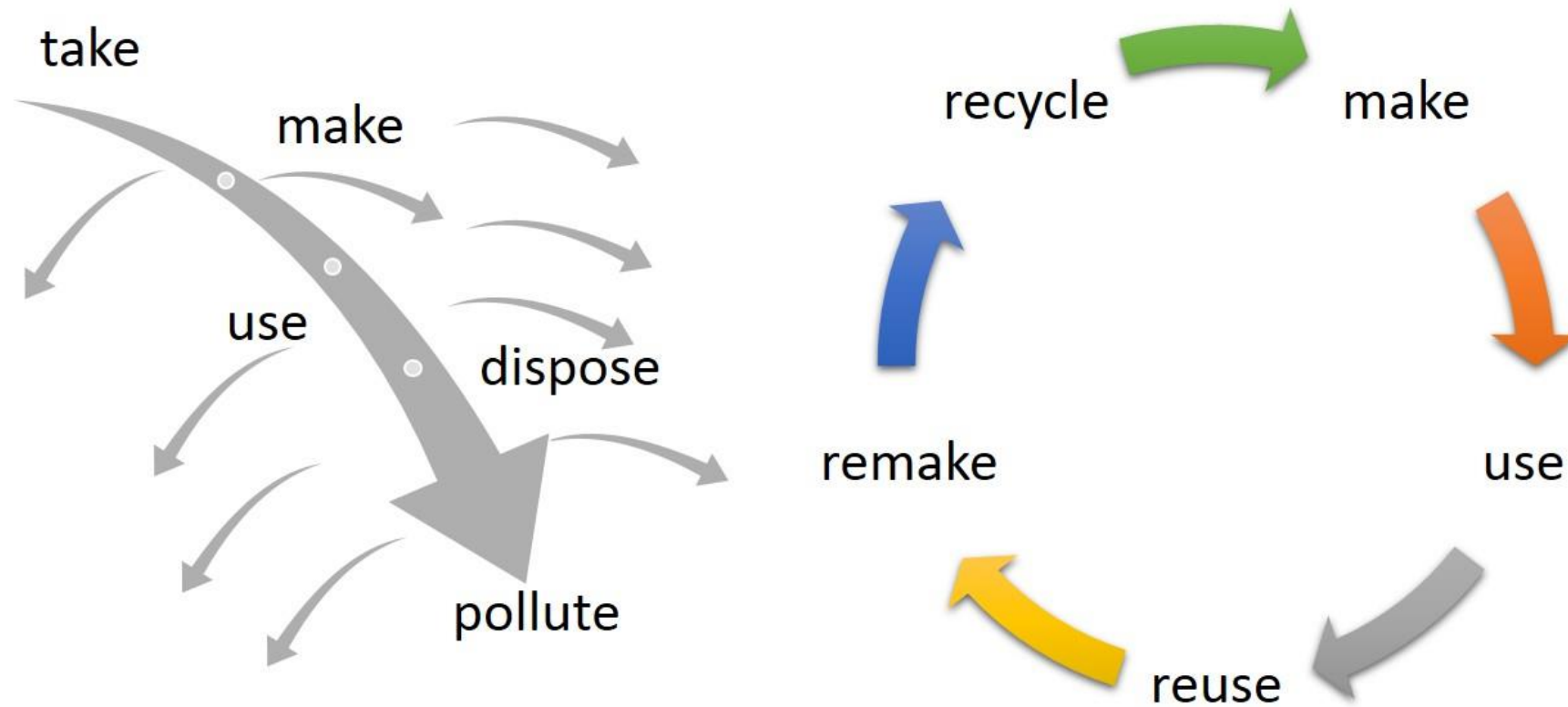
Health Product Declarations, or HPDs, disclose the materials or ingredients in our products and their associated human health effects. The HPD was created by the not-for-profit Health Product Declaration Collaborative to be the industry standard format for conveying details about product content and associated health information. 1000ppm.

Declare labels are like nutrition labels for our products. They answer questions like where a product comes from, what it's made of and where it goes at the end its life. 100ppm.

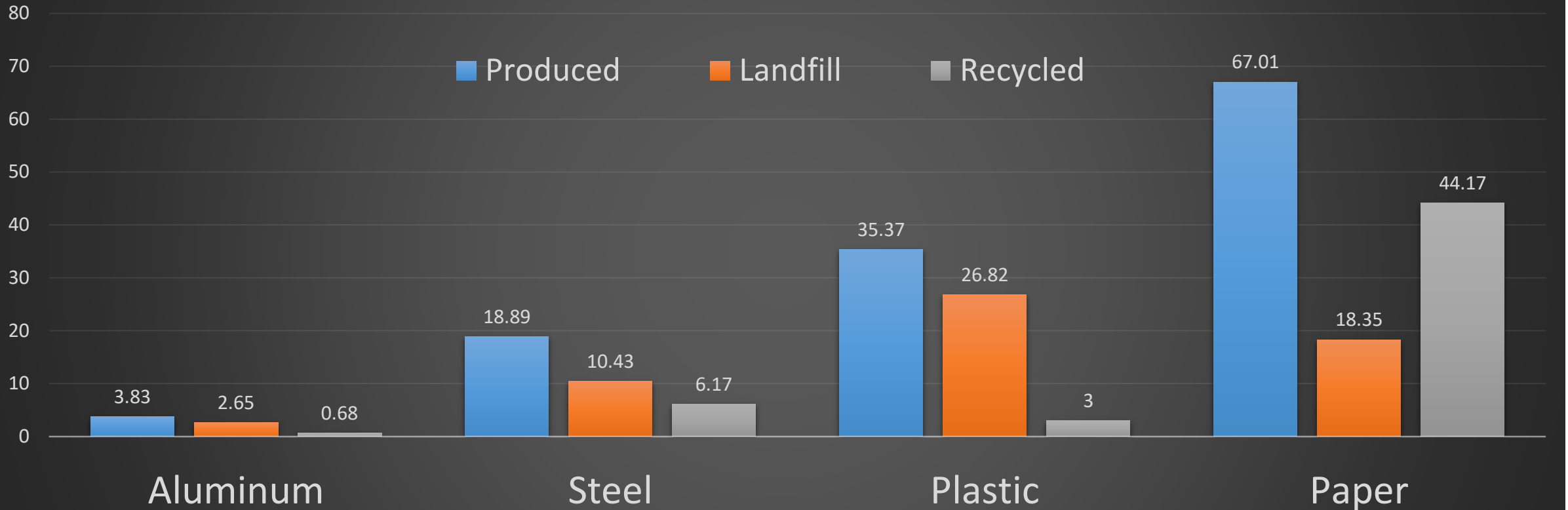
The International Living Future Institute (ILFI) developed the Declare label and certifies products based on the criteria of the Living Building Challenge (LBC):

- LBC Red List Free, which means the product is free of all red list ingredients
- LBC Compliant, which means the product contains some Red List chemicals, or
- Declared, which means the product is not compliant with the Red List or its temporary exceptions.

Recover Resources - Circular Economy



Material Produced and Recycled in US (Million tons)



<https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/guide-facts-and-figures-report-about-materials>

Potential Savings - Recycle vs Raw

- Aluminum 95% energy savings
- Steel 67% energy savings
- Paper 60% energy savings
- Plastics 33% energy savings

<https://www.americangeosciences.org/critical-issues/faq/how-does-recycling-save-energy>

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Better Lighting



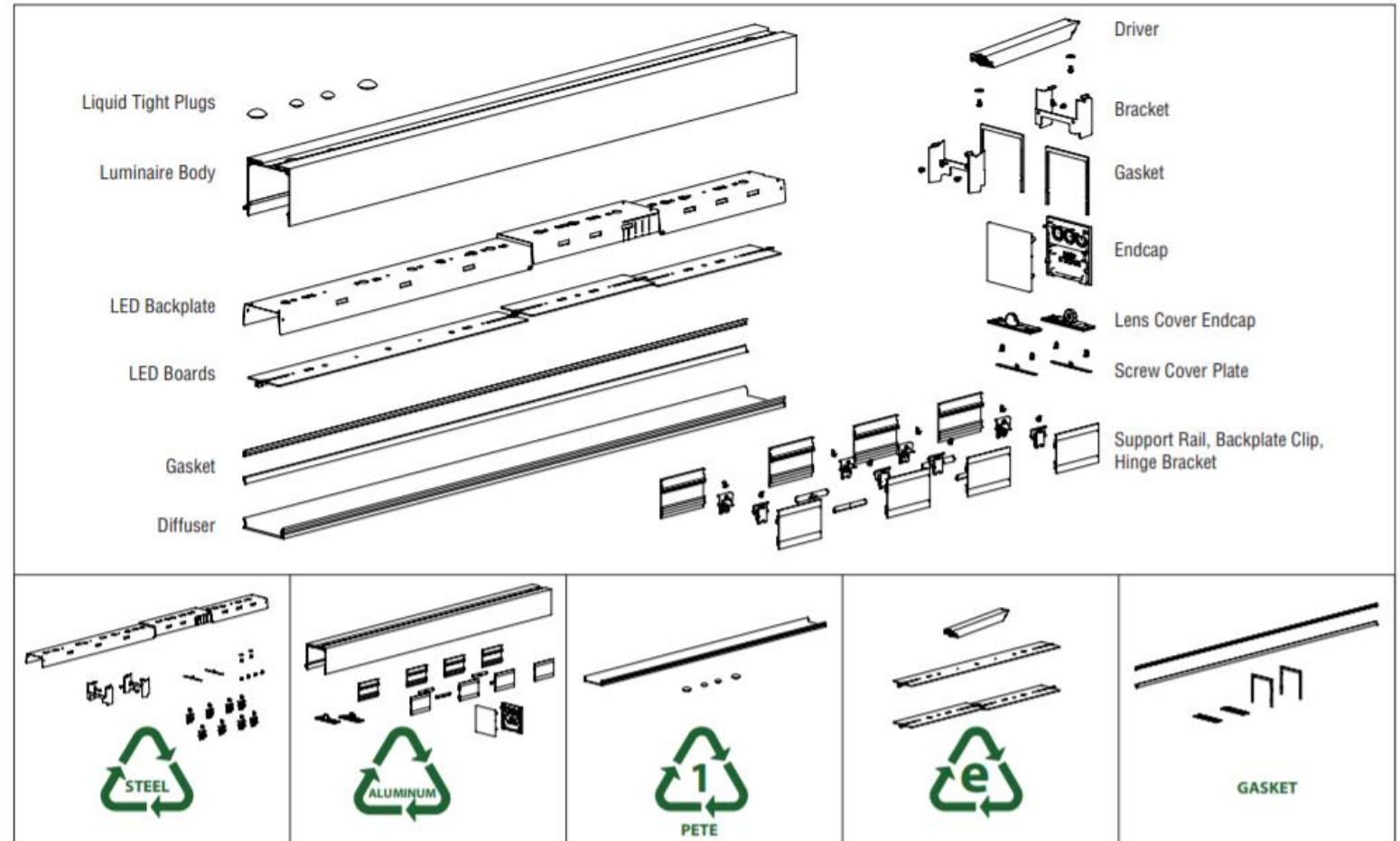
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Deconstruct Differently



Design Differently – Eco Design

- Eliminate chemicals of concern
- Eco friendly materials
- Durability
- Long life
- Reuse
- Refurbish
- Easily recyclable
- Carbon footprint



Design Differently – Natural Materials

BAMBOO PENDANT

ENVISIONING A CLEAN, GREEN FUTURE FOR OFFICE
LIGHTING AND ELECTRIC INFRASTRUCTURE

MANUFACTURING INNOVATOR CHALLENGE:
SUSTAINABLE MANUFACTURING OF LUMINAIRES

KOERNER
DESIGN



FINELITE[®]
Better Lighting

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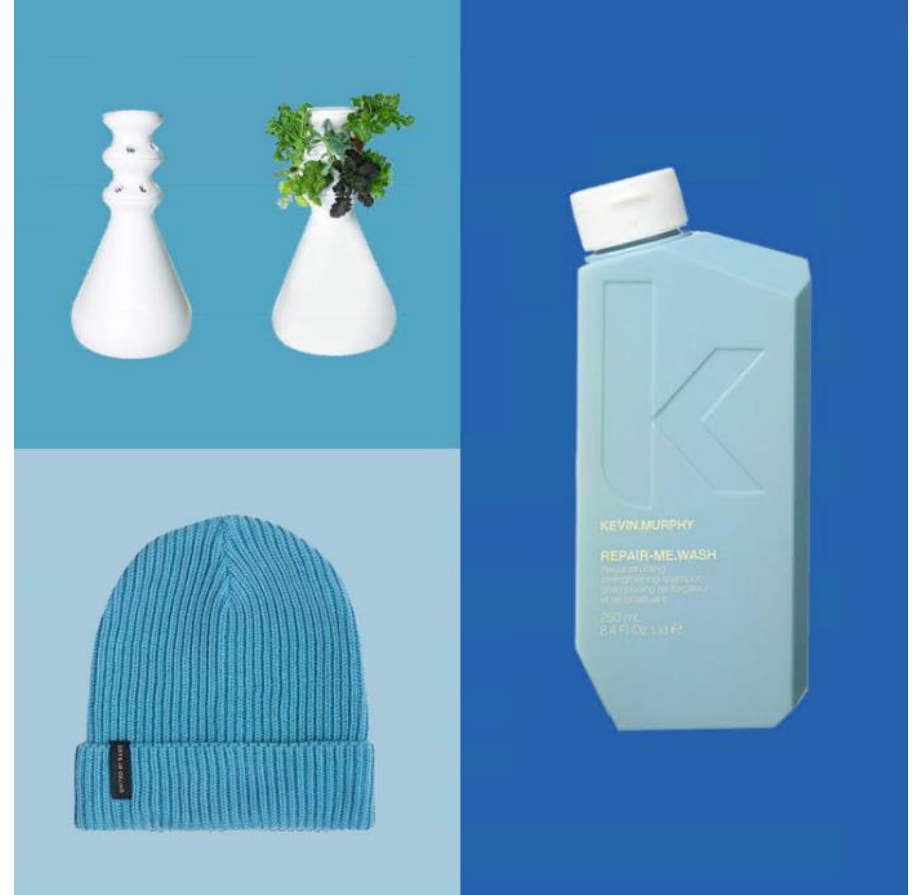
Design Differently - Print your trash



- Pick, Clean, Shred and Print
- Distributed Recycling and Additive Manufacturing (DRAM)
 - <https://theconversation.com/how-to-turn-plastic-waste-in-your-recycle-bin-into-profit-147081>

<https://thenewraw.org/>

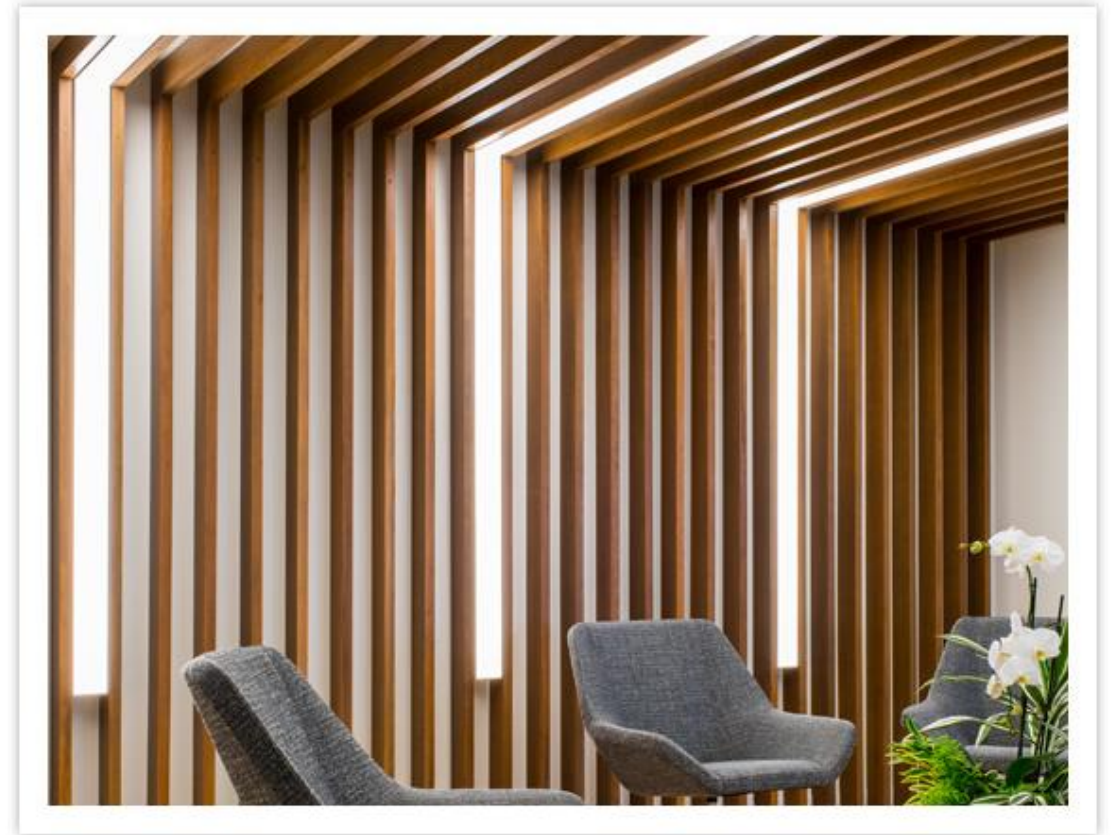
Design Differently - Build with Ocean Plastics



Jump Start New Approaches

Consider adding sustainability requirements to all DOE RFP's and give preference to:

- Developing technology that is recyclable, reusable and free of harmful chemicals.
- Investigates materials and designs that can be used to feed the circular economy at the end of construction.
- Develop natural supply chains like bamboo, flax seed, for use in new lighting technologies.
- Explore trash recovery for large scale 3D printing.
- Make optics, lenses and other components out of ocean plastics.



Thank You!