

Dematerializing Buildings

Building Better with Less

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Session Description

- The session will explore the cutting edge of material science for the built environment and the challenge of putting these advances into actual practice. The speakers will show a profusion of radical new innovations for dematerialization drawing from fields such as nanotechnology and biomimicry. They will engage participants in identifying risks and dealing with challenges to using these lightweighting techniques and technologies to improve building performance, durability, and resilience.

Learning Objectives

- Able to describe how buildings can function better with less material mass
- Able to understand how the design community is assimilating and applying new material and information science
- Able to explore how actual projects are practically using this new knowledge
- Able to apply new approaches for overcoming resistance to adopting new materials and technologies

The Sustainability Challenge

Is it possible to sustain continued economic growth to meet the needs of 7 billion people, and to adequately protect our natural environment at the same time?

The Sustainability Challenge

If so, how?

How will it affect the built environment?

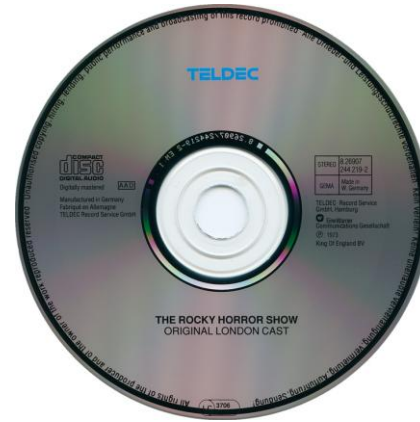
Necessary but Not Sufficient



A Short Story



What is an Album?



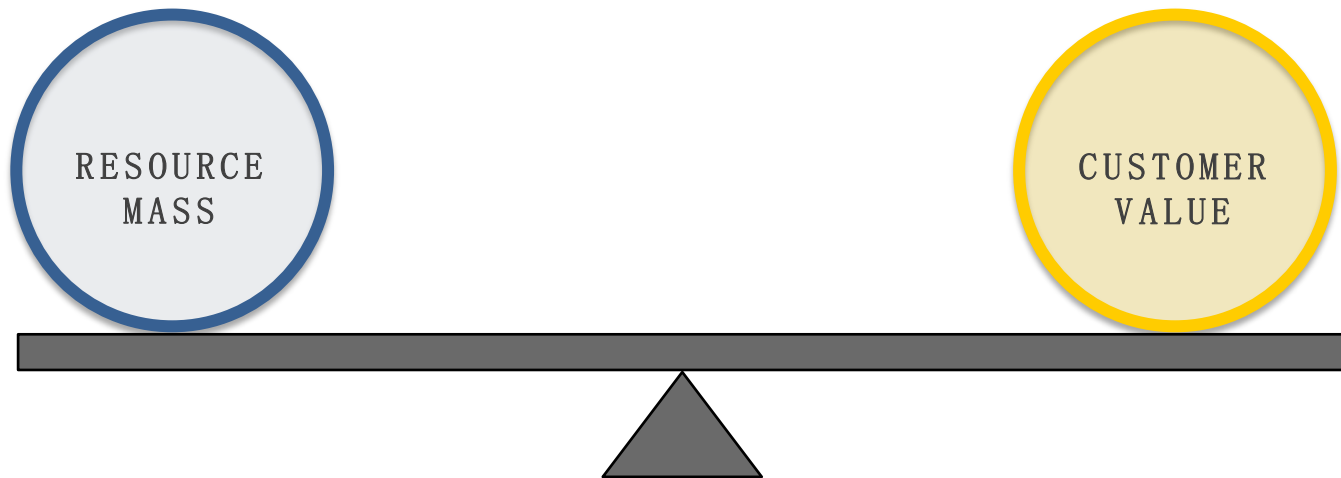
What is a house?



Can we build better with less?



Resource Performance

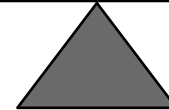


Resource Performance

RESOURCE
MASS



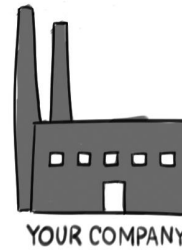
CUSTOMER
VALUE



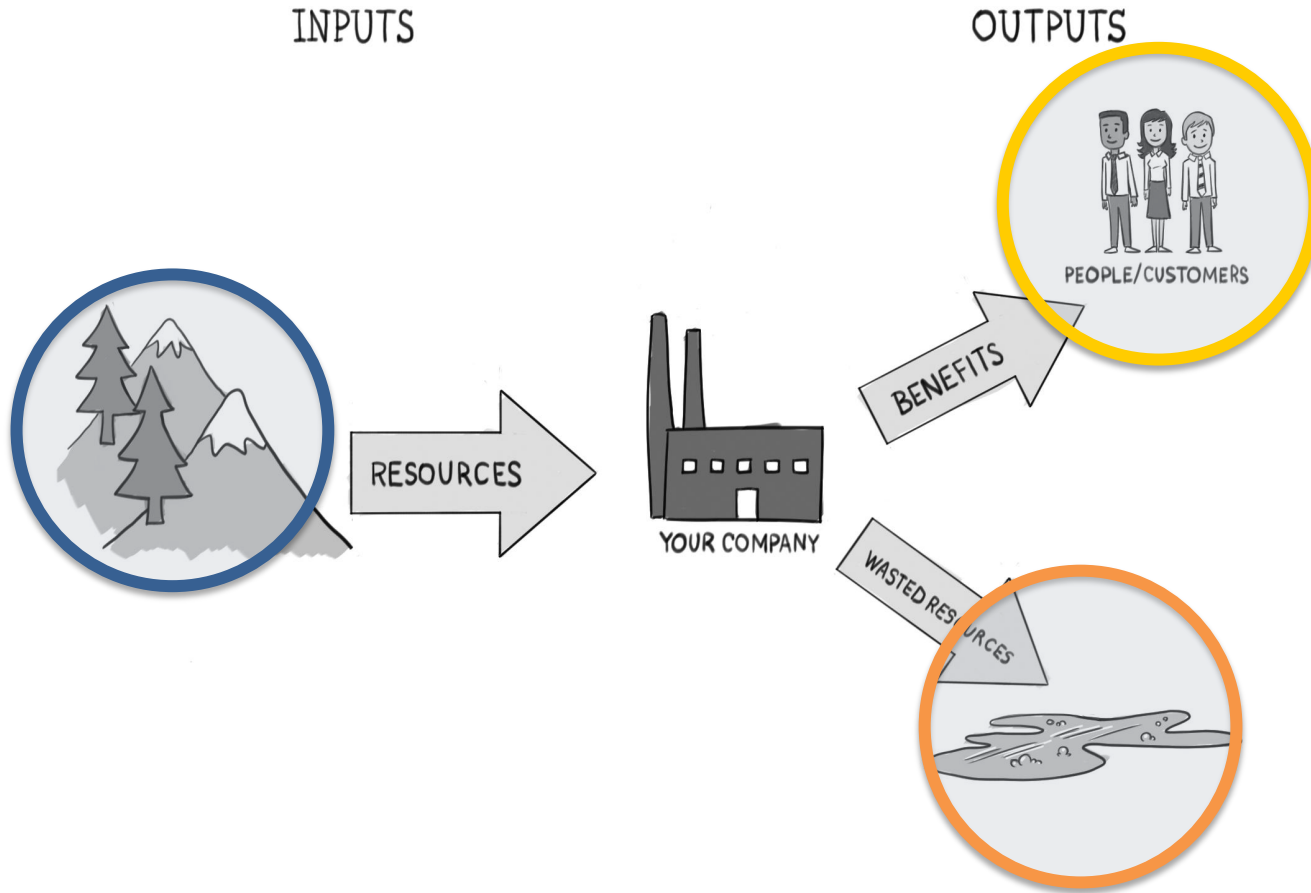
Resource Performance

INPUTS

OUTPUTS



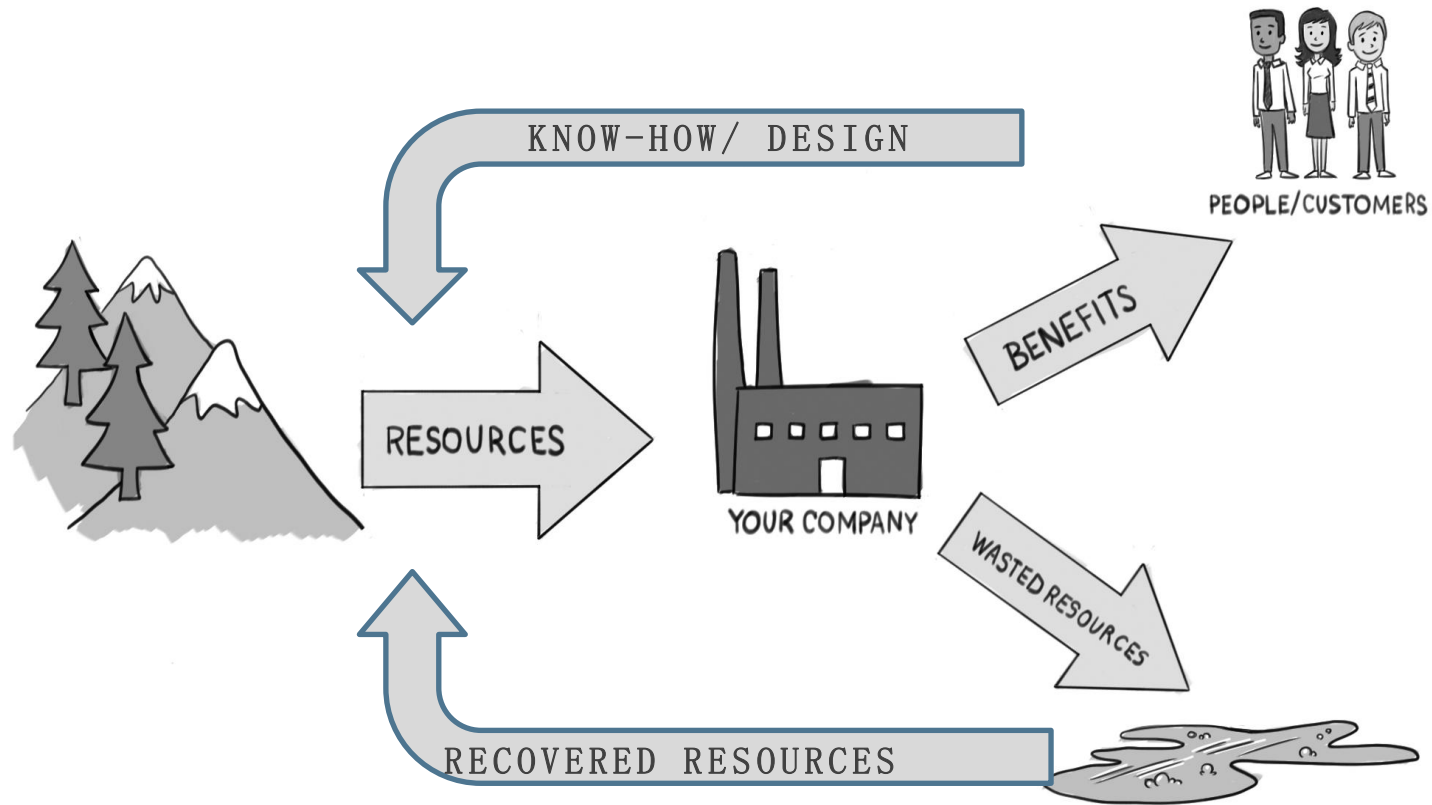
Resource Performance



Resource Performance

INPUTS

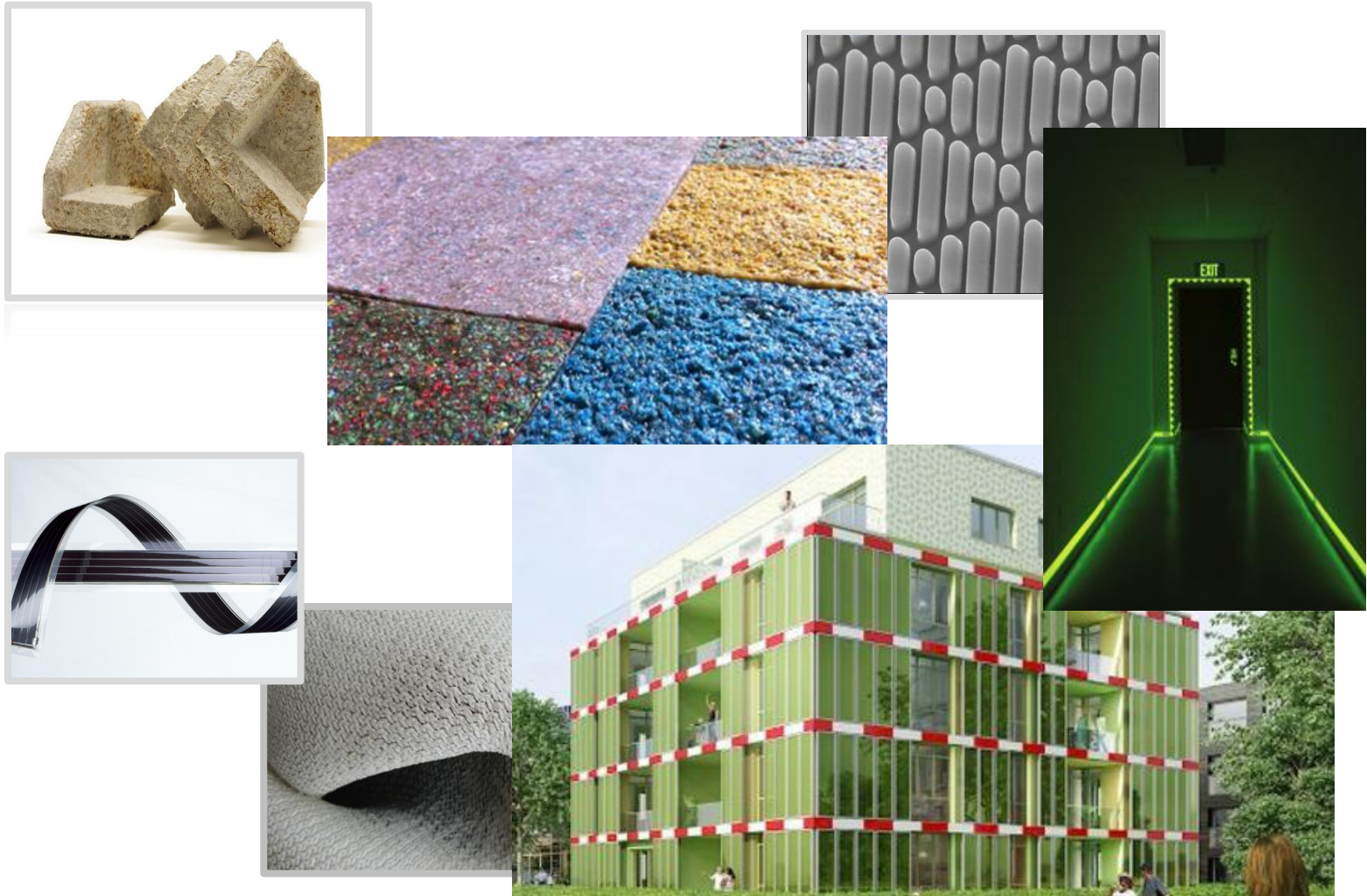
OUTPUTS



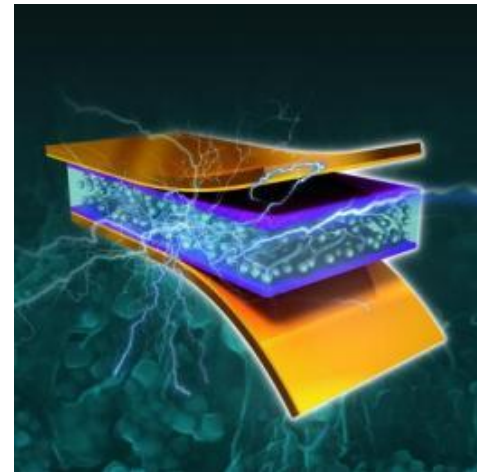
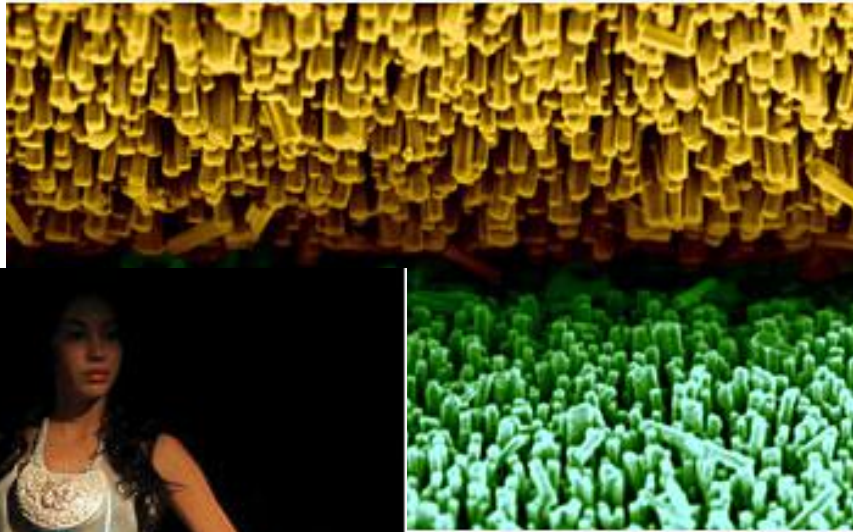
A New Perspective

- ✓ Most products are mostly waste
- ✓ Innovation has direction
- ✓ People buy benefits not products
- ✓ Benefits are weightless
- ✓ All pollution is wasted resources

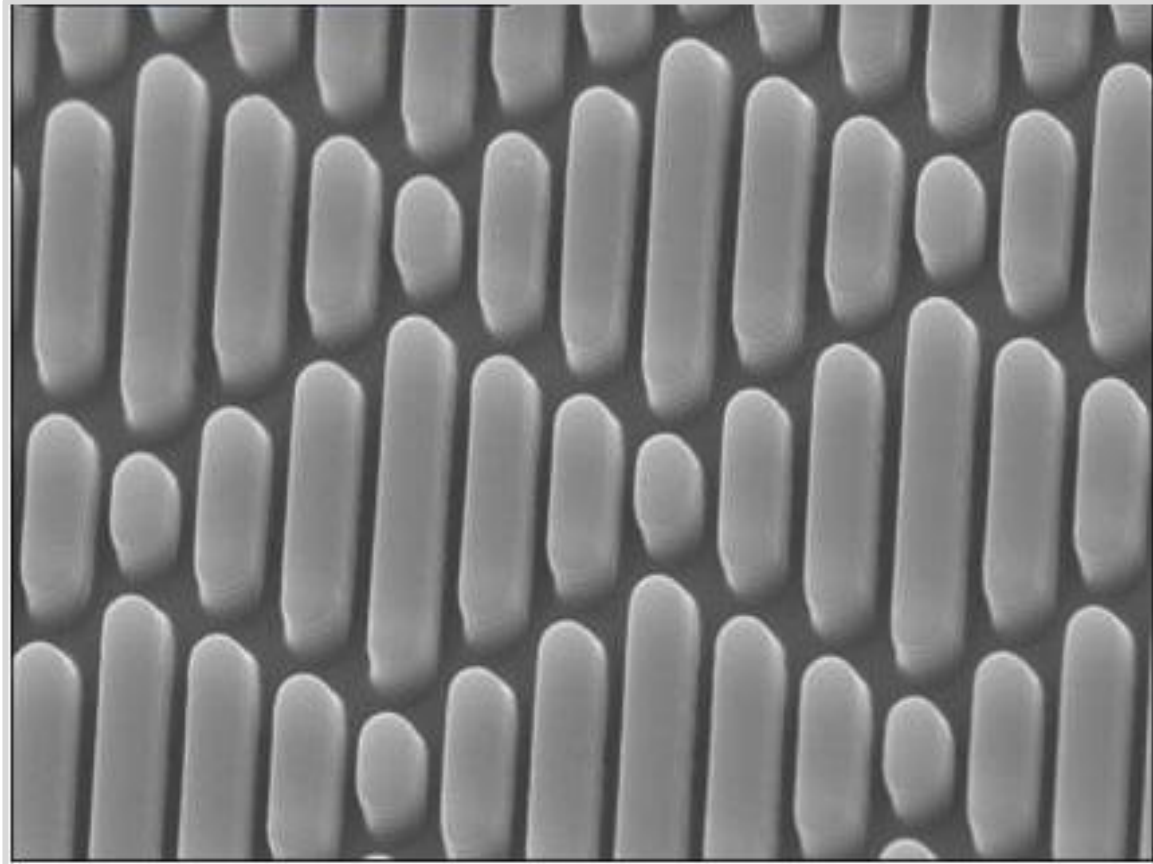
The Science of Lightweighting



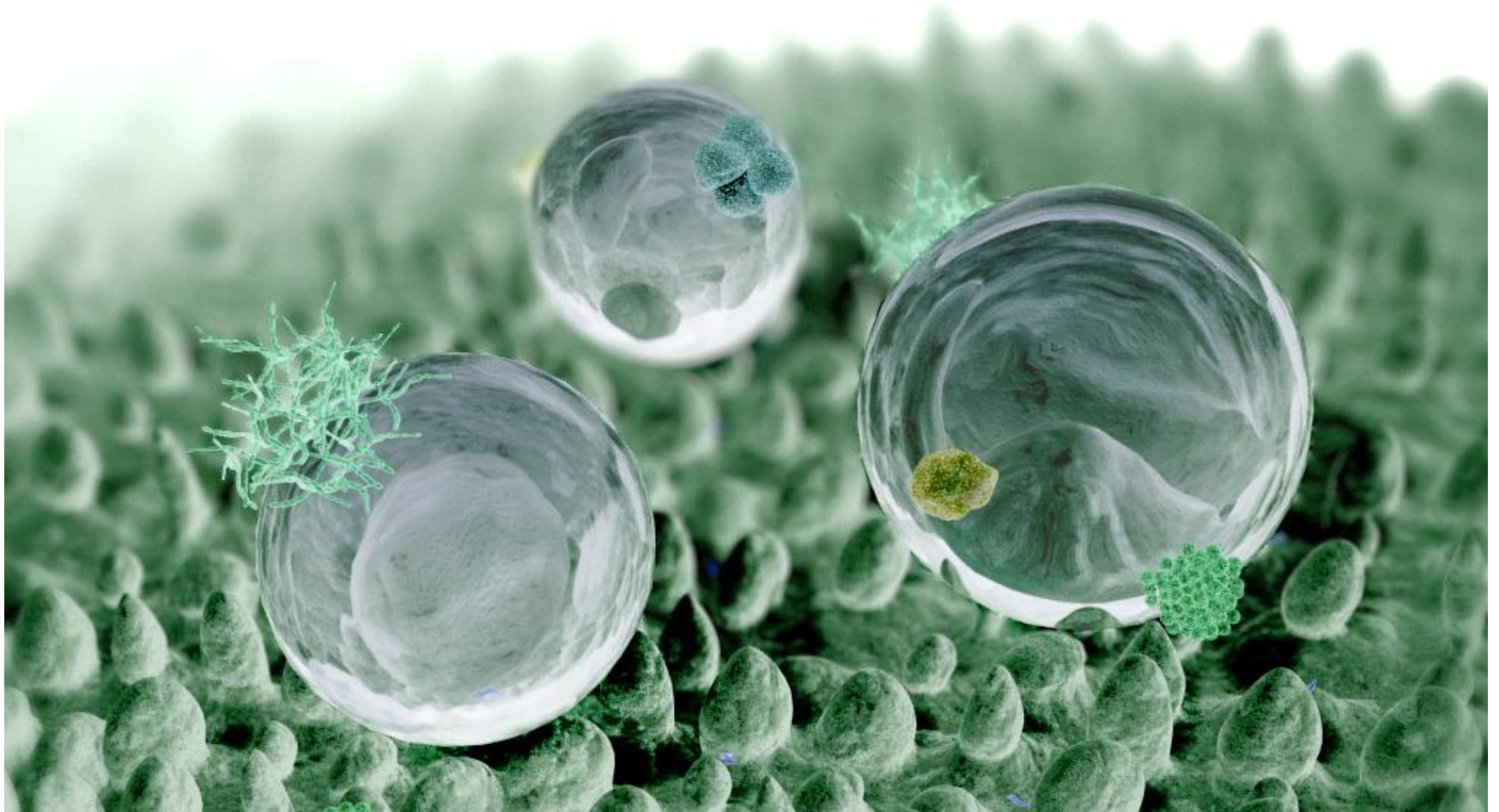
Clothing Power



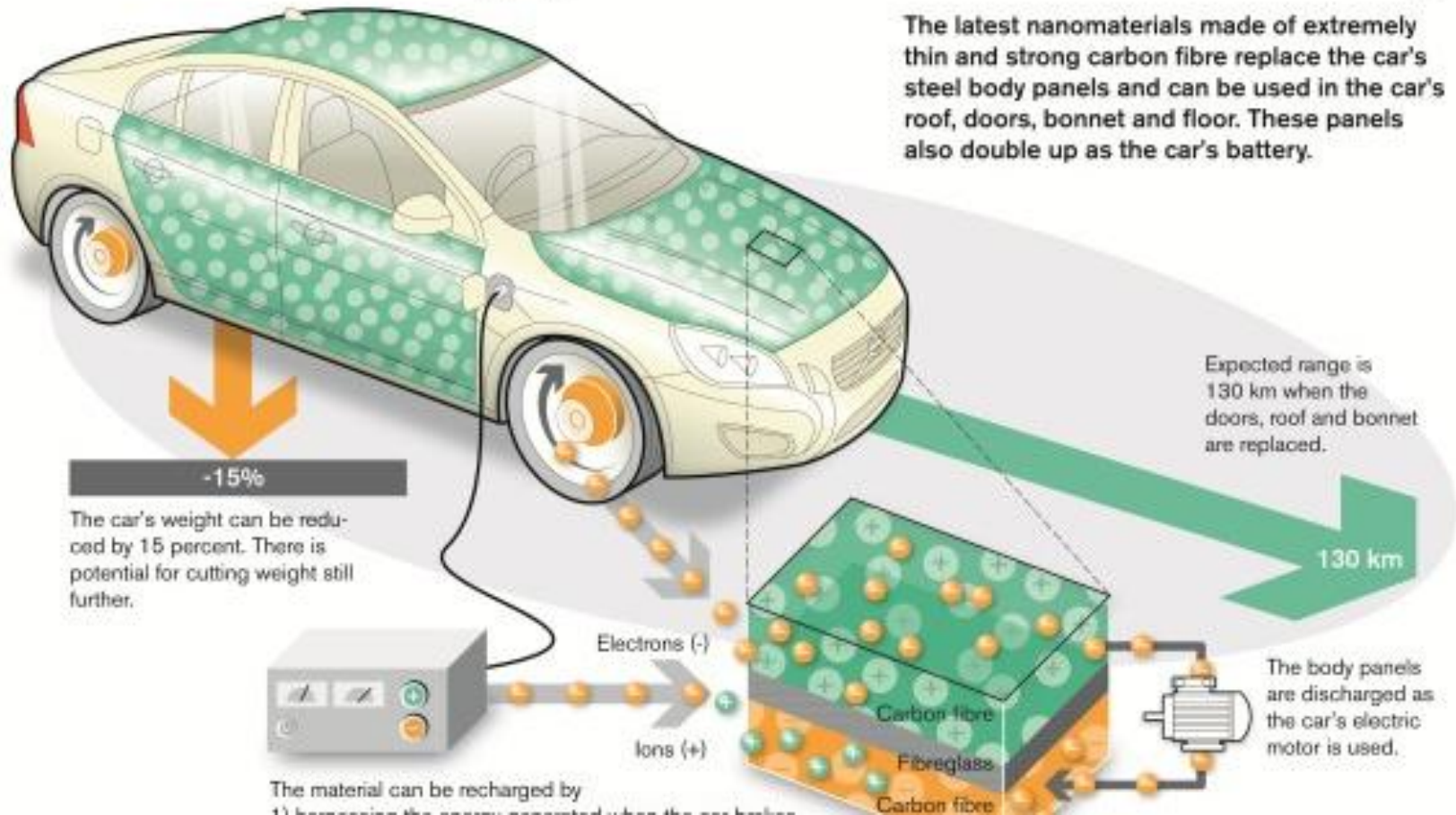
Anti-bacterial Surfaces



Hydrophobic Surfaces



Integral Energy Storage



Poo Tiles



Mushrooming Buildings



Soil Power



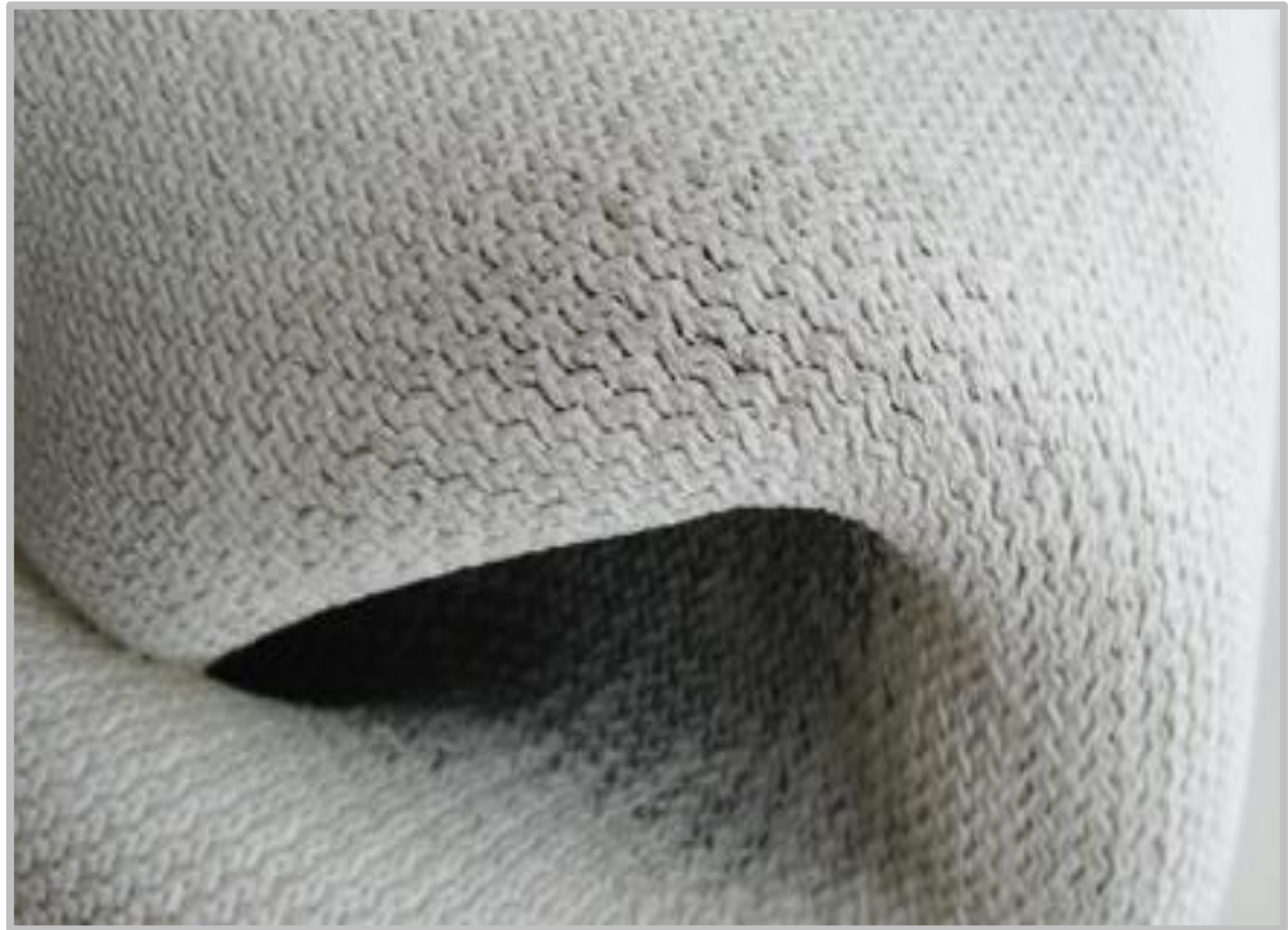
Algae Power



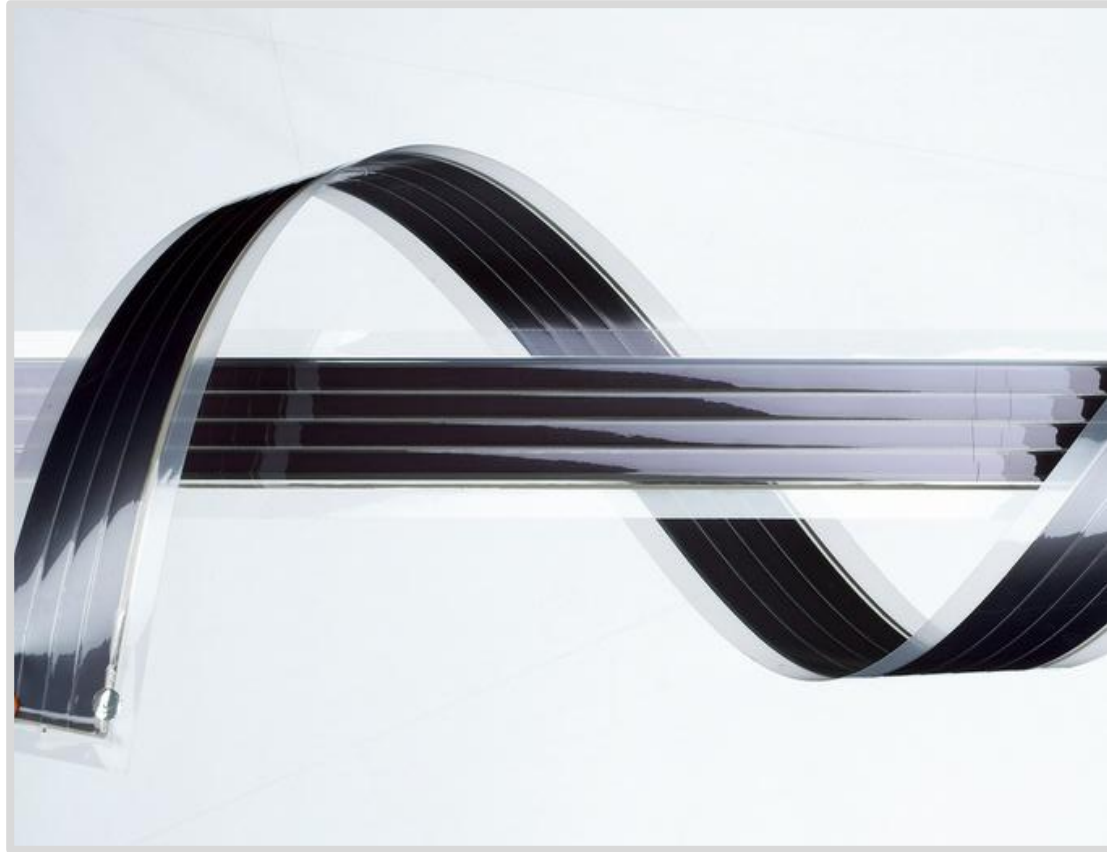
Adaptive Materials



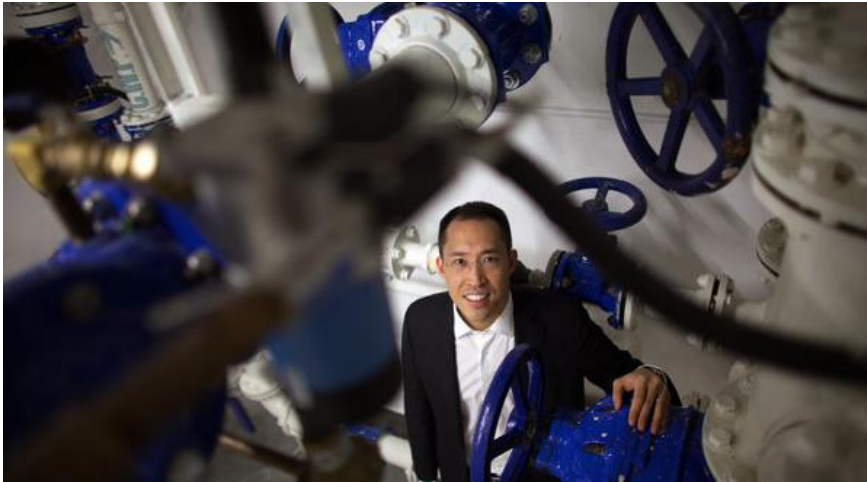
Concrete Cloth



Power Strip



Building Integrated Hydro



3D Printing

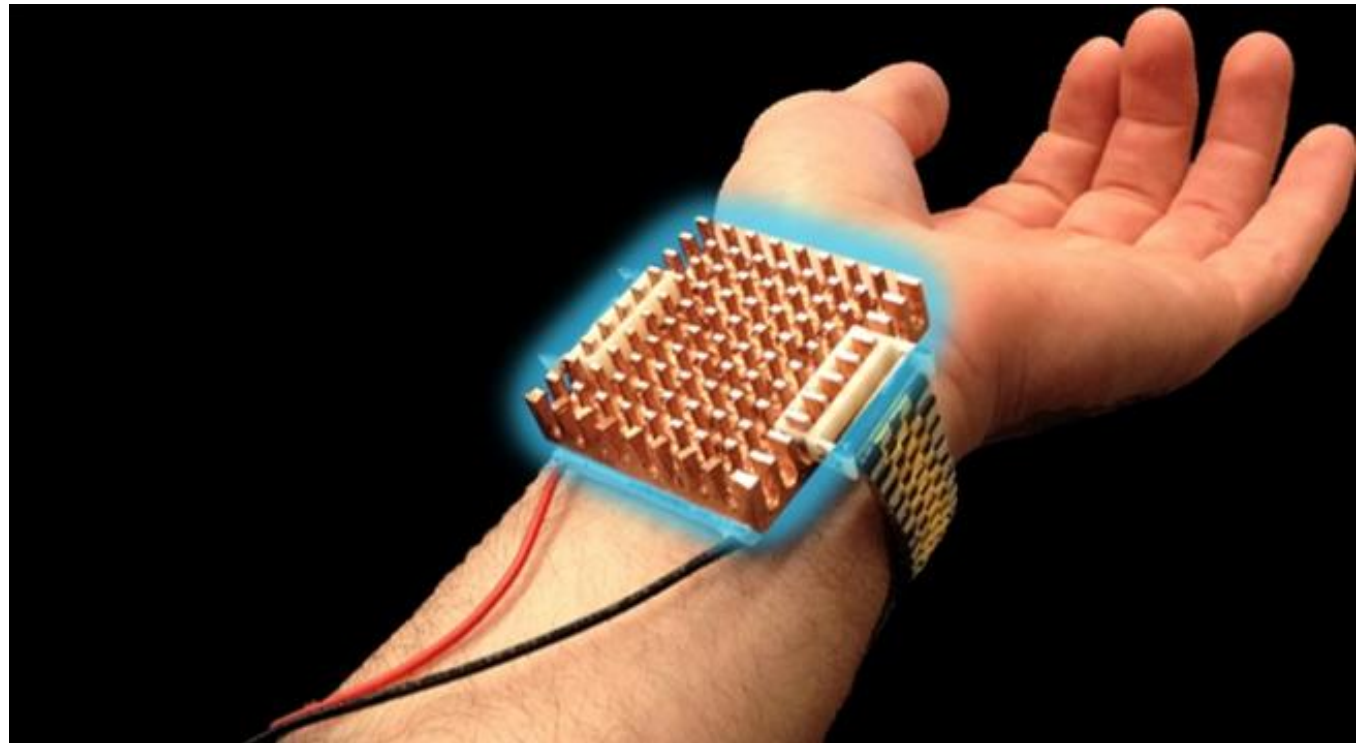


Unprinting



Photo By: Whitney Truitt

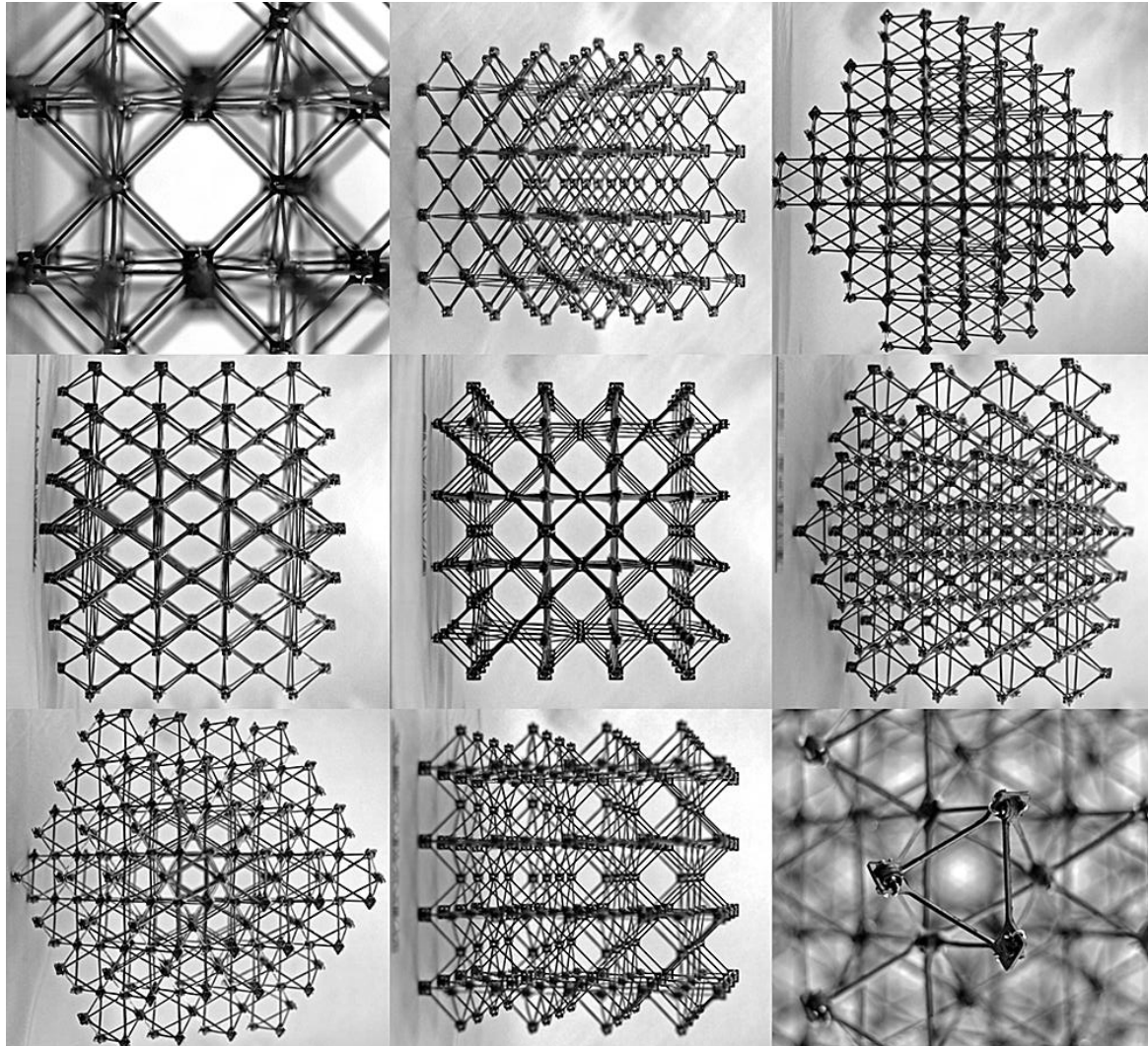
Personal Cooling



Waterless Laundry



Lightweight Structure



Lightweighting Lighting



Lightweighting Lighting



60w

800 lumens

2 oz



15w

800 lumens

6 oz



9.5w

900 lumens

4 oz

Lightweighting Lighting



Lightweighting: Lighting



Letting nostalgia go



Grid-integrated luminaires



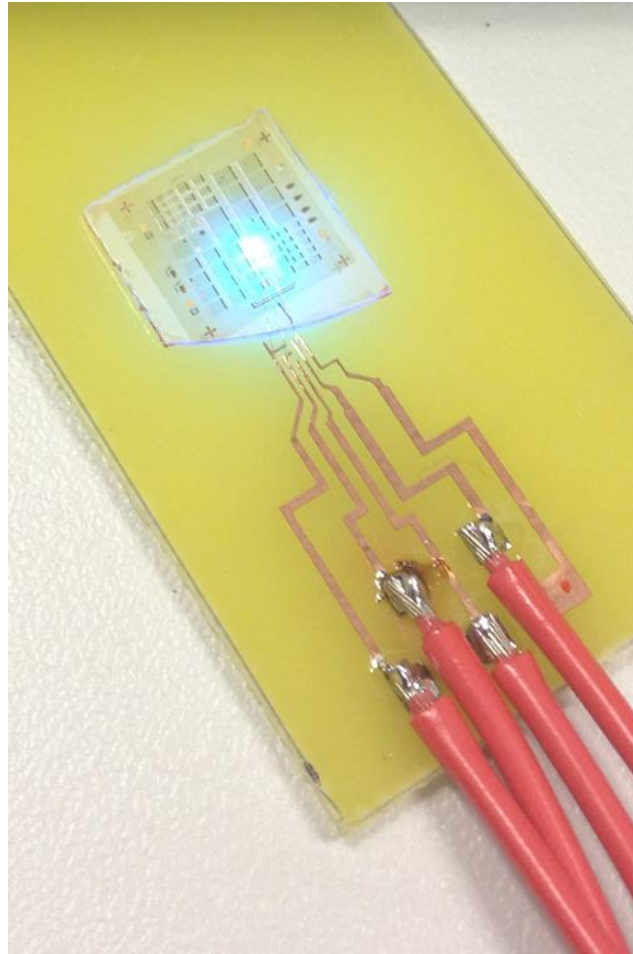
LED Sheet



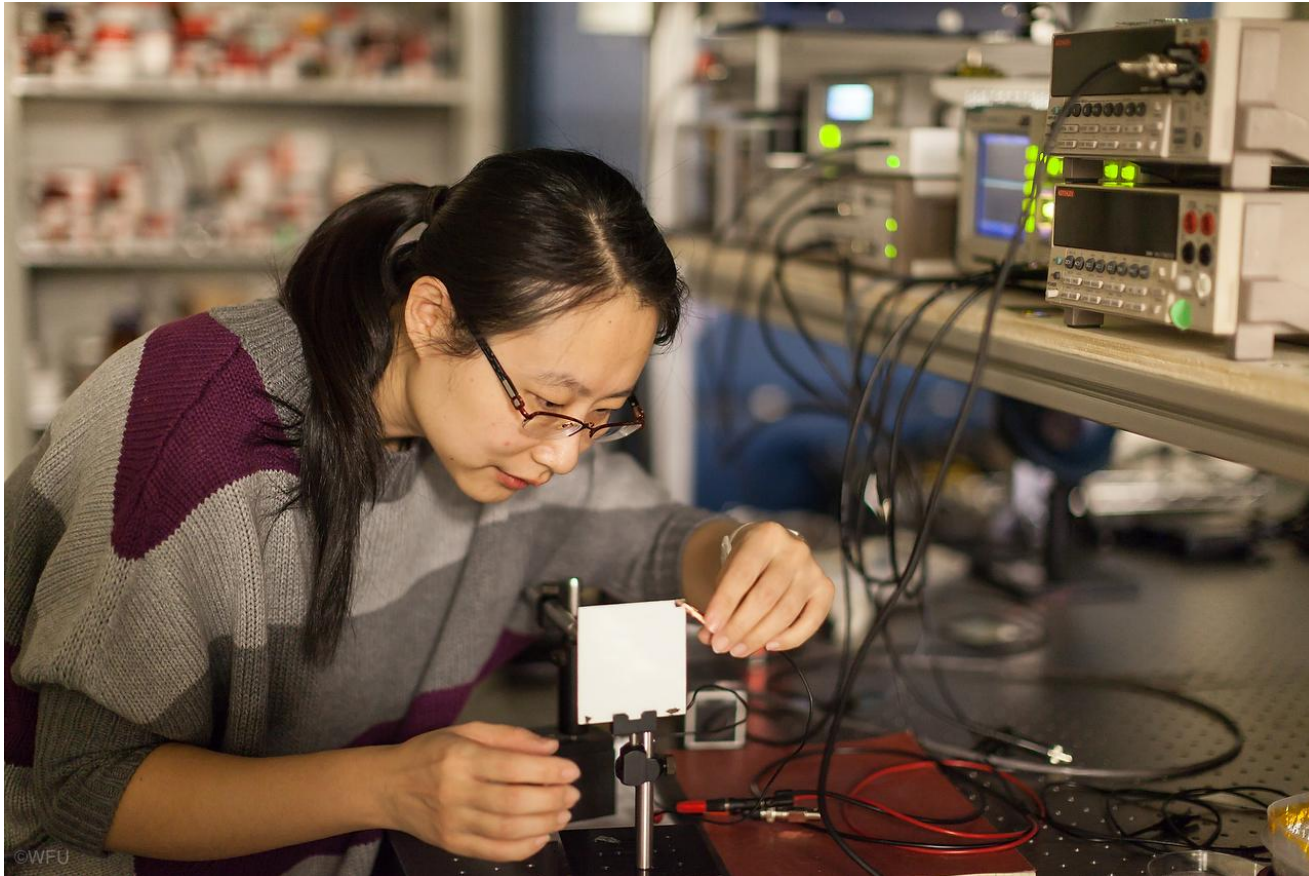
Light Emitting OLED Walls



Firefly LED Coatings



FIPEL

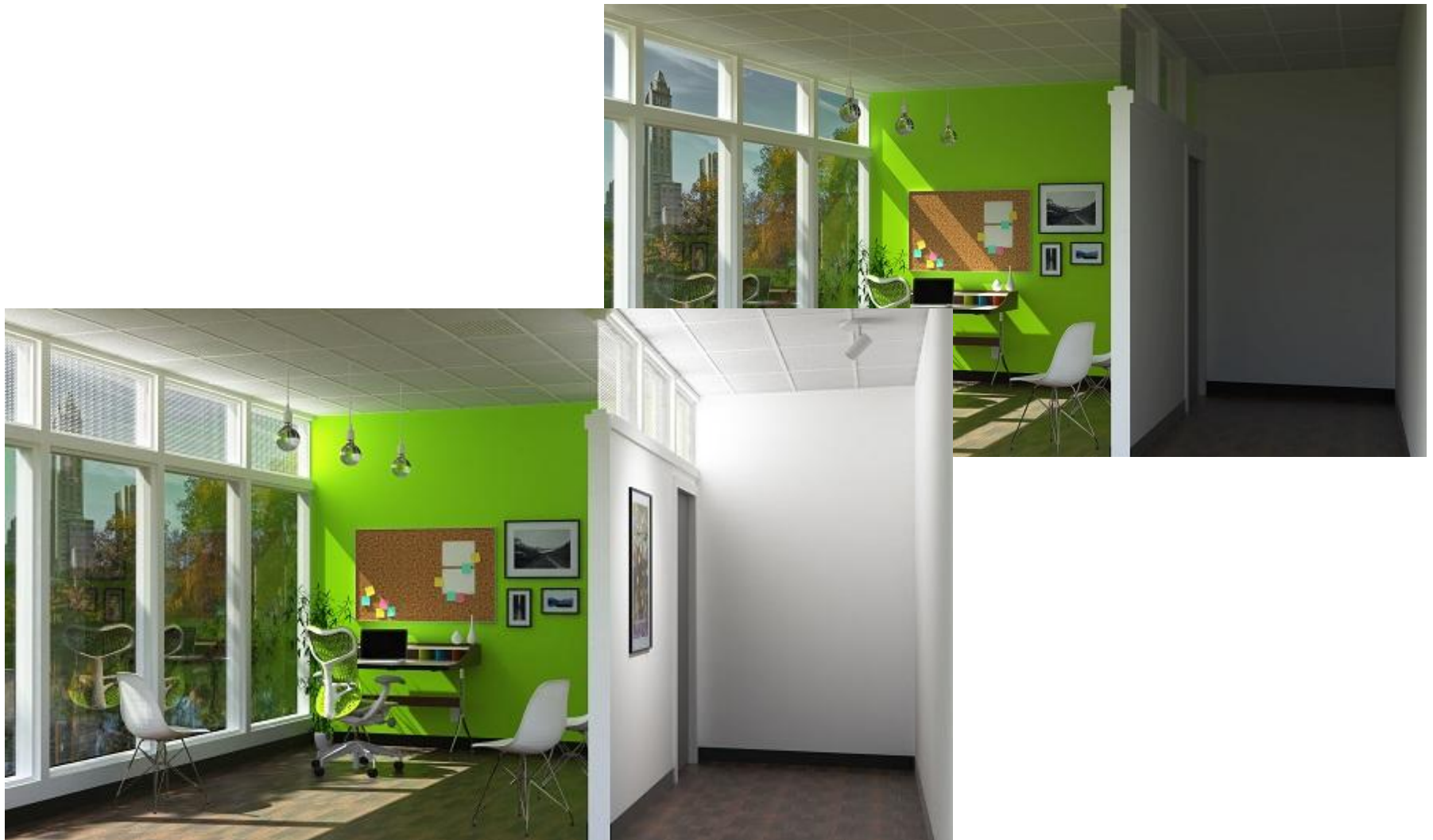


Field-induced polymer electroluminescent

Light Emitting Plasma



Electrofluidic Cells



Sun Lighted Pavement



Storing Light



The Quality of Light



Base Zero Lighting Design



Design to Dematerialize

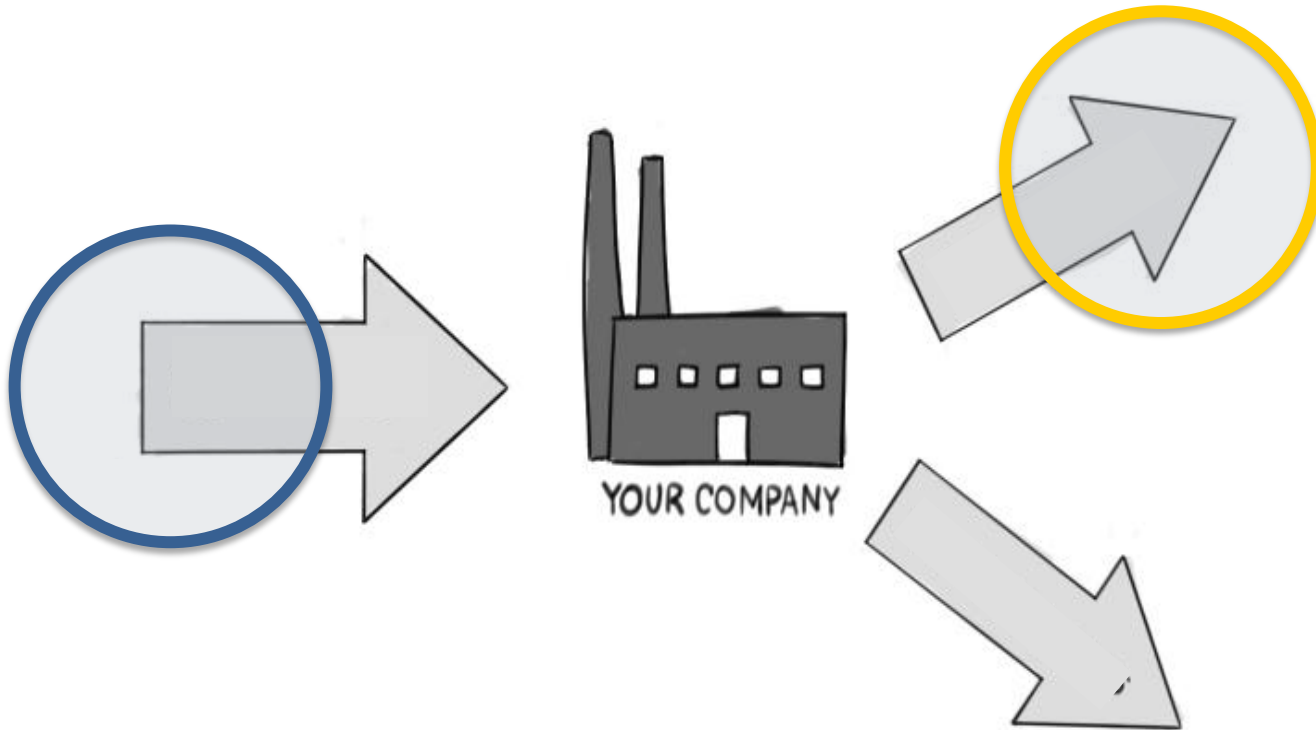
- ✓ Providing most value with the least resources
- ✓ Taking the initiative
- ✓ Improving the quality of human experience



Δ RESOURCE PERFORMANCE

Δ DELIVERED
BENEFITS

Δ RESOURCE MASS



Questions?

Comments?

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