Sustainable Manufacturing

Presented by Aaron Smith
VP of Technology and R&D

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Mark Ridler, BDP, https://youtu.be/kWUAHhfW3V0

Waste Hierarchy:

Avoid – Remove Harmful chemicals and composites.

Avoid - Increase performance and innovate to use less lighting.

Reduce – Reduce Carbon. Know the life cycle costs and try and improve them.

Reuse – Design for long life and serviceability.

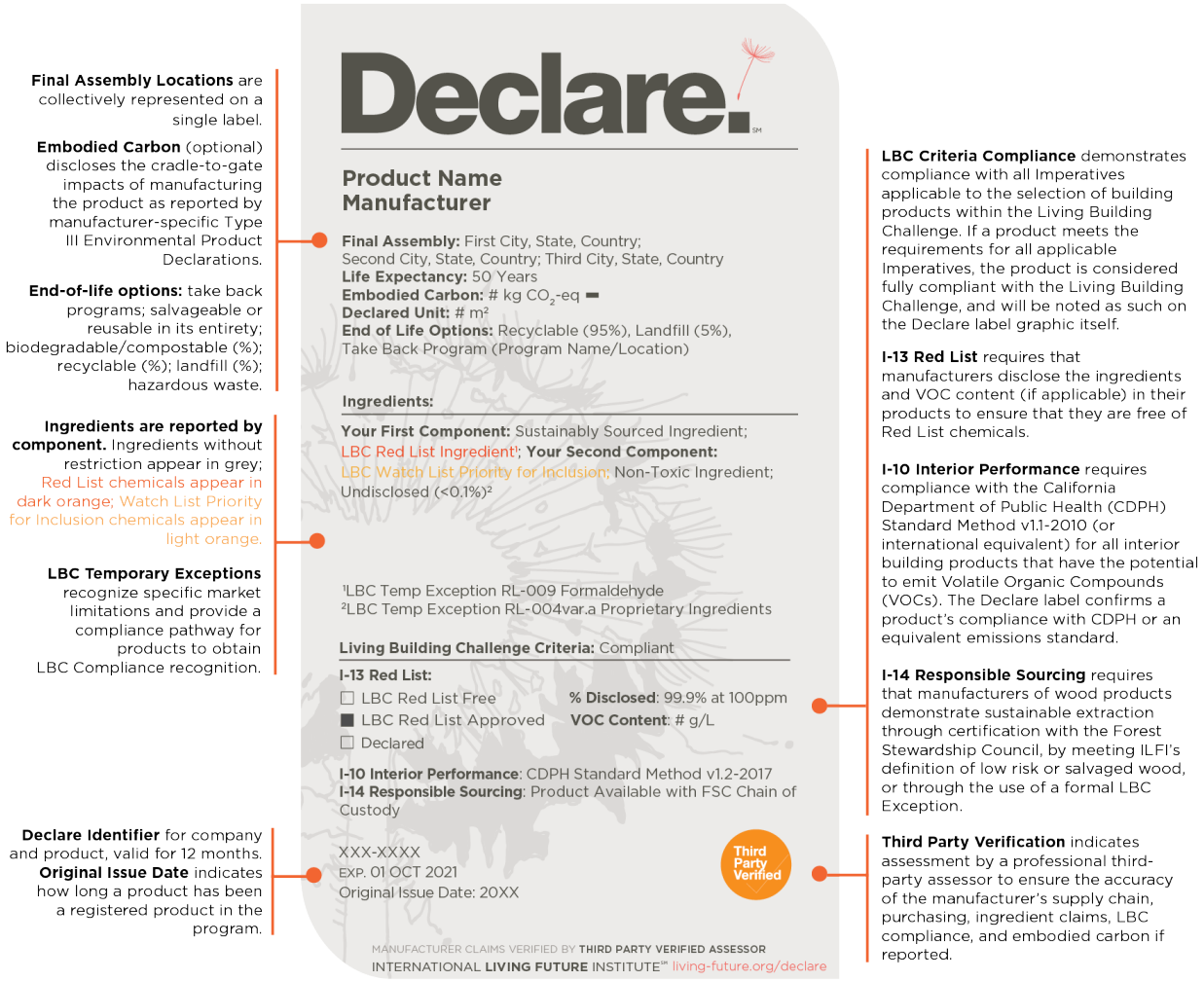
Recycle – Make all components capable of recycling including packaging

Transparency (Avoid)

- Eliminate harmful chemicals
- Drive this through the supply chain

Challenges

- We need material alternatives
  - PVC
  - Phthalates
- Electronics components
- Supply chain traceability
  - Blockchain
  - Smart contracts



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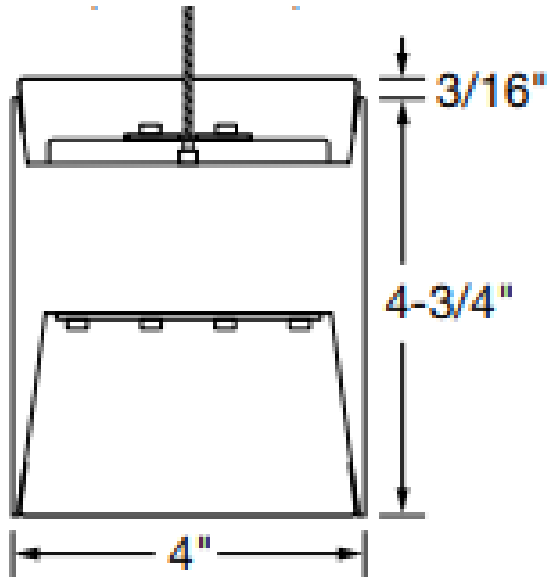
Eliminate Materials (Avoid)

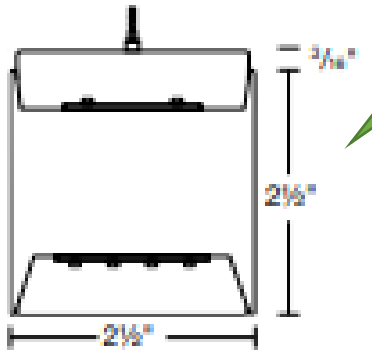
- Less weight
- Higher performance

Challenges

- Component size



1972 lm/ft
106 lm/W
3.4 lb/ft



2046 lm/ft
119 lm/W
2.3 lb/ft

32% Less Weight

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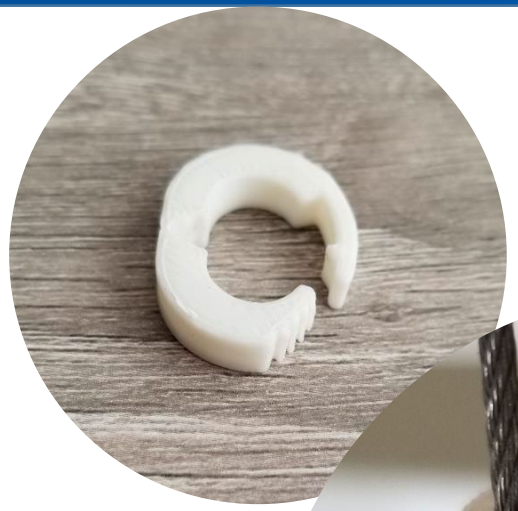
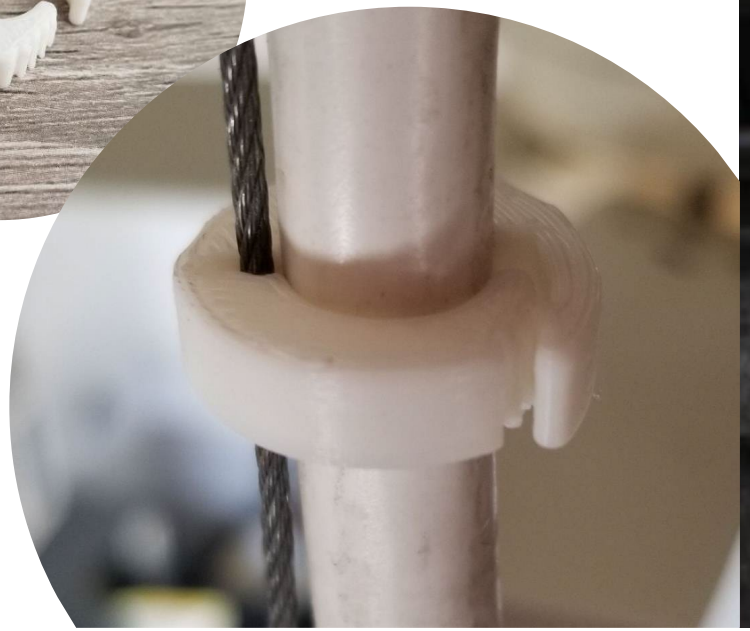
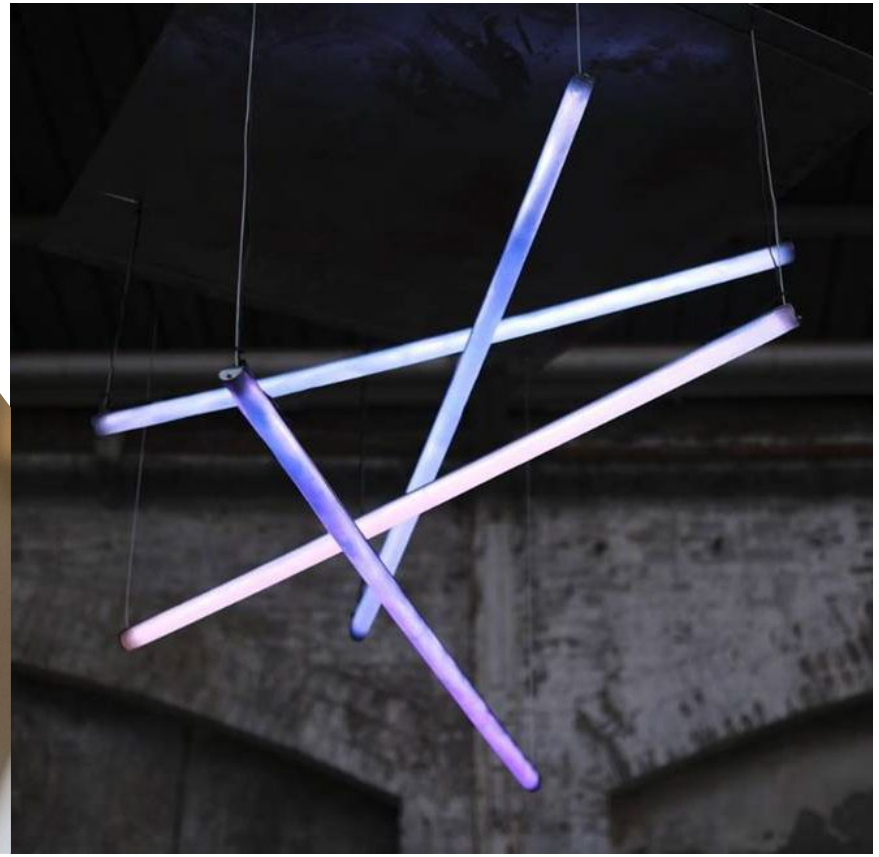
Build with Ocean Plastics (Reduce)







Challenges

- Consistent supply
- Consistent performance
- Manufacturing partners
- Compliance
- Cost

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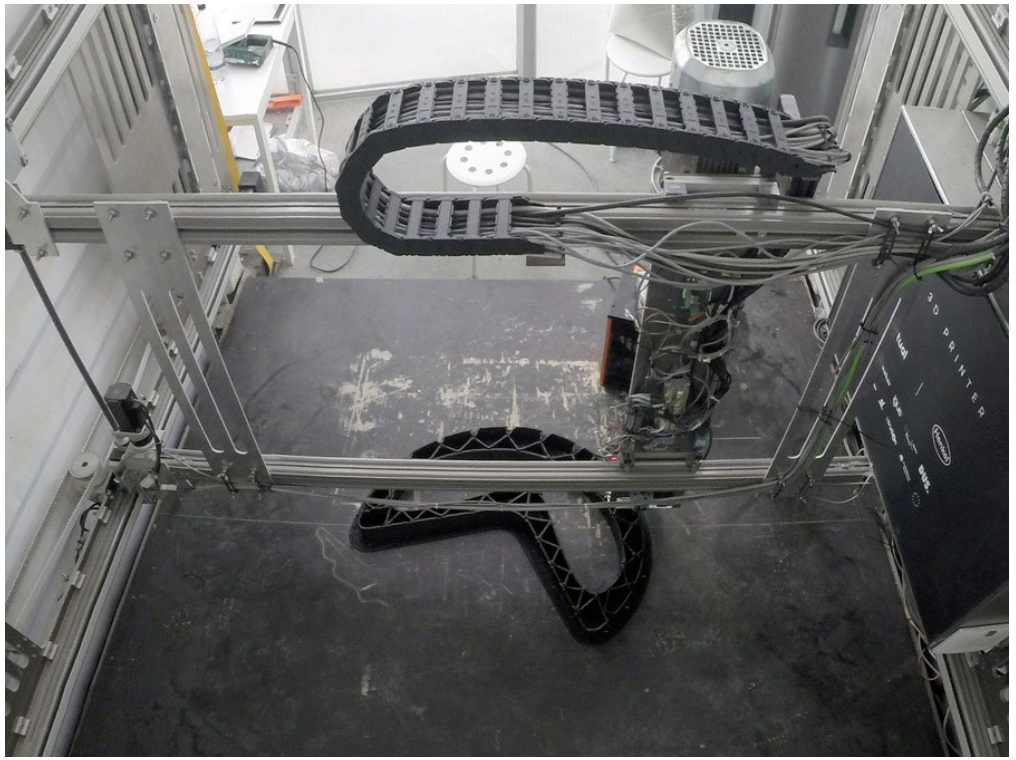
Print your trash (Reduce)



- 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/

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Natural Materials (Reduce)

Bamboo

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Bamboo vs Aluminum

Challenges

- Most bamboo lumber is made outside the US and imported.
- Looking for materials that can be sourced in the US.
- Cost is much higher and much of the value of the lumber is milled away
- Much harder for us to design around and process

Life Cycle Assessment (LCA)

Global warming potential

(to produce 1kg of material)

- Bamboo Lumber
  - GWP = 8 – 4kg CO2
- Standard Aluminum Processes
  - GWP = 8 – 5 kg CO2
- State of the Art Aluminum Processes
  - GWP = 4 – 2kg CO2
- Recycled Aluminum (est.)
  - GWP = 1 - 0.5 kg CO2

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Natural Materials (Reduce)

Algae Foam

- Replace a plastic neoprene gasket with a bioderived alternative
- Algae sourced from waterways with high risk of algae blooms.
- Removes toxic nuisance species and converts into a useful material
- Algae foam is currently a blend of plastic and algae that lowers carbon footprint compared to plastic alone.

Challenges

- Small plastic parts are hard to recycle and likely end up in landfills
- Looking for completely biodegradable alternative.

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Natural Materials (Reduce)

Molded Pulp

- Reduces packaging waste
- Equal shipping performance
- Faster to package
- Faster to unpackage

Challenges

- Lighting market adoption
- Develop for more durable applications

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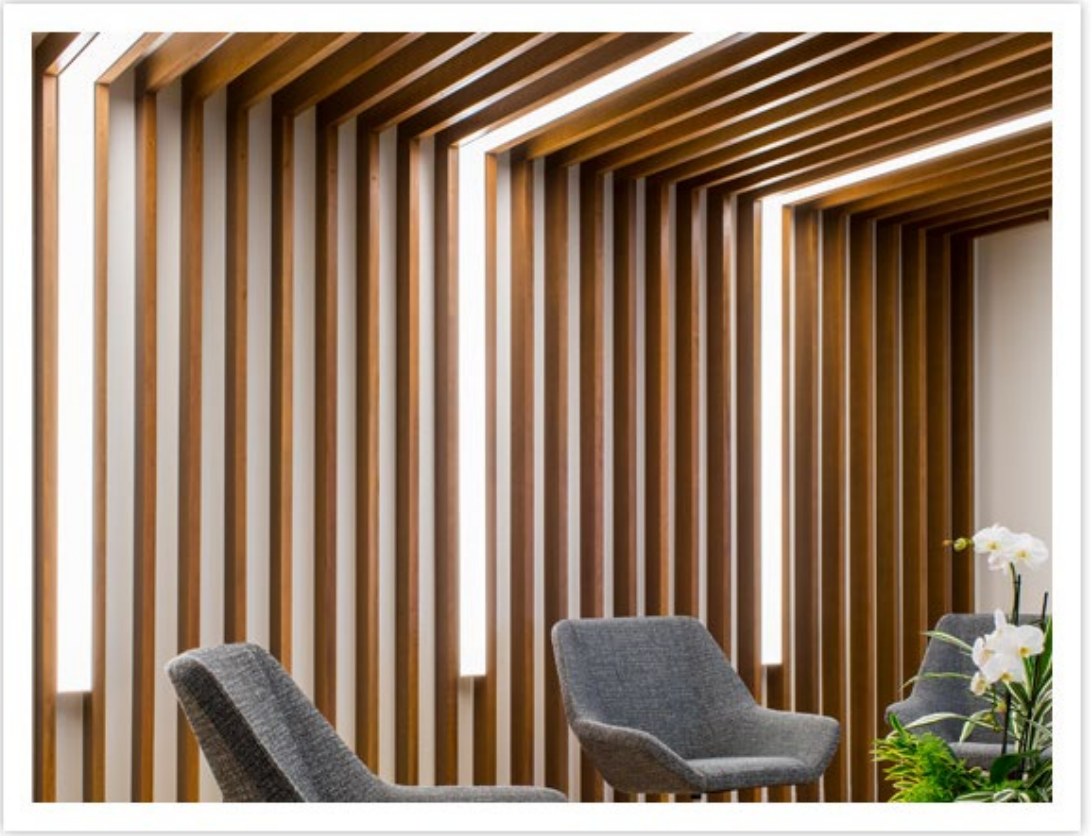
Jump Start New Approaches

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

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



Thank You!

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