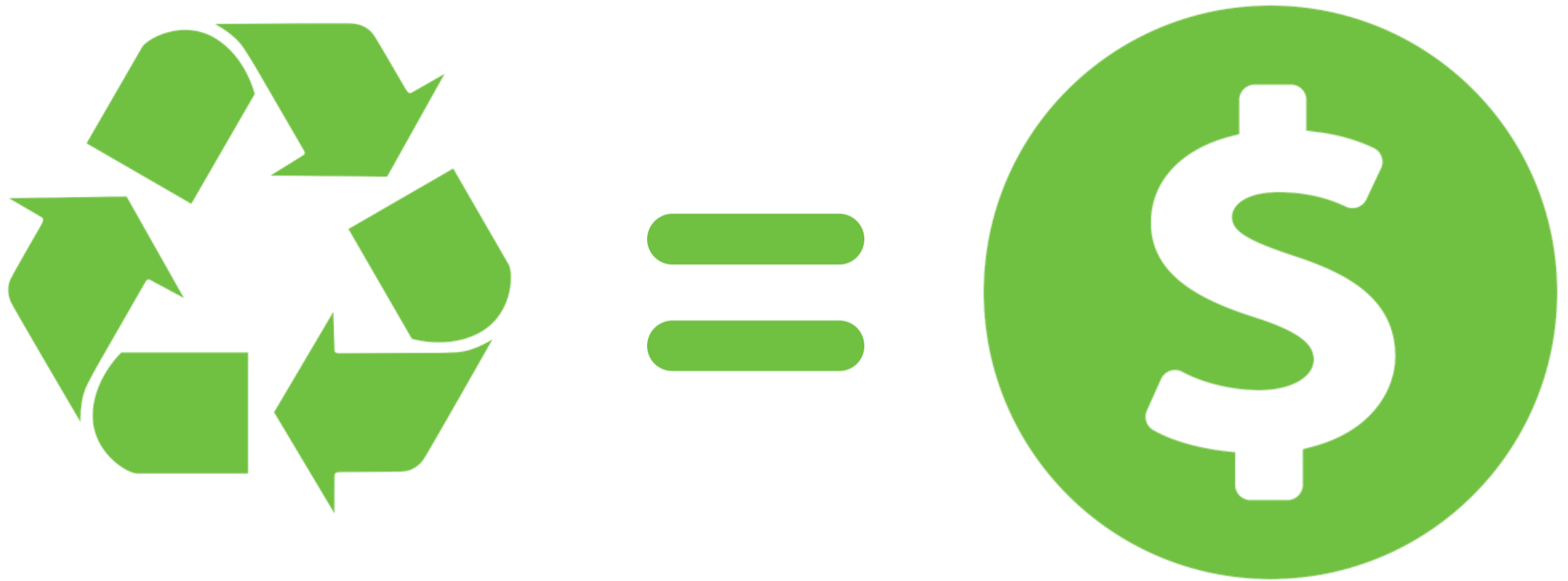




# Sustainability Drives Adoption

US DOE SSL R+D WORKSHOP 2020



**Does “deep green” sustainability  
lead to radically reduced costs?**

# 6 years ago...

## 2014 US DOE Solid State Lighting R+D Workshop

### The Evolution of Adoption

2014 US DOE Solid State Lighting R+D Workshop

Philips Energy

**Does "deep-green" sustainability lead to radical cost reductions?**

**Customers will hold the lighting industry accountable for lifecycle costs. (OMG!)**

**PERFORMANCE ECONOMY**

- Contracts for holistic lifecycle costs
- Planned performance upgrades
- System leasing plans
- "Pay-per-lux" billing
- "Take back" programs

**PERFORMANCE ECONOMY**

**CIRCULAR ECONOMY**

**Externalities...**

**...internalized?**

**"The transition from a linear to a circular economy is a necessary boundary condition. A circular economy requires innovation in the areas of material components and product reuse, as well as related business models."**

**...economic growth will eventually be decoupled from the use of natural resources and ecosystems. In such we economy the lower use of raw materials allows us to create more value."**

**-Frans van Houten, CEO Royal Philips**

**Peak Design**

**Performance Economy**

**Leasing?**  
Residual value of the fixtures?

**Energy services?**  
Shared value?

**Pay-per-use?**  
Pricing for light-as-a-service?

**Residual Value?**

Place your bets: Asset or Liability?

Year 1 Year 10

**The Fashion Cycle?**

What is the residual value of the fixtures?

**Extracting value at "end of life"**

Reuse → Used Lighting Market?

Rebuild → Maintenance?

Reclaim → Separation/OEM Parts?

Recycle → Biological? Technical?

**Extracting Value?**

200 lm/w L70 - 50,000 hrs

140 lm/w L70 - 50,000 hrs

100 lm/w L70 - 50,000 hrs

70 lm/w L70 - 50,000 hrs

**Where could the DOE invest?**

**Reduce the junk:**  
system consolidation

**Shrink the fixture:**  
treat light as a material

**Go "deep green":**  
eco-materials + lifecycle

**Reduce the junk:**  
system consolidation

**Reduce the junk: Simplify, simplify**

**Reduce the junk: miniaturization of "smart" drivers**

**Reduce the junk: integrate drivers?**

**Shrink the fixture:**  
treat light as a material

**Why are our lighting systems constrained to "fixtures"?**

We're selling gaslight era fixture formats instead of architectural lighting systems.

**Seagram Building**

NYC Energy Audit

Best: 100 out of 100

Median: 68 out of 100

Seagram: 1 out of 100

**Can we treat lighting just like gypsum board?**

On highly complex, customized projects, how can we efficiently produce, ship and install sheets of light?

**LuxExcel**

20 lumens per watt

**Coolidge Lighting**

**Secondary benefits of package-integration R+D?**

**Cut it?**

**Bend it?**

**Mold it?**

**Stamp it?**

**Glue it?**

**LED module and digital fabrication may lead to innovations in low cost manufacturing of lighting fixtures.**

**Go "deep green":**  
eco-materials, lifecycle, material bank

**Why do our lighting products use such energy intensive materials?**

Do we really need steel, aluminum and plastic in our lighting products?

**How can we use renewable, natural materials?**

Molded bamboo fiber pulp

**How can we use reclaimed, recycled material streams?**

Examples: Recycled plastic lumber products

**SUSTAINABLE MATERIALS STRATEGY**

**What Goes In**

**What Comes Out**

**Bioderived or bio-degradable parts?**

**Do the current safety codes allow for eco-friendly material use?**

**Where could the DOE invest?**

**Reduce the junk:**  
"systems on a chip"

**Shrink the fixture:**  
electronic integration of resistors

**Go "deep green":**  
redundancy at EOL, material reclamation

**Another L-Prize?**

**Circular Economy Prize**

**Featherweight Prize**

**THANK YOU!**

**Brad Koerner**  
Director of Experience Design  
Philips Lighting

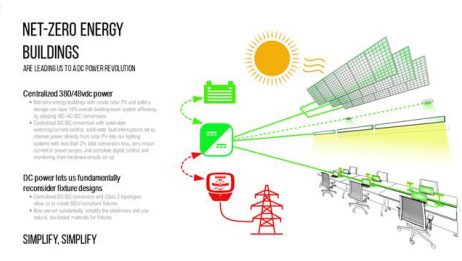
**www.lucept.com**

**brad.koerner@philips.com**

<https://lucept.com/2014/02/10/us-doe-ssl-rd-workshop/>



## 2019 US DOE Manufacturing Innovator Challenge: Sustainable Manufacturing of Luminaires



<https://lucept.com/2019/12/04/koerner-design-wins-us-doe-sustainable-luminaire-design-competition/>





What is holding the lighting  
industry back?



**Sustainability:**

**“Perfection is the enemy of the good”**

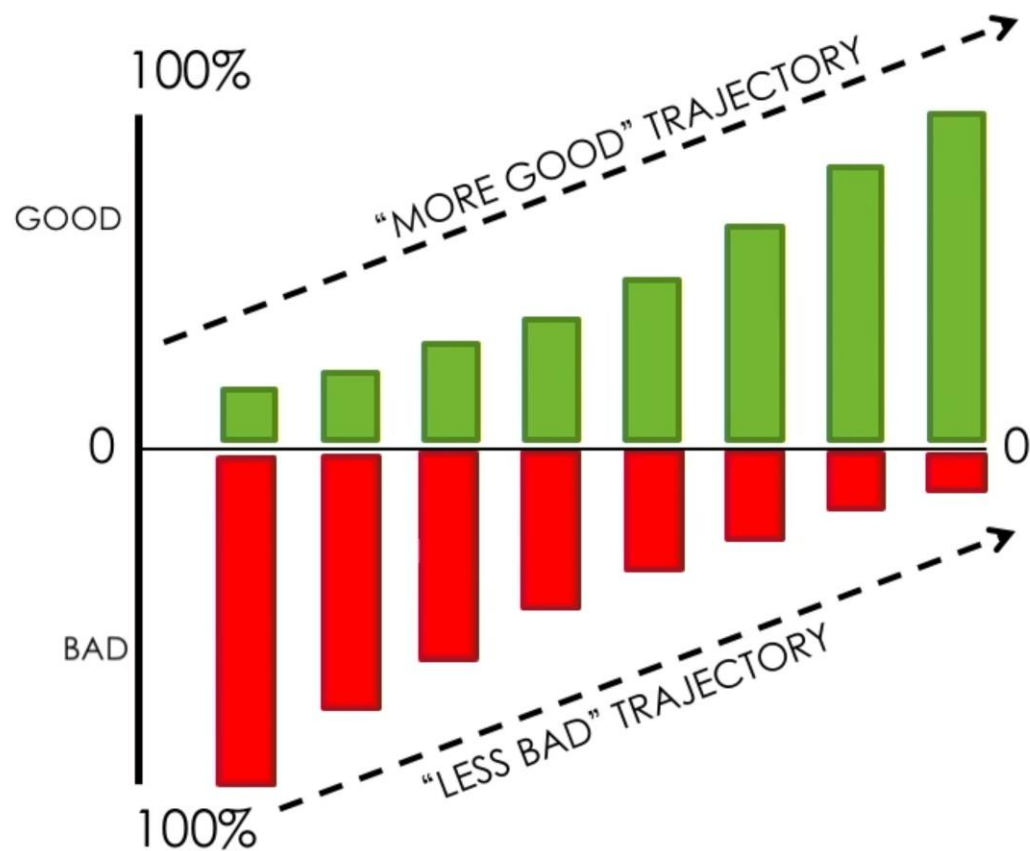
# **Before we can start:**

**Does EVERY component need to be perfectly sustainable?**

**Does EVERY fixture type need to be perfectly sustainable?**

**Does EVERY process need to be perfectly sustainable?**

**Theory is nice, but so intimidating that it kills progress before it can even be tried.**



***“Being less bad is not also being good.”***

**-William McDonough**







Shame, shame, shame!



**What does the US lighting industry need?**

**A genuine R&D challenge**

(not just an easy layup for more product-marketing **greenwashing**)



## Two possible R&D competitions:

### L-PRIZE

FEATHERWEIGHT  
PERFORMANCE

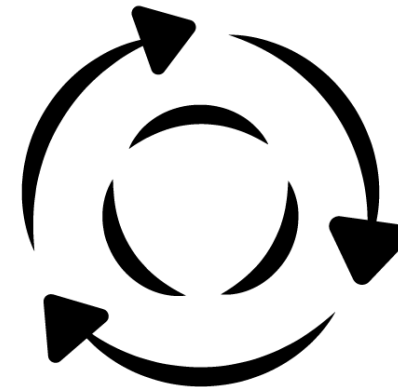


**Highest lm/w/gram**  
(@ minimum lm, specs)

Reduce material consumption, fixture size & complexity,  
and secondary transport & handling costs

### L-PRIZE

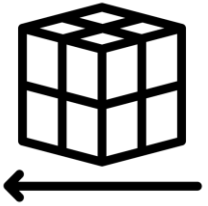
TOTAL LIFECYCLE  
COSTS



**Measurement against  
theoretically pure standard**

A complete luminaire – from electrons to photons – to meet  
a stringent life-cycle analysis

# Sustainable design rating as a competitive barrier



Reduction in transport waste:

**Mass** X **Volume** X **Distance Traveled**



Sustainable materials and components:

**Locally Sourced** X **Bioderived** X **Biodegradeable** X **Distance Traveled**



Efficient recycling

**Low-Labor Disassembly** X **Distance Traveled**





# Brad Koerner

VP of Product Development



[bkoerner@cimanetwork.com](mailto:bkoerner@cimanetwork.com)

[www.linkedin.com/in/brad-koerner](http://www.linkedin.com/in/brad-koerner)

[www.lucept.com](http://www.lucept.com)

# THANK YOU!