

# **BUILDINGENERGY BOSTON**

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## **Lighting the Way: Strategies for Achieving Life Cycle Goals**

**Alexandra Gadawski (HMFH Architects)**

**Kate Hickcox (Pacific Northwest National Laboratory)**

**Melissa Mattes (Sladen Feinstein Integrated Lighting)**

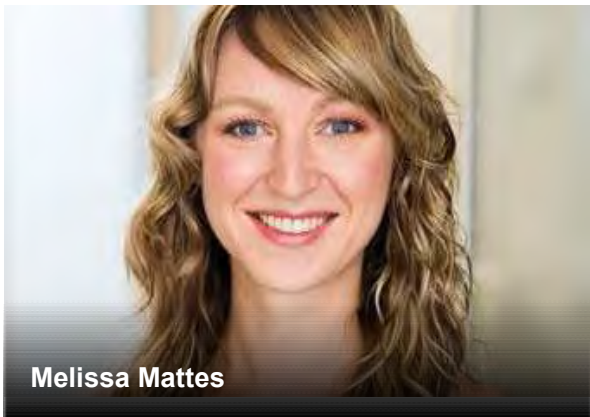
**Curated by Fred Davis (Fred Davis Corporation)**

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**Northeast Sustainable Energy Association (NESEA)**

**March 1, 2022**

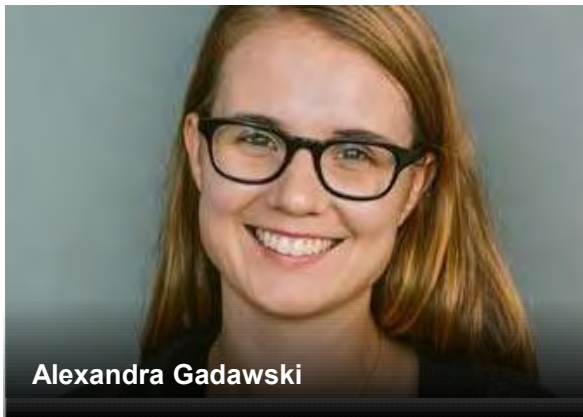
# Introductions



**Melissa Mattes**

Senior Lighting Designer  
Sladen Feinstein Integrated Lighting

Specializes in residential, multi-family, and hospitality design; with special interest in sustainable lighting design solutions and advocating for luminaire material transparency



**Alexandra Gadawski**

Associate  
HMFH Architects

Architect and Sustainability Leader, focus on material health, embodied carbon, lighting and daylighting and education environments



**Kate Hickcox**

Lighting Research Scientist  
Pacific Northwest National Laboratory

Focus areas include lighting design, lighting and sustainability, energy equity and justice, nighttime outdoor lighting and visual research including discomfort glare



## Learning Objectives



Discuss the difference between embodied carbon and operational carbon and explain to colleagues and clients why both should be considered when making sustainable lighting choices.



Analyze design decisions and quantify potential environmental impacts.

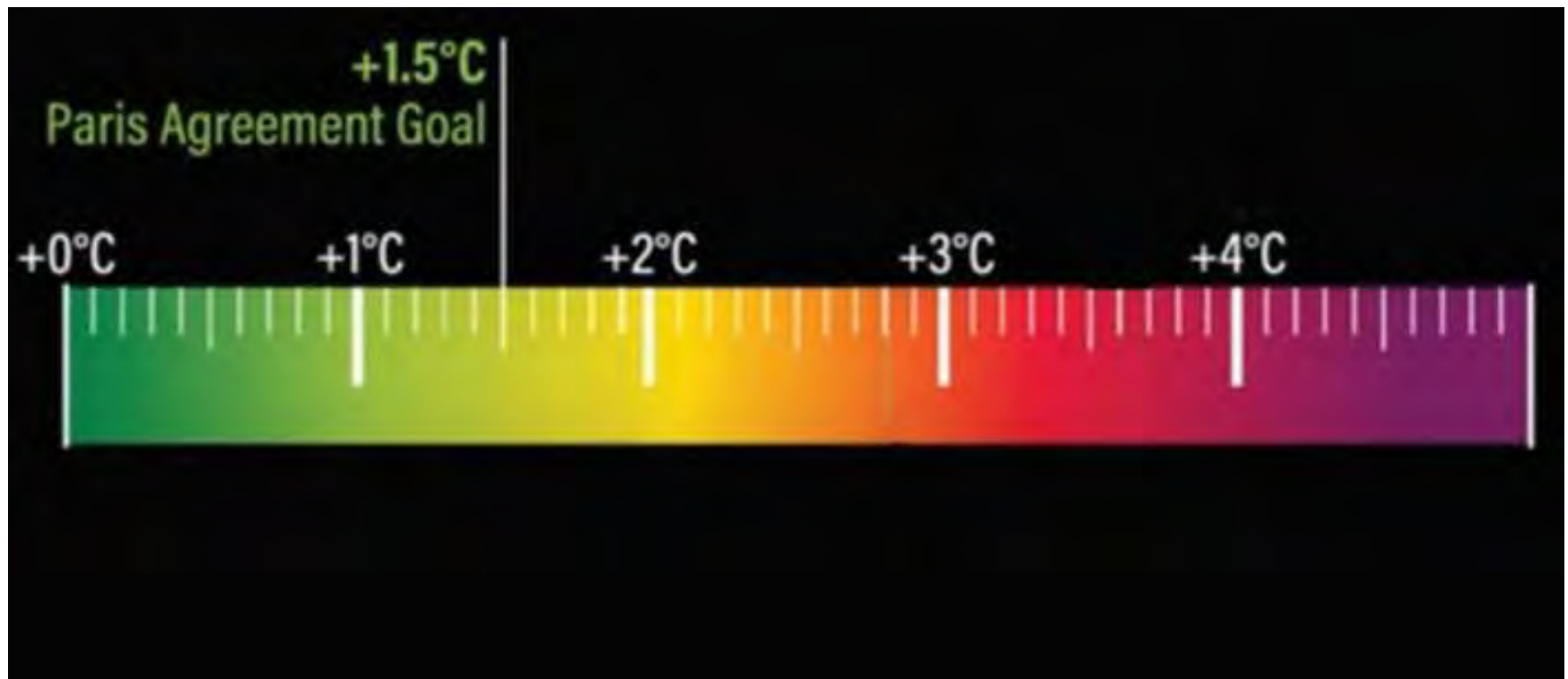


Identify pathways and levers to improve sustainable design choices

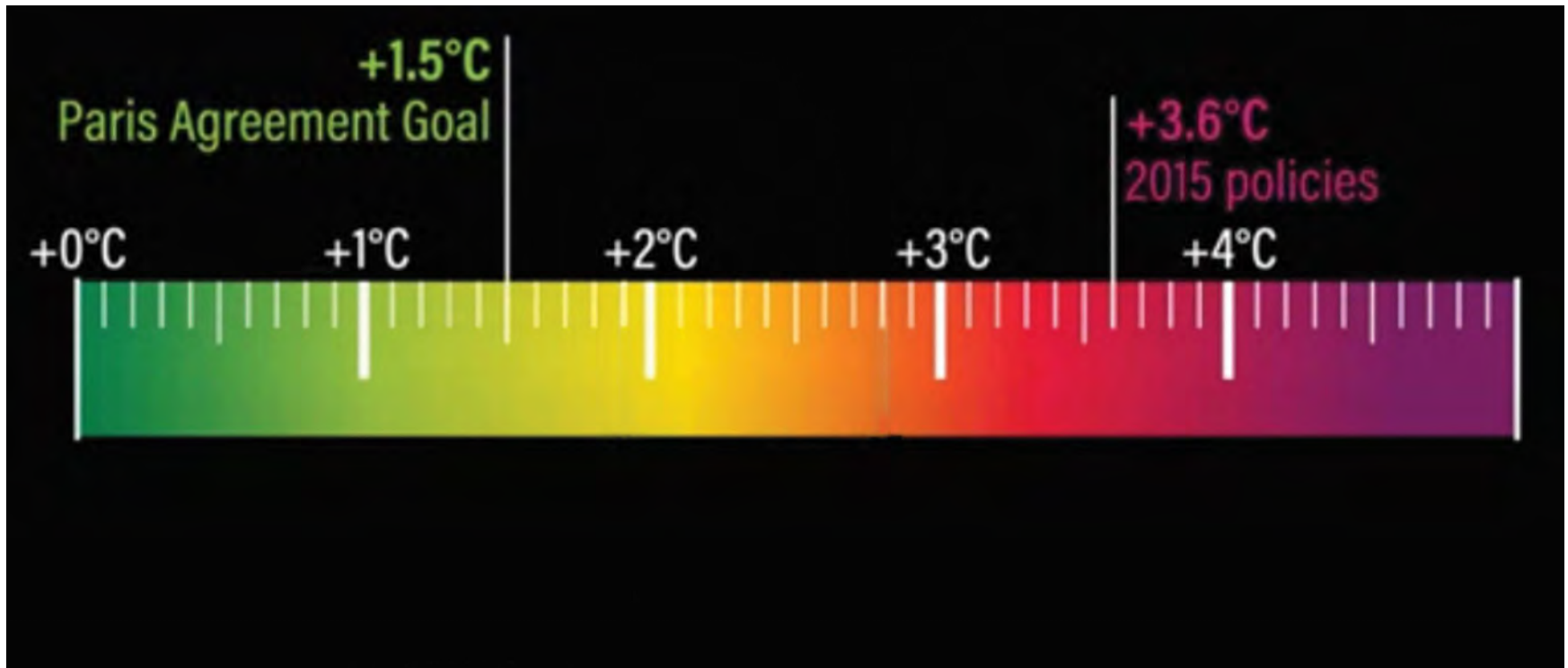


Define sustainability policies or goals and implement them on a personal or company level.

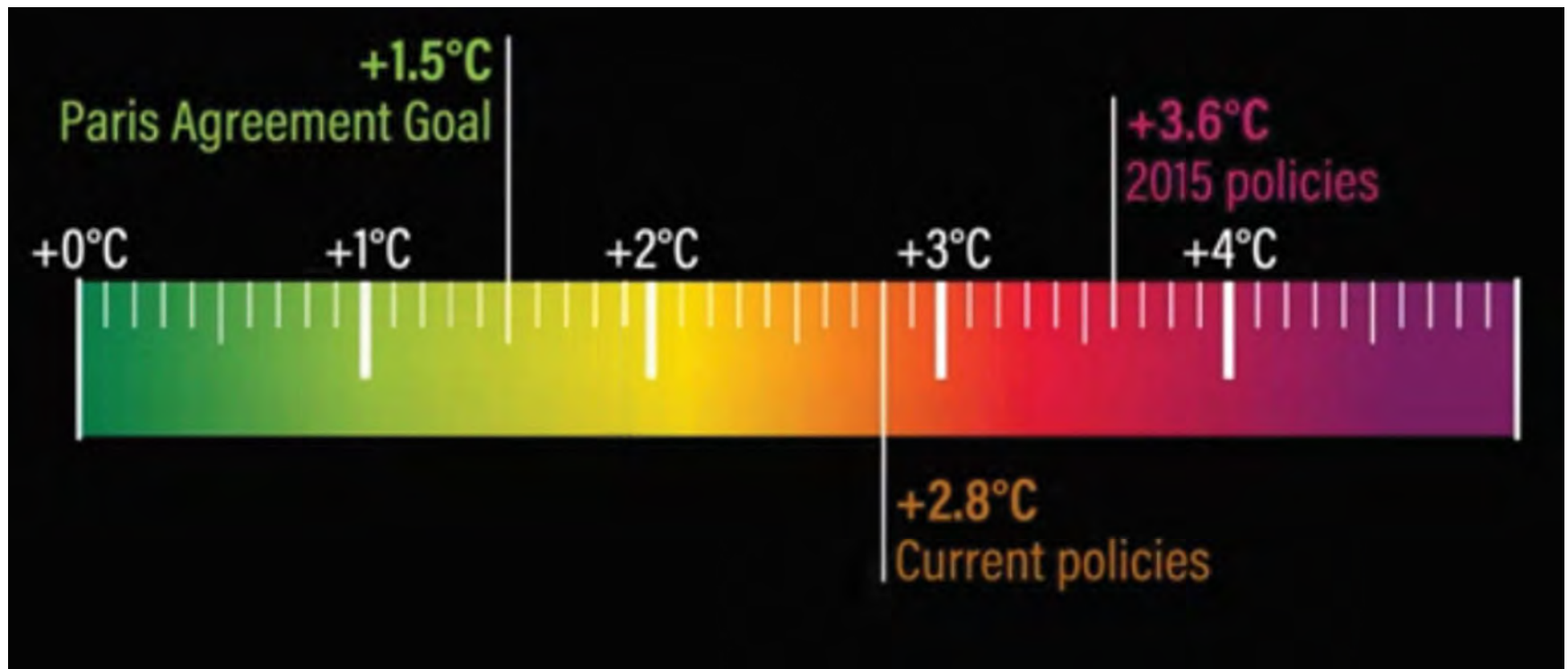
# Global Temperature Rise by 2100



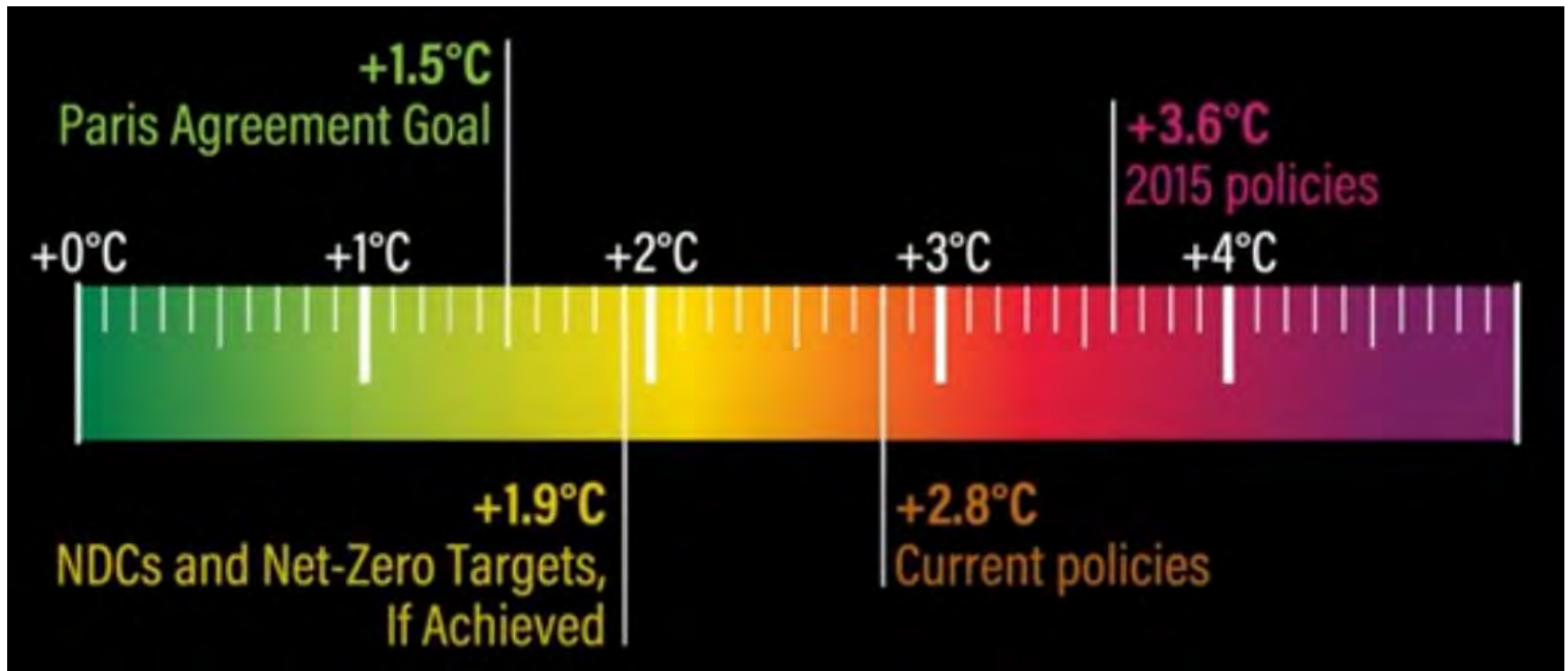
# Global Temperature Rise by 2100



# Global Temperature Rise by 2100



# Global Temperature Rise by 2100



# Why Commitments Matter: Industry Evolution

## A+D Letters

- Series of letters to manufacturers asking for transparency of building products



April 2018

AIA  
Materials Pledge  
Public Launch



July 2021

**Declare.**  
Now (Early 2022)

- Many, many more labeled luminaires available on the market than 1 year ago



mid 2024  
Whole Building Life Cycle  
Assessments– lighting included

2012

## LP50 Formed

- Group of manufacturers collaborating to transform the materials economy through transparency, green chemistry, supply chain innovation & awareness.

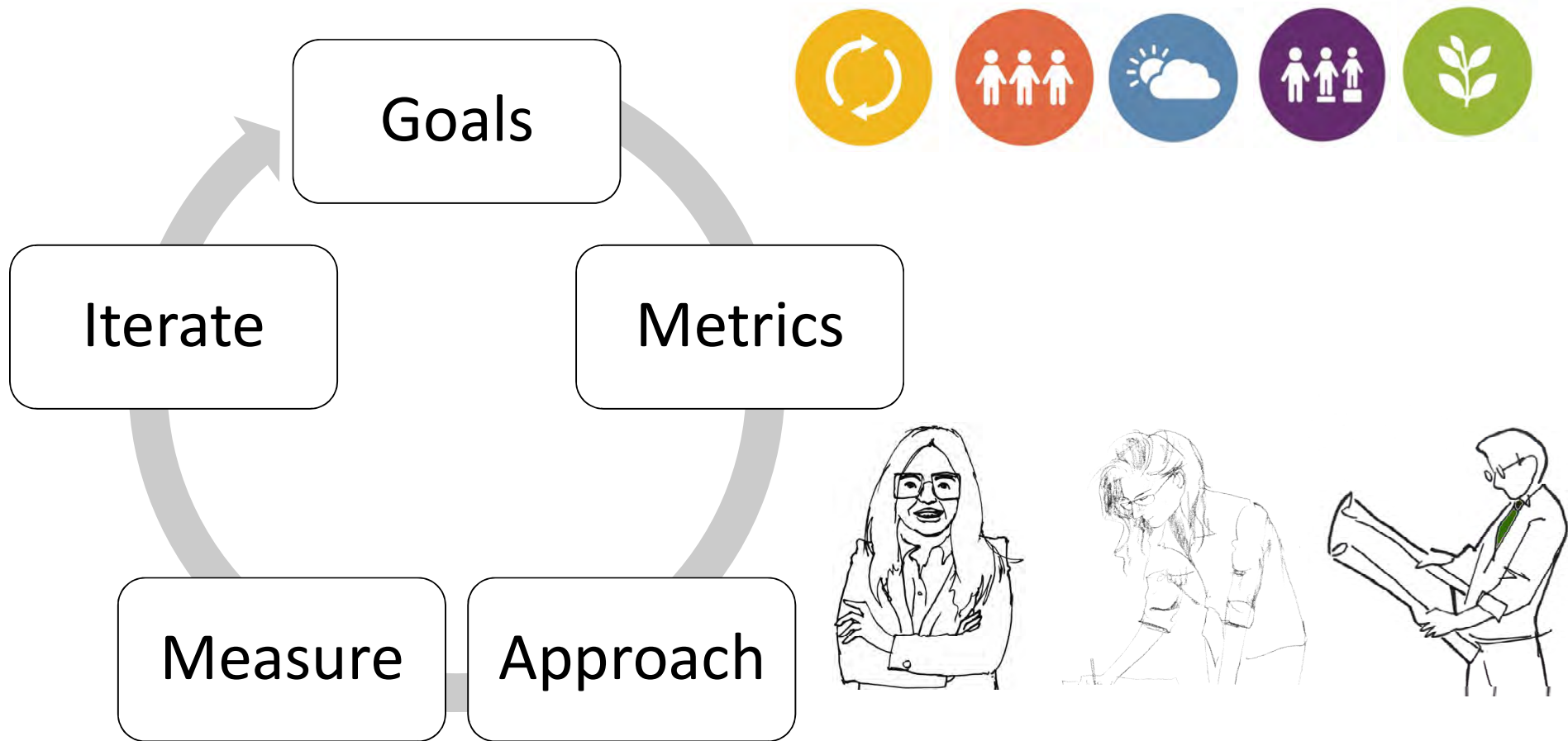


April 2019

Lighting Advocacy Letter  
Public Launch  
(Inspired by the LP50 Letter)



# Why Goal Setting Matters



# Goals

HUMAN HEALTH

CLIMATE HEALTH

CIRCULAR ECONOMY

FOCUS  
AREAS

ECOSYSTEM HEALTH

SOCIAL HEALTH AND EQUITY



## Human Health

Support **human health** by preferring products that support and foster life throughout their life cycles and seek to eliminate the use of hazardous substances

*AIA Materials Pledge*

<https://www.aia.org/pages/6351155-materials-pledge>



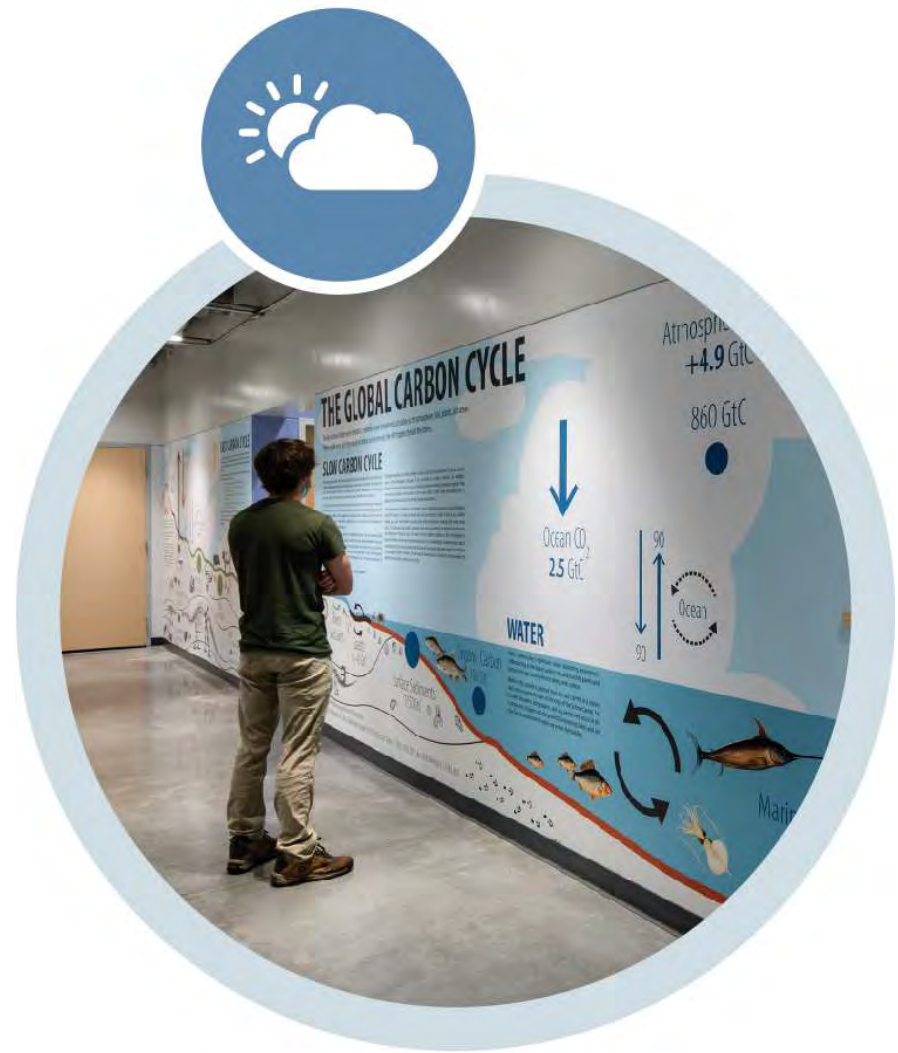


## Climate Health

Support *climate health* by preferring products that reduce carbon emissions and ultimately sequester more carbon than emitted

AIA Material Pledge

<https://www.aia.org/pages/6351155-materials-pledge>





## Ecosystem Health

support **ecosystem health** by preferring products that support and regenerate the natural air, water, and biological cycles of life through thoughtful supply chain management and restorative company practices

AIA Materials Pledge



<https://www.aia.org/pages/6351155-materials-pledge>

# Social Health and Equity

*Support **social health & equity** by preferring products from manufacturers that secure human rights in their own operations and in their supply chains, positively impacting their workers and the communities where they operate*

AIA Materials Pledge



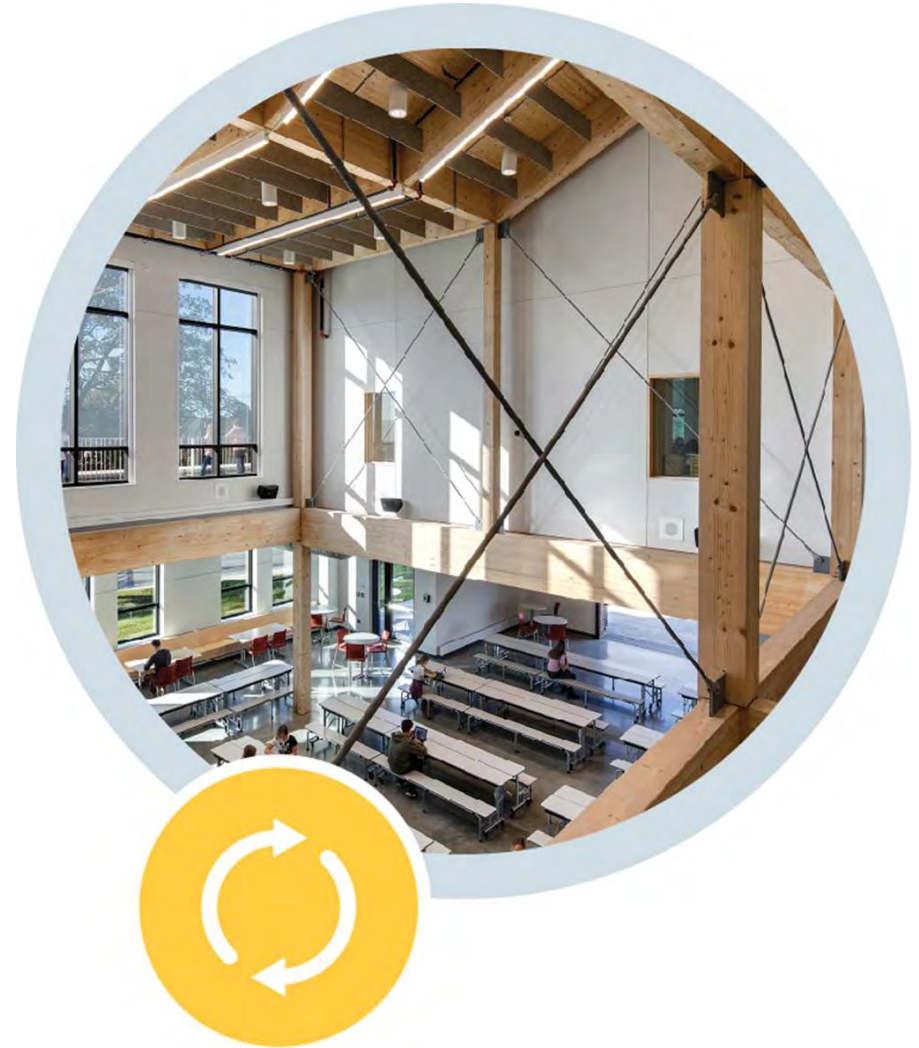
<https://www.aia.org/pages/6351155-materials-pledge>

## Circular Economy

*Support a **circular economy** by reusing and improving buildings and by designing for resiliency, adaptability, disassembly, and reuse, aspiring to a zero-waste goal for global construction activities*

AIA Materials Pledge

<https://www.aia.org/pages/6351155-materials-pledge>



## 3 Design Professionals: 3 Projects



### Lighting Designer

- Budget office fit-out project without specific sustainability goals



### Manufacturer

- Designing a linear direct/indirect pendant for offices/schools, etc.



### Architect

- New 400,00 sq ft public high school in Massachusetts



## Project: Budget Office Fit-out without Sustainability Goals

Meet **Liona**, the Lighting Designer!

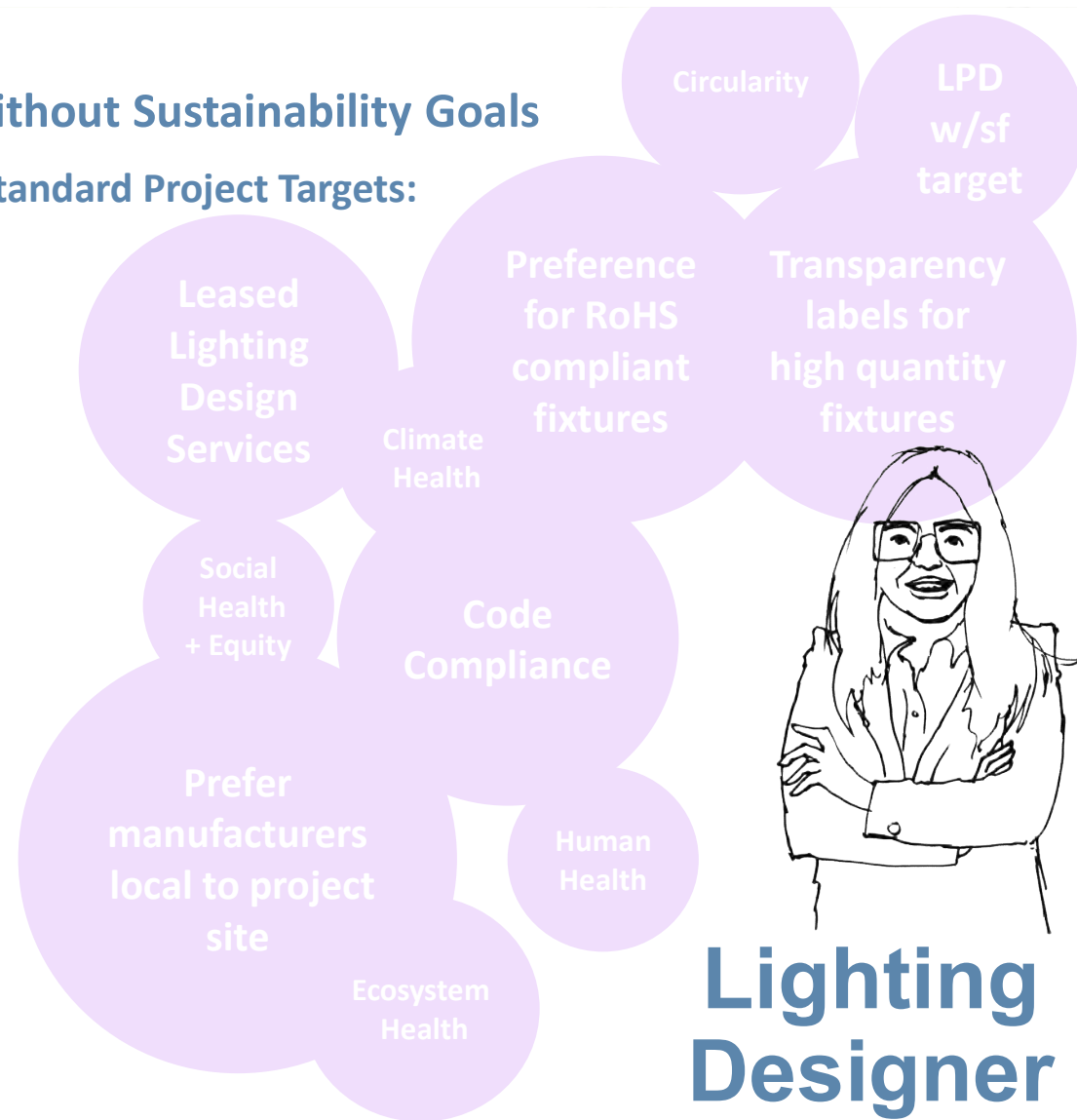
- Still working from home
- Passionate about growing family
- Loves trail walks with her dog
- Interest in teaching daughters to protect and care for the earth



**Lighting  
Designer**

# Project: Budget Office Fit-out without Sustainability Goals

## Firm's Standard Project Targets:



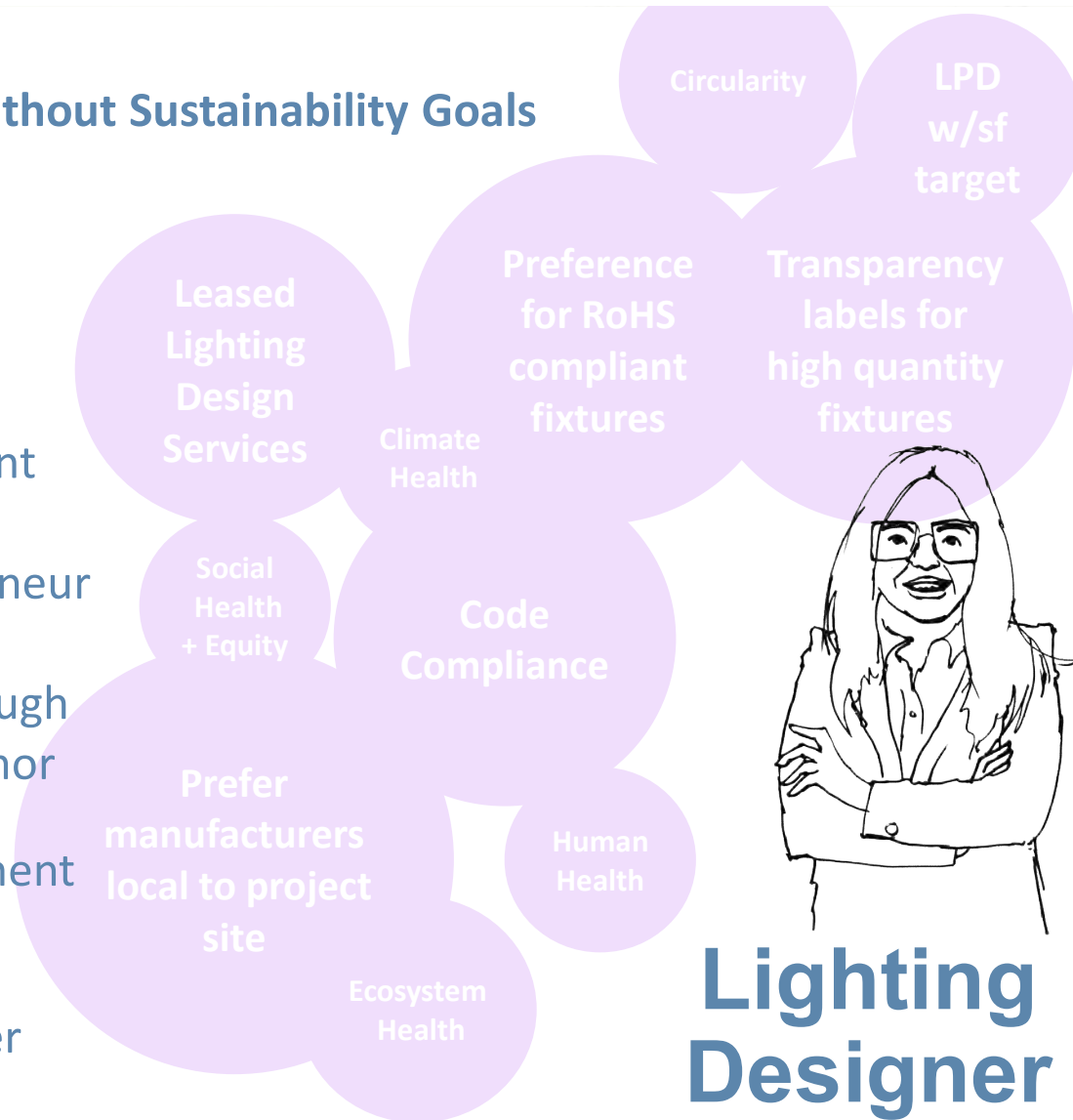
# Project: Budget Office Fit-out without Sustainability Goals

## Meet Richard, the Client!



**Client**

- Former real estate agent turned commercial development entrepreneur
- Known for his billowy laugh and good sense of humor
- 3rd property development
- First time working with a Lighting Designer



**Lighting Designer**

# Project: Budget Office Fit-out without Sustainability Goals

## Richard's Project Parameters:

Task lighting for Open Office

Low-glare Fixtures

Offer Premium Lease Packages

Marketability

Reconfigurable lighting

Leased Lighting Design Services

Climate Health

Preference for RoHS compliant fixtures

Transparency labels for high quantity fixtures

Circularity

LPD w/sf target

Social Health + Equity

Code Compliance

Prefer manufacturers local to project site

Human Health

Ecosystem Health

Low cost

Fast time-line



**Client**



**Lighting Designer**

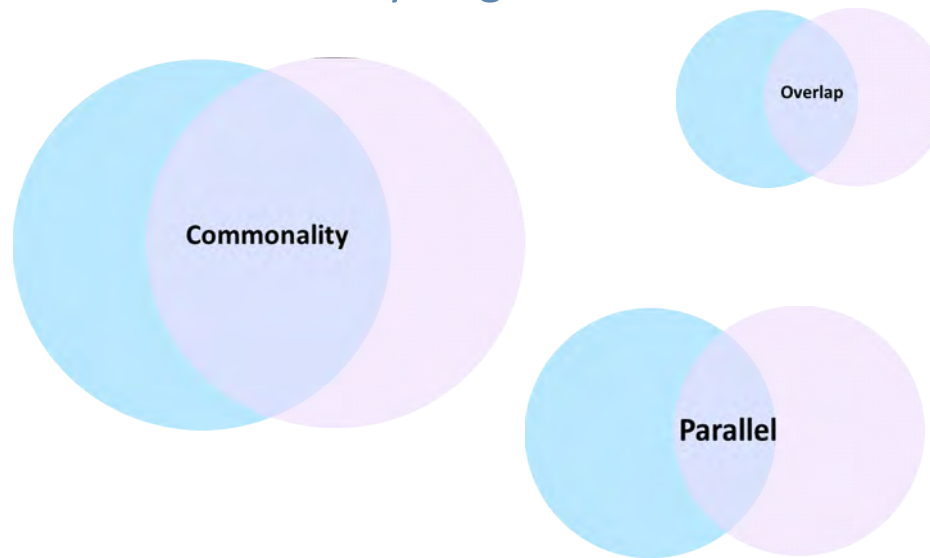
## Project: Budget Office Fit-out without Sustainability Goals

How does Liona achieve client deliverables and her firm's project targets?

1. Tease out parallels between lighting firm values and client values
2. Pitch to client as solutions to meet their needs while also meeting firm's standard sustainability targets



**Client**



**Lighting Designer**

# Project: Budget Office Fit-out without Sustainability Goals

## Richard's Highest Priorities:

Task lighting for Open Office

Low-glare Fixtures

Offer Premium Lease Packages

Marketability

Reconfigurable lighting

Low cost

Fast time-line

Leased Lighting Design Services

Climate Health

Preference for RoHS compliant fixtures

Transparency labels for high quantity fixtures

Circularity

LPD w/sf target

Social Health + Equity

Code Compliance

Prefer manufacturers local to project site

Human Health

Ecosystem Health

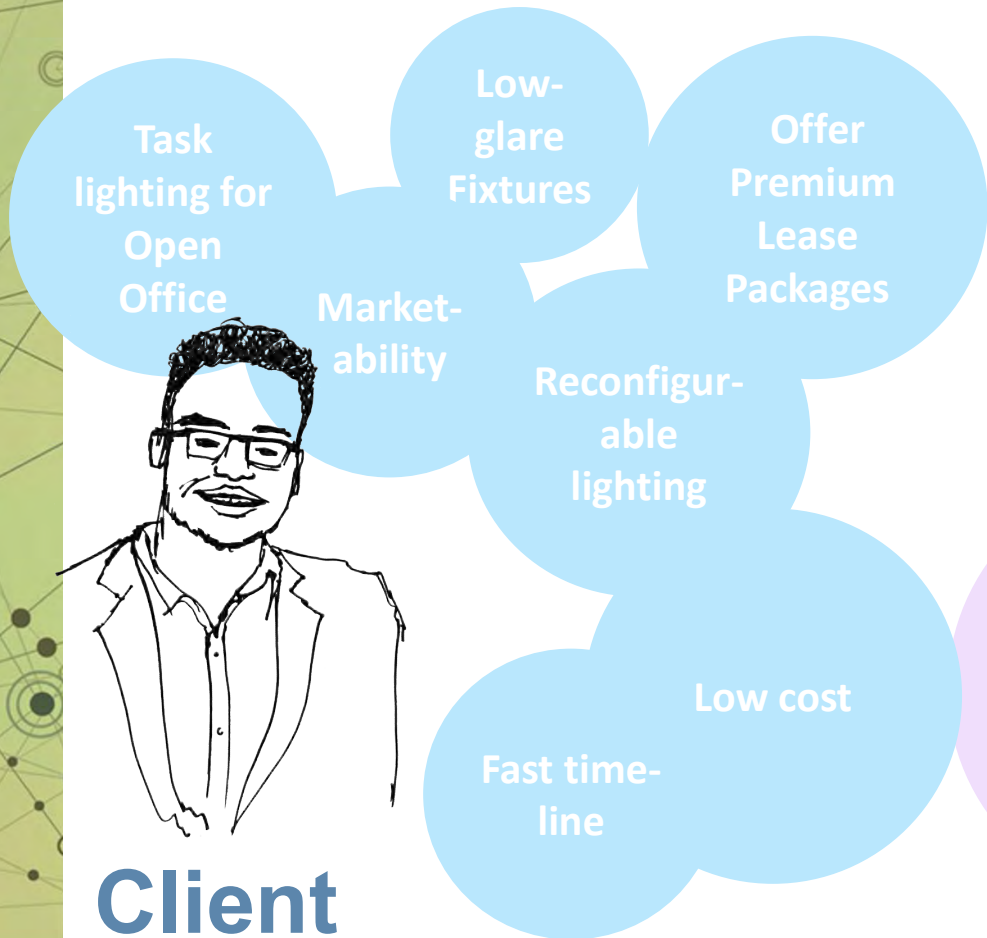


**Client**

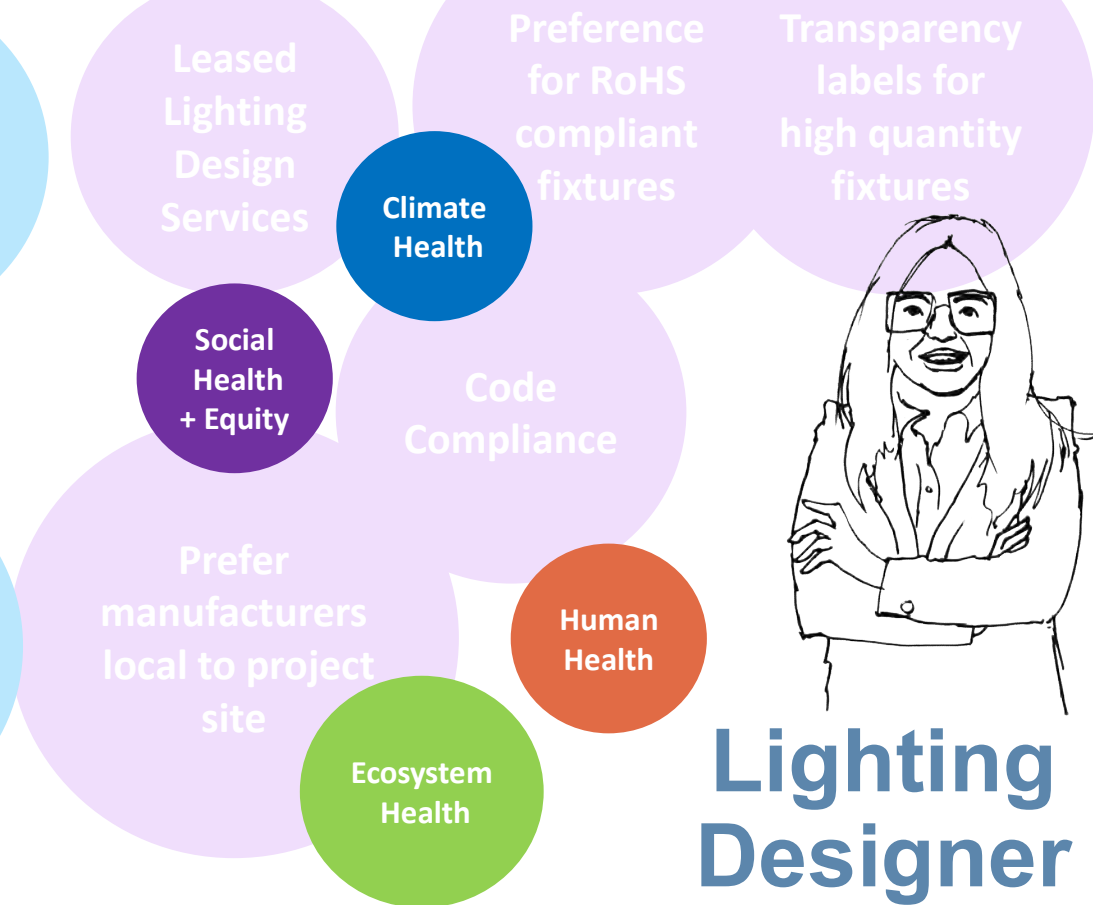


**Lighting Designer**

# Project: Budget Office Fit-out without Sustainability Goals



## Firm's Sustainable Values:



# Project: Budget Office Fit-out without Sustainability Goals

Configurable



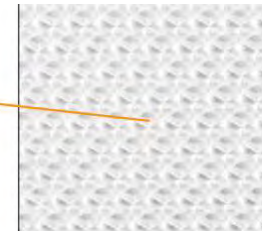
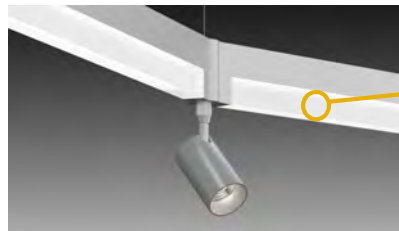
Kit-of-Parts



Direct / Indirect  
2, 3, & 4 way Connectors  
Accent Light Modules



Low Glare Optics



Design Approaches!



## Lighting Designer



# Project: Budget Office Fit-out without Sustainability Goals

## Concept/Schematic

- Goal Development: Focal Areas
- Budget Conversations
- Design Concepts

## Construction Documents

- Ensure specification language is included in final document set

- Determine overlap between client and design firm goals
- Choose transparency label or equivalent commitment on lrg qty light fixture(s)

## Design Development

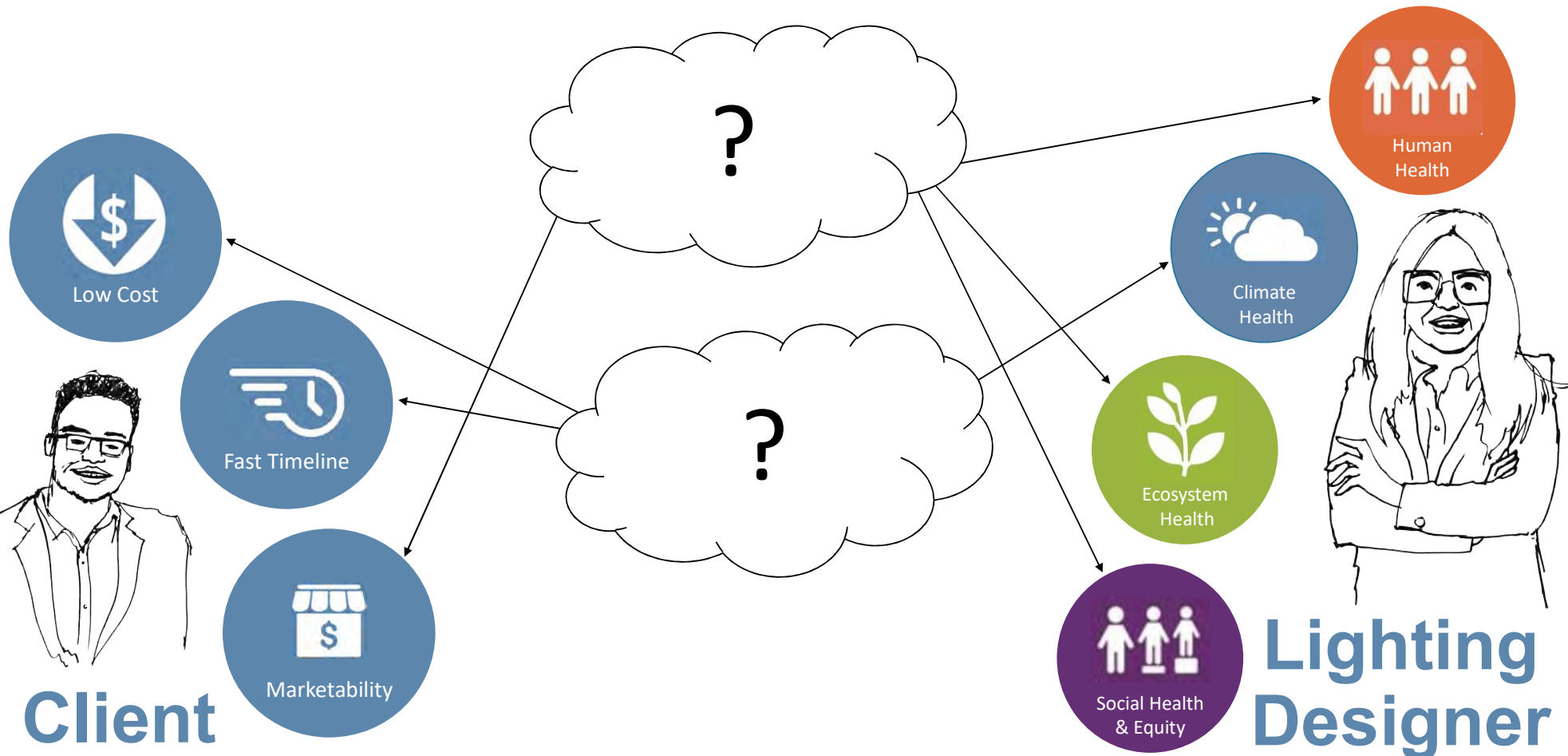
- Provide necessary documentation required for Transparency labels, etc.

## Bid/Construction Administration

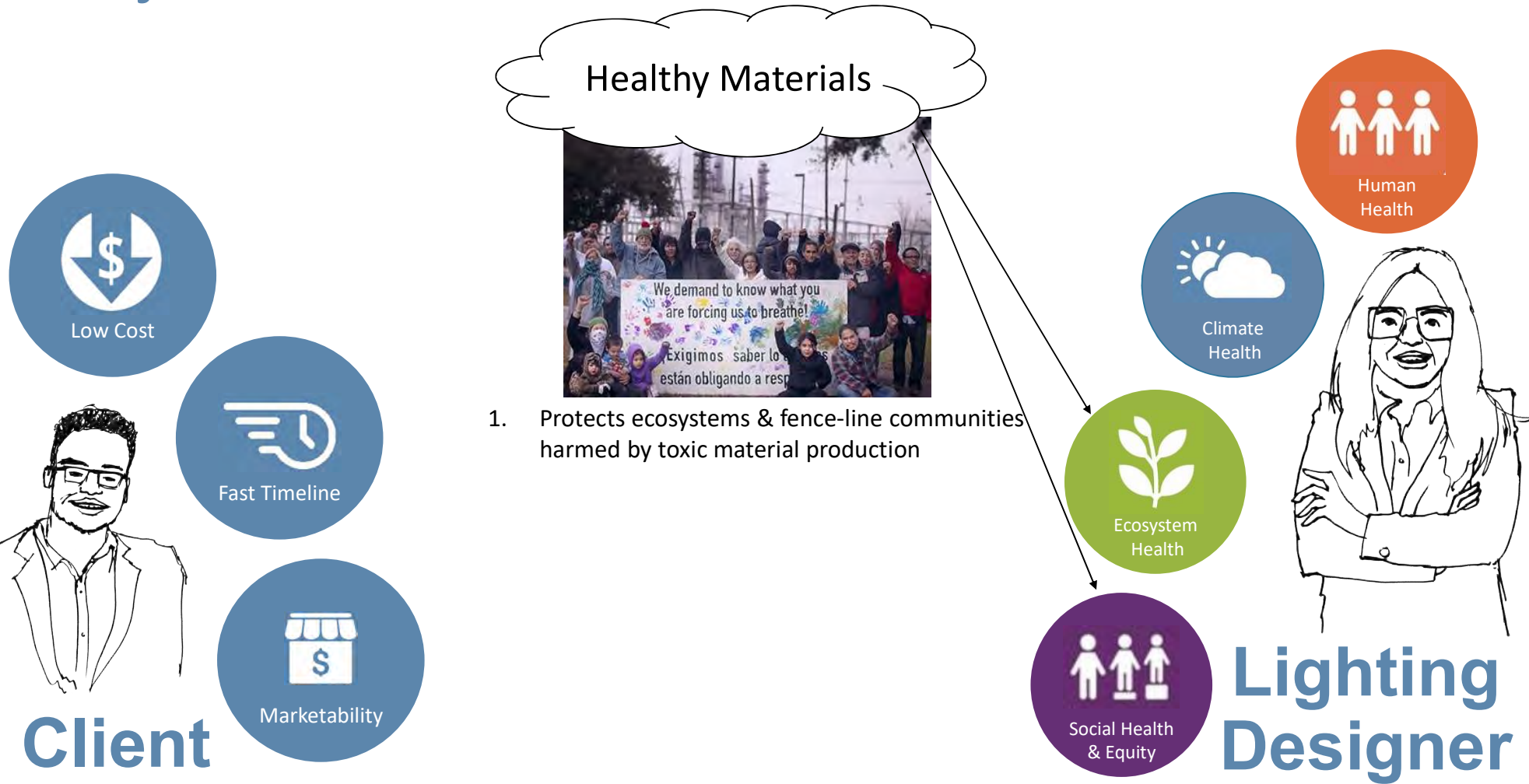


# Lighting Designer

# Project: Budget Office Fit-out without Sustainability Goals



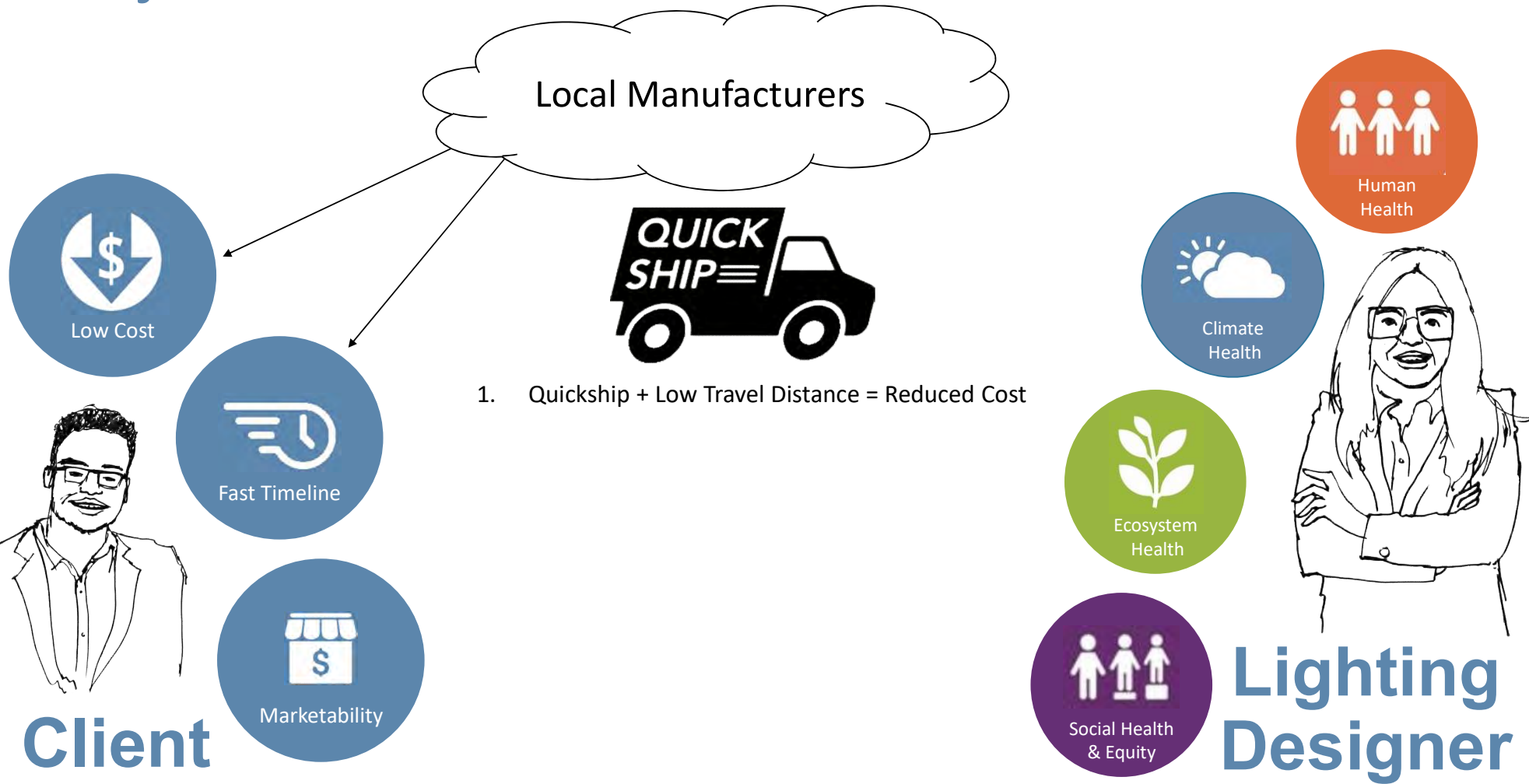
# Project: Budget Office Fit-out without Sustainability Goals



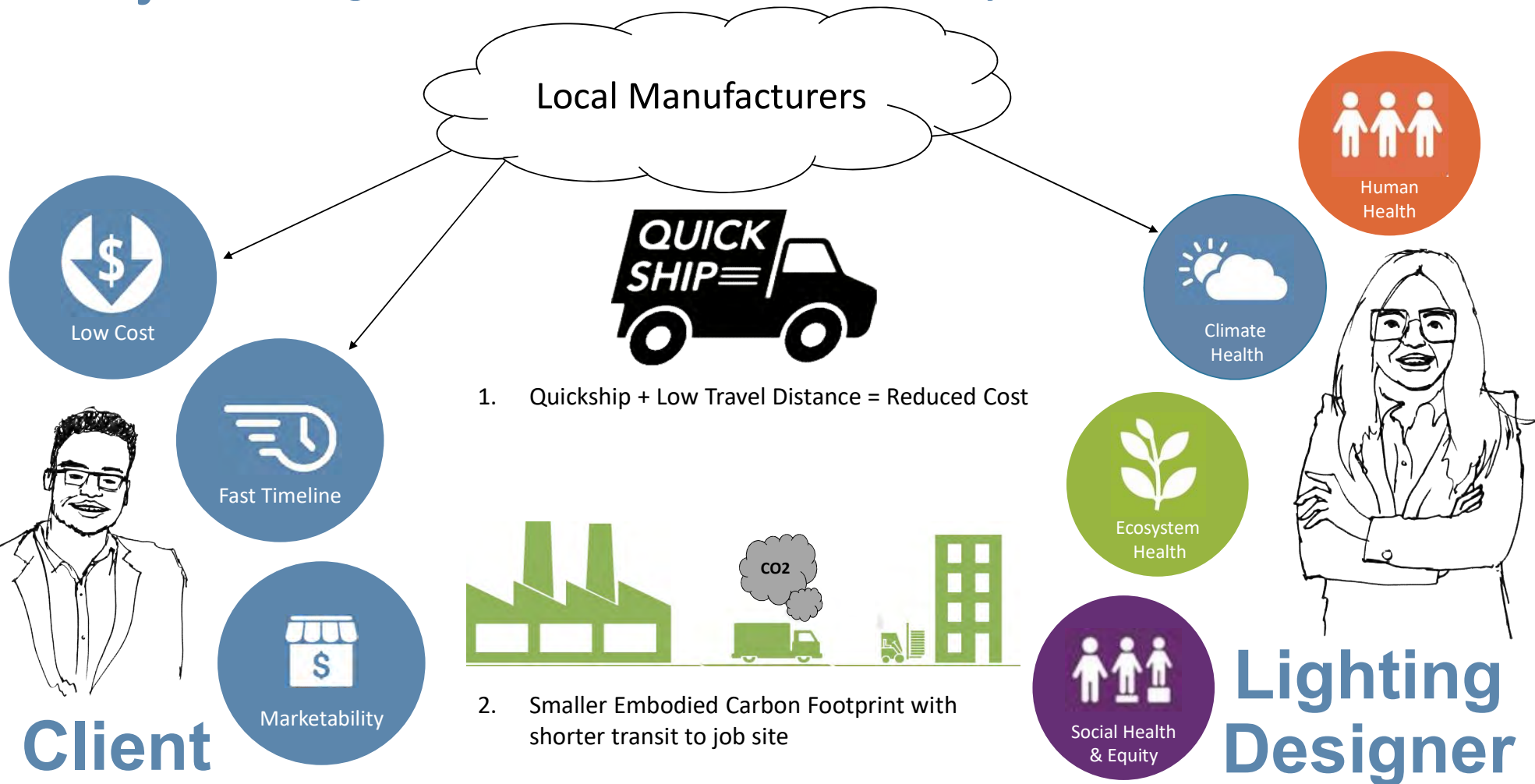
# Project: Budget Office Fit-out without Sustainability Goals



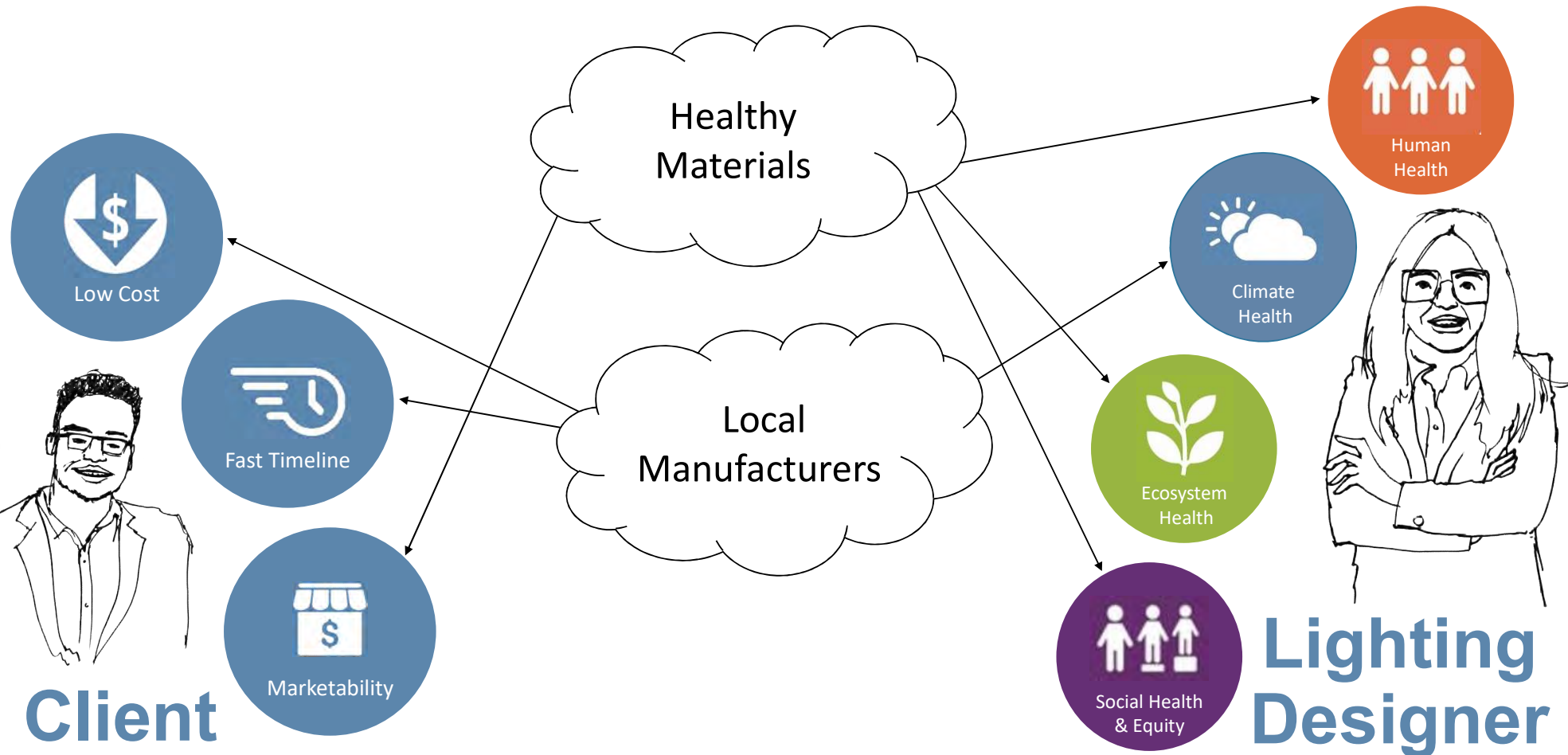
# Project: Budget Office Fit-out without Sustainability Goals



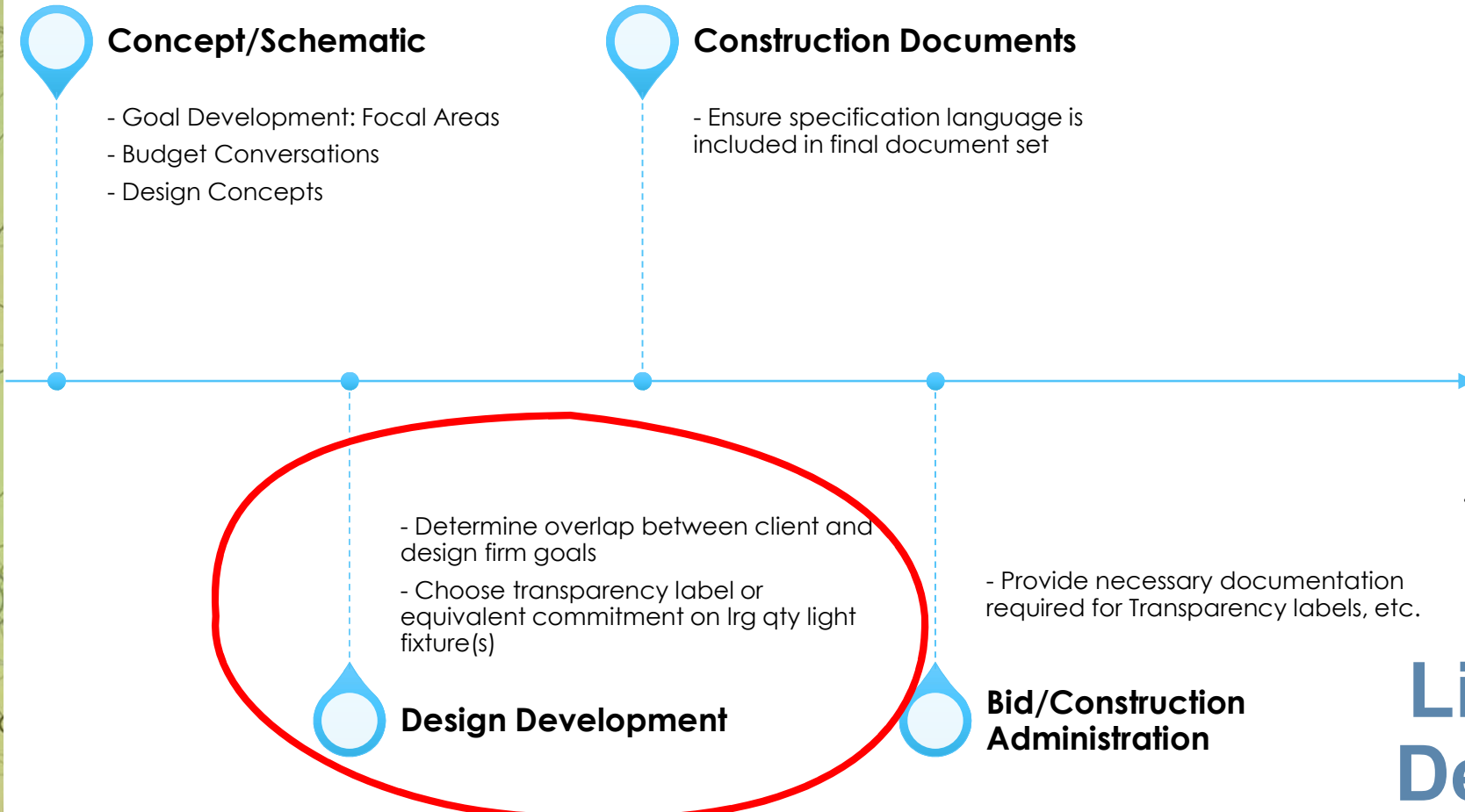
# Project: Budget Office Fit-out without Sustainability Goals



# Project: Budget Office Fit-out without Sustainability Goals



# Project: Budget Office Fit-out without Sustainability Goals



## Lighting Designer



# Project: Budget Office Fit-out without Sustainability Goals

Available Metrics!

Healthy Materials

- RoHS Compliance
- HPD's
- Declare Labels
- Red List Free = No Phthalates, PVC, + Polycarbonates



Impact on Environment

- Local Manufacturers
- LPD Target - 10% reduction from current code
- Ask for EPD's



Lighting Designer

# Project: Budget Office Fit-out without Sustainability Goals

Measurable Action!



- Frequency label equivalent for fixture by quantity
- RoHS compliant fixtures in fixture



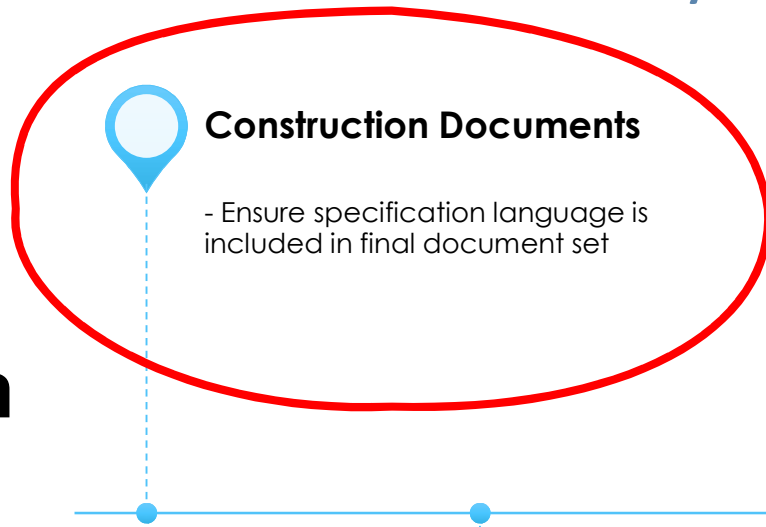
- Manufacturers project site
- Require EPD in fixture



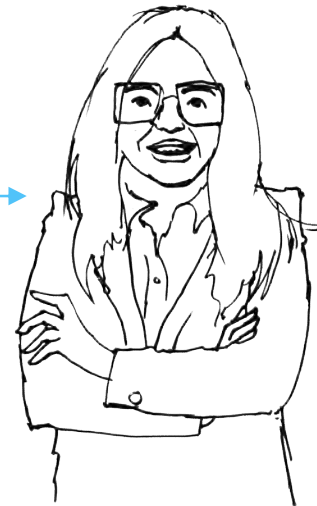
Lighting Designer

# Project: Budget Office Fit-out without Sustainability Goals

## Capture Language on Schedule



LP1 EQ1	██████	BPRO4-LIN-FLSH-LED35-90-400LUMEN/FT-LENGTH-CC-SAL-NU-SC-UNV-CA#-DIM01	3.8W/LF LED 3500K 90 CRI	0-10V	Y	EQ1 <b>DECLARE LABEL</b>
LP1 EQ2	██████	ARCL-44-D-DP-935-CO-CP-AC-CC-DIM10 <b>MATERIAL INGREDIENT REPORT REQUIRED</b>	XXW/LF LED 3500K 90 CRI	0-10V	Y	EQ2



# Lighting Designer

# Project: Budget Office Fit-out without Sustainability Goals

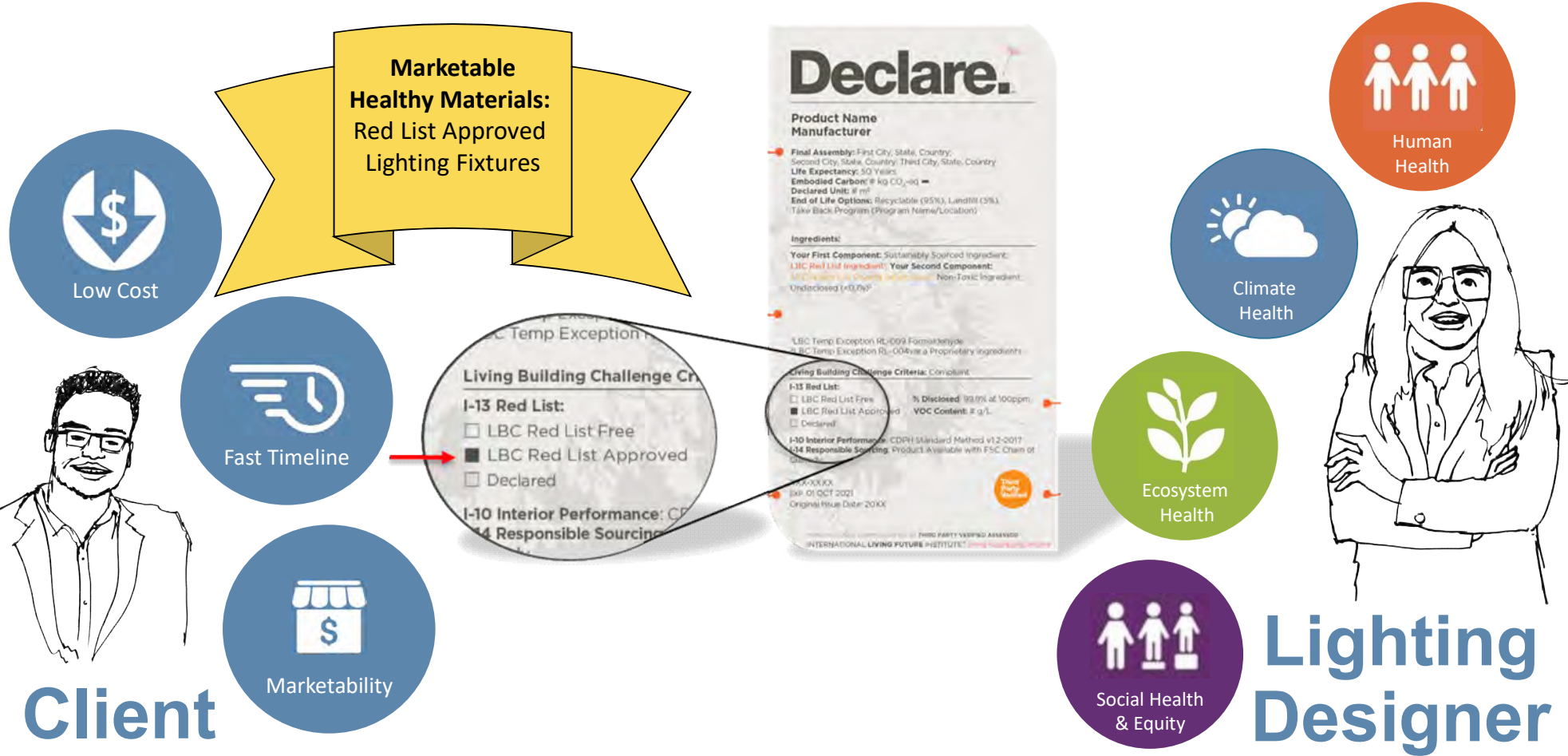


## Provide Documentation

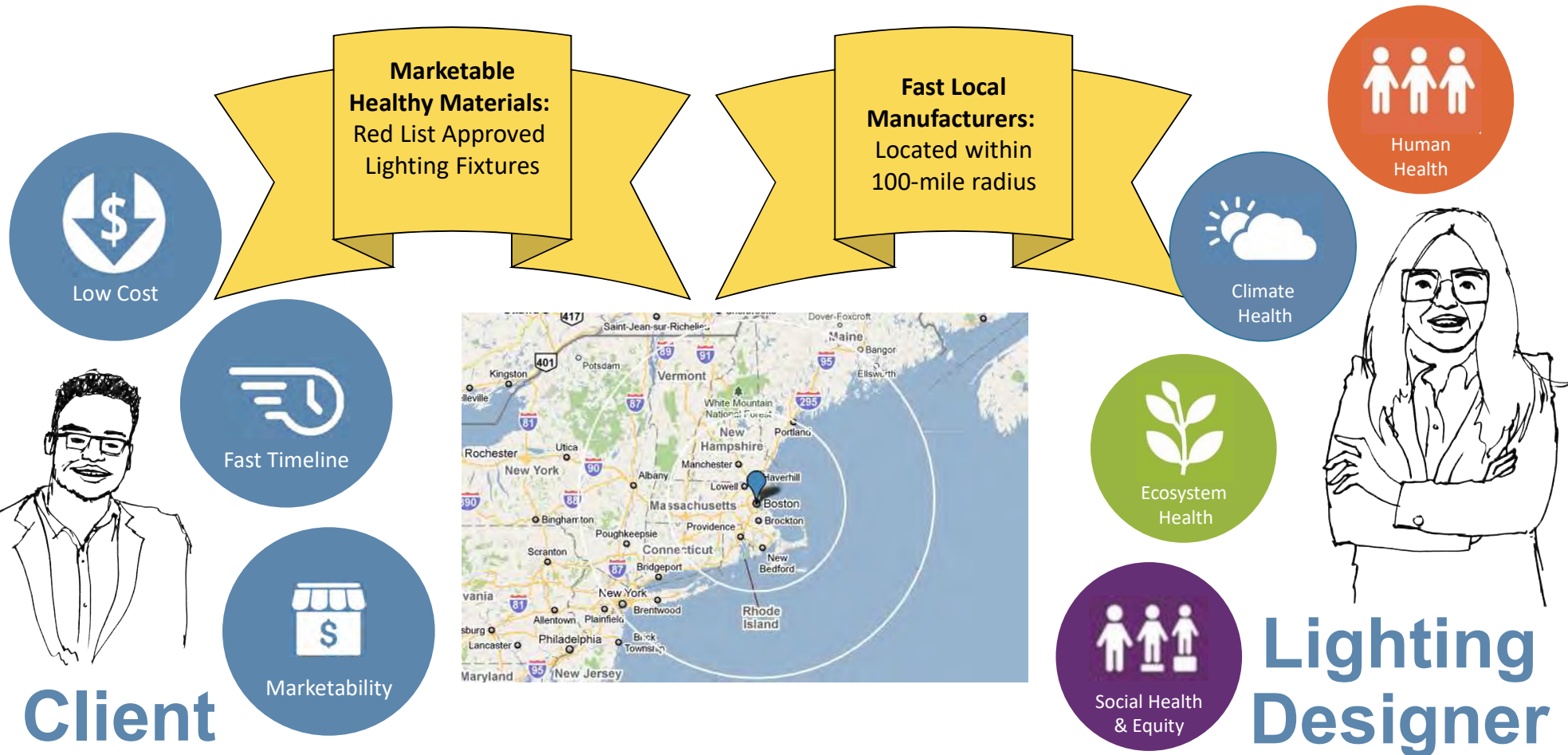


# Lighting Designer

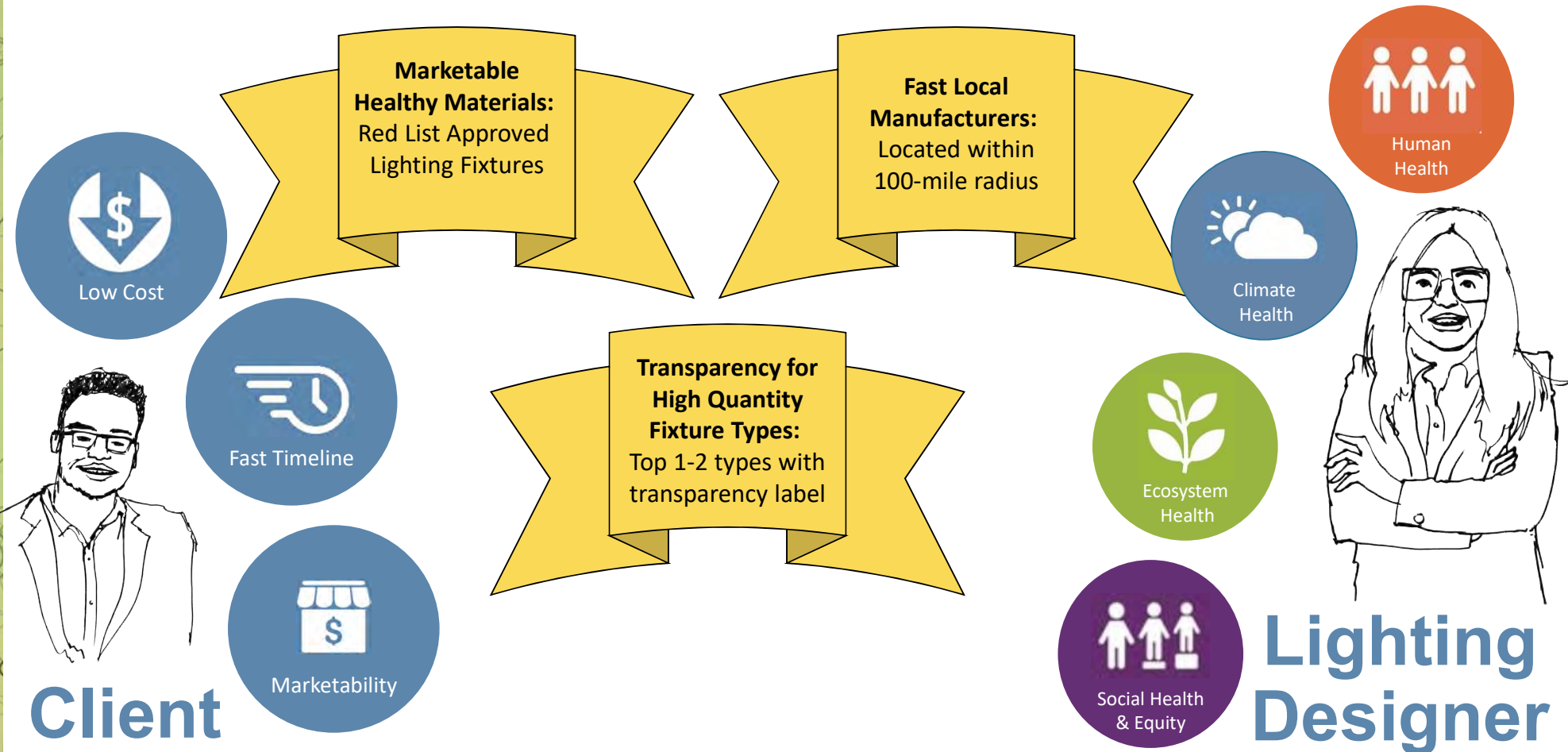
# Project: Budget Office Fit-out without Sustainability Goals



# Project: Budget Office Fit-out without Sustainability Goals



# Project: Budget Office Fit-out without Sustainability Goals



# Project:

designing a new linear interior direct/indirect pendant for use in interior offices, schools, etc.

Improve diversity and inclusion

Financial Success

Climate Health

Supply chain issues

Circular Economy

Worker Productivity

Healthy Materials

Sustainable and Regenerative

Attract new talent

Return on Investment

Lower Commuting Times

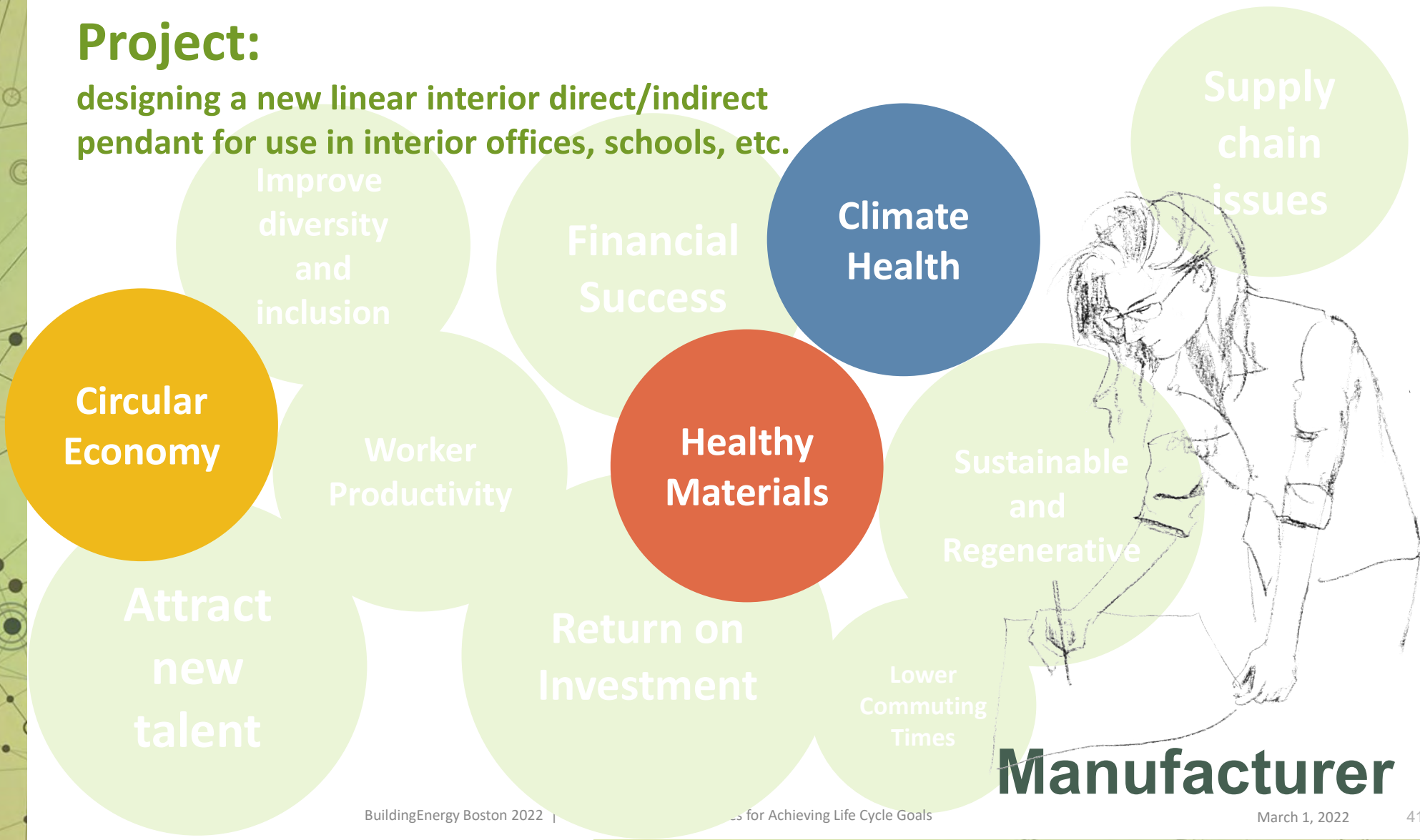
**Manufacturer**





# Project:

designing a new linear interior direct/indirect pendant for use in interior offices, schools, etc.



**Manufacturer**

## Project: new linear interior direct/indirect pendant



**Circular  
Economy**



**Human  
Health /  
Healthy  
Materials**



**Climate  
Health**

- **Environmental impact of a product is largely determined in the design stage**
- **Most embodied carbon for lighting products are released in production stage**



# How we measure can affect our design approach



**Circular  
Economy**



**Human  
Health /  
Healthy  
Materials**



**Climate  
Health**

- **Efficacy (lm/W)**
- **Color Temperature (CCT)**
- **Payback**
- **Material Health**
- **Impact on Environment**
- **Circularity**



# Identifying Design Approaches

- Efficacy (lm/W)
- Circularity
- Material Health
- Impact on Environment

- Modular Design
- Low Impact Materials

Reduce Embodied Carbon

- Modular Design
- High Efficacy

Reduce Operational Carbon

- Modular Design
- Take-back program

Support Circular Economy

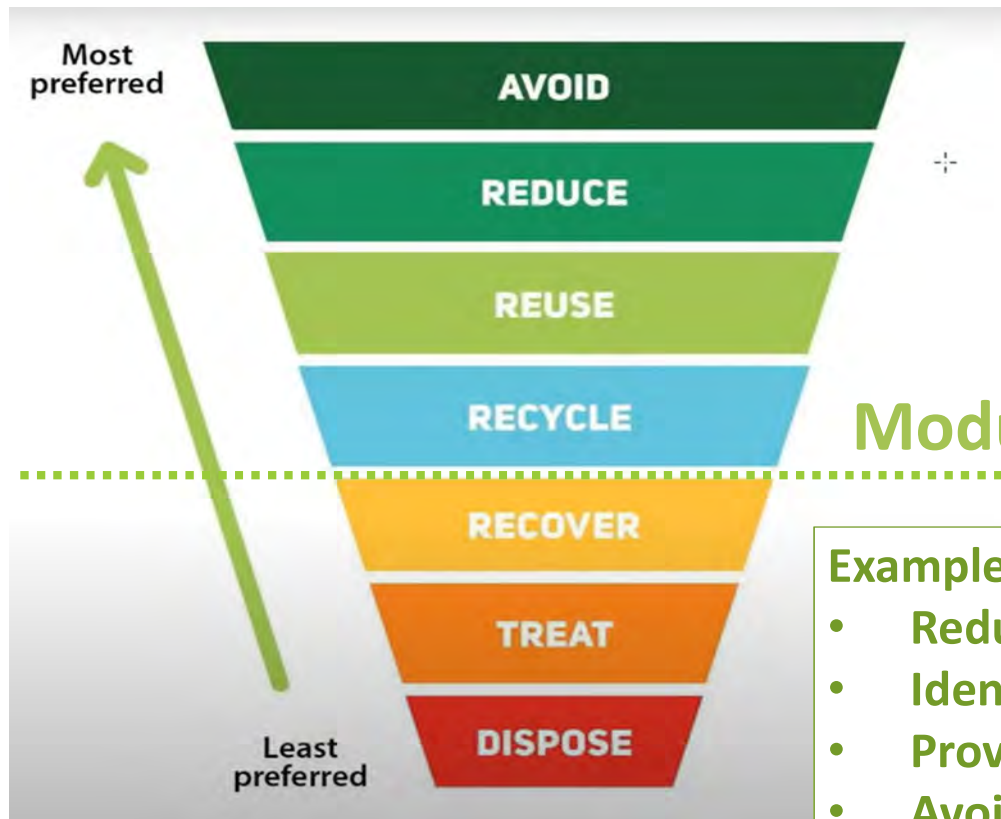
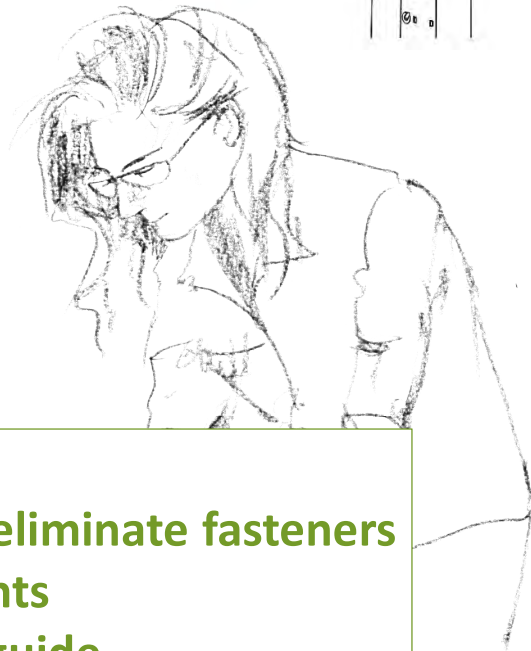
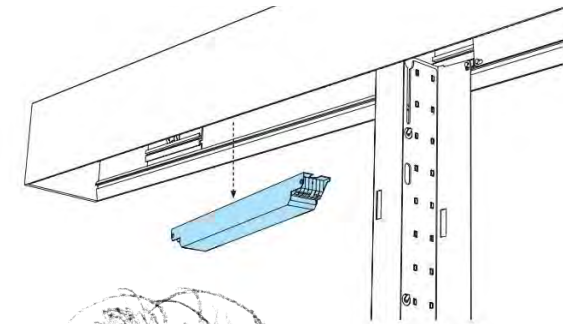
- Materials healthy going in
- Materials healthy at EoL

Healthy Materials

**Manufacturer**



# Design Hierarchy & Modular Approach



## Modular Design

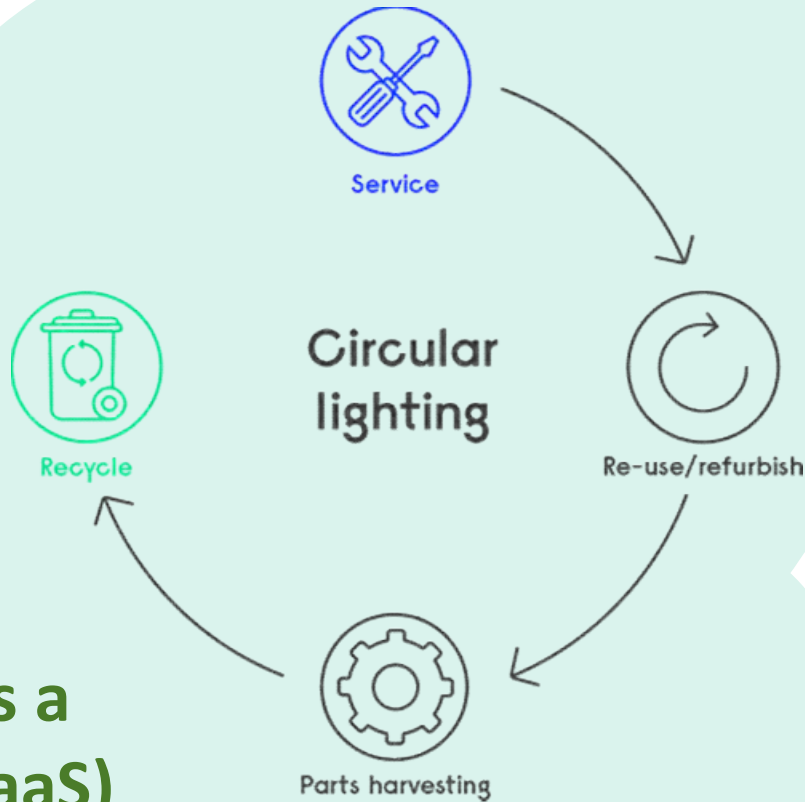
### Example: Fasteners

- Reduce, standardize & eliminate fasteners
- Identify separation points
- Provide a disassembly guide
- Avoid adhesives and composite materials

Overview about Circular Economy Approaches in Lighting Designs and Projects by Mark Ridler, BDP, UK <https://www.youtube.com/watch?v=kWUAHhfW3V0>

# Manufacturer

# Alternative Business Models



- **Take-back programs**
- **Lighting as a Service (LaaS)**



## Manufacturer

<https://www.signify.com/global/lighting-services/managed-services/circular-lighting>

# Measurement and Reporting Frameworks



**Circular Economy**



**TM66**

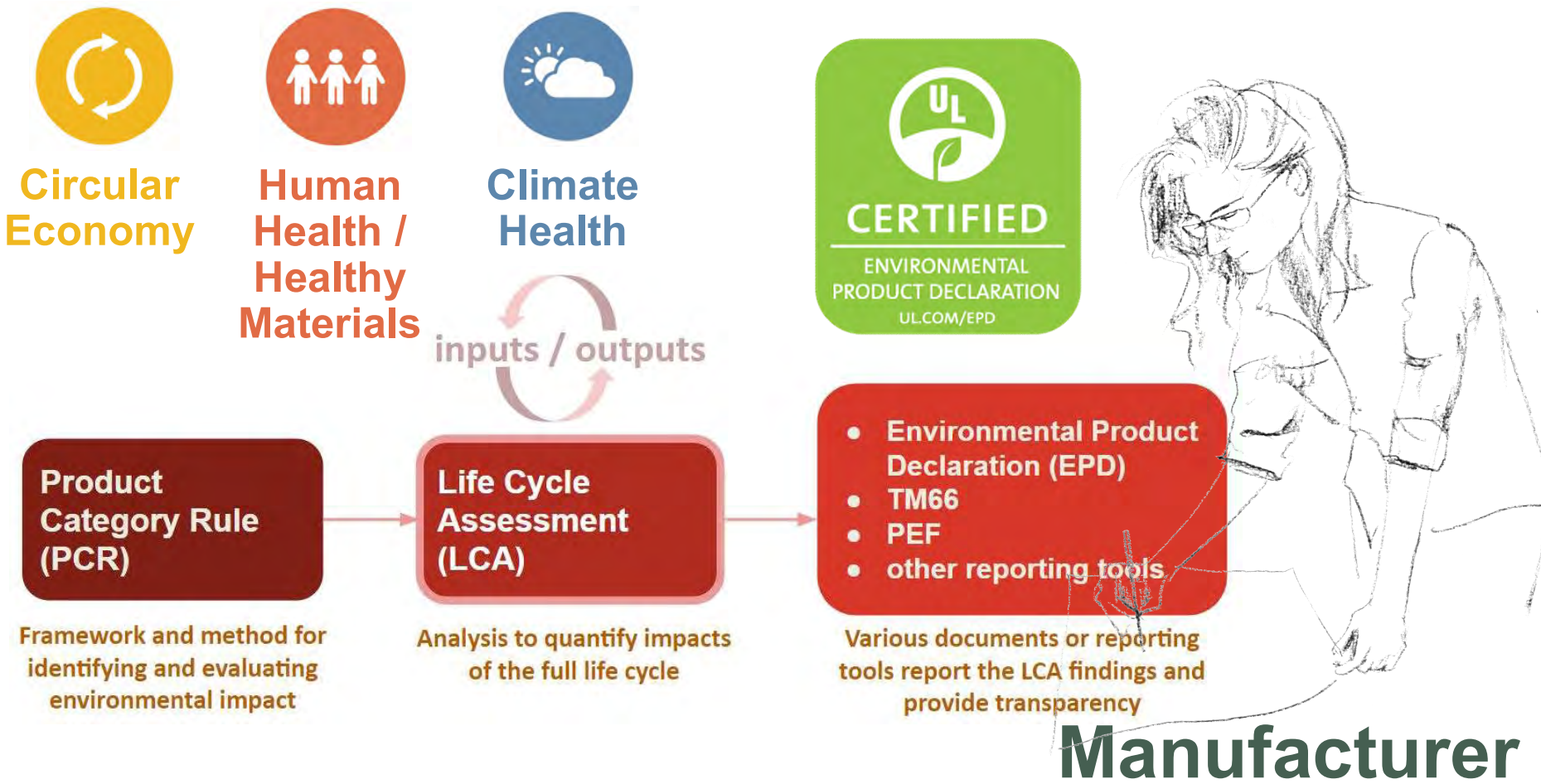


Figure 4 The circular economy model.



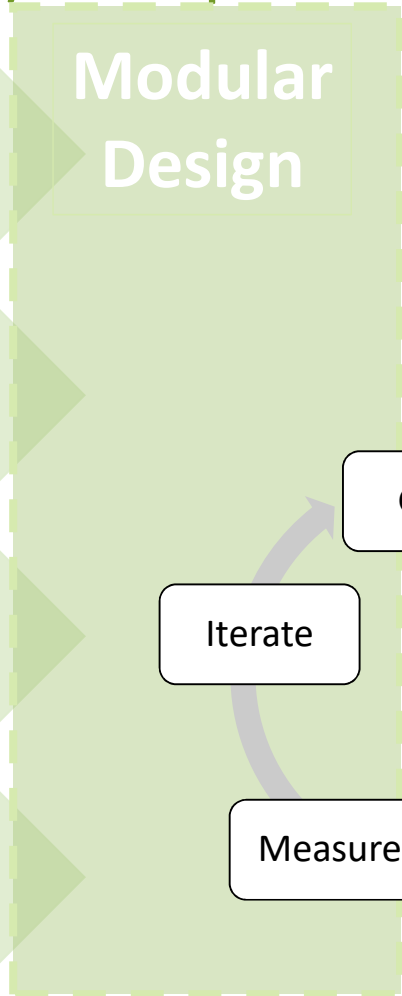
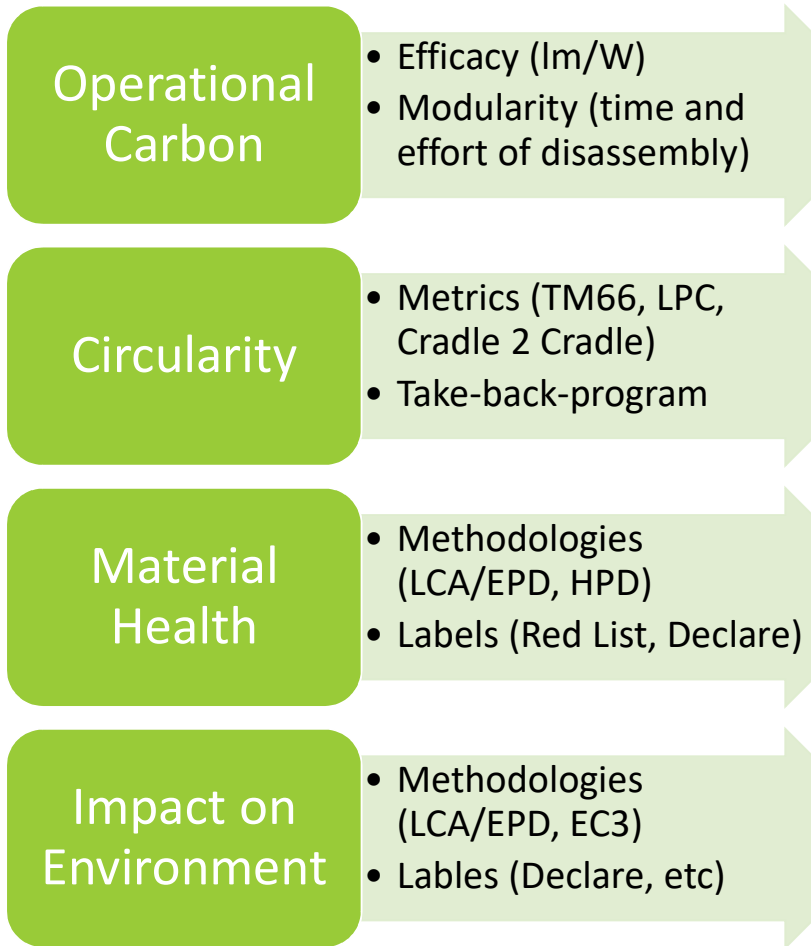
Figure 4. The circular economy model. TM66 The Chartered Institution of Building Services Engineers (CIBSE) 2021

# Measurement and Reporting Frameworks





# Project: new linear interior direct/indirect pendant



**TM66**



# Manufacturer

# Project: New Public High School

## Meet Archie the Architect

I am committed to...  
AIA Materials Pledge  
2030 Challenge  
Lighting Advocacy Letter



# Project: New Public High School

Public high school in  
Massachusetts  
3 Equals for all specified  
products

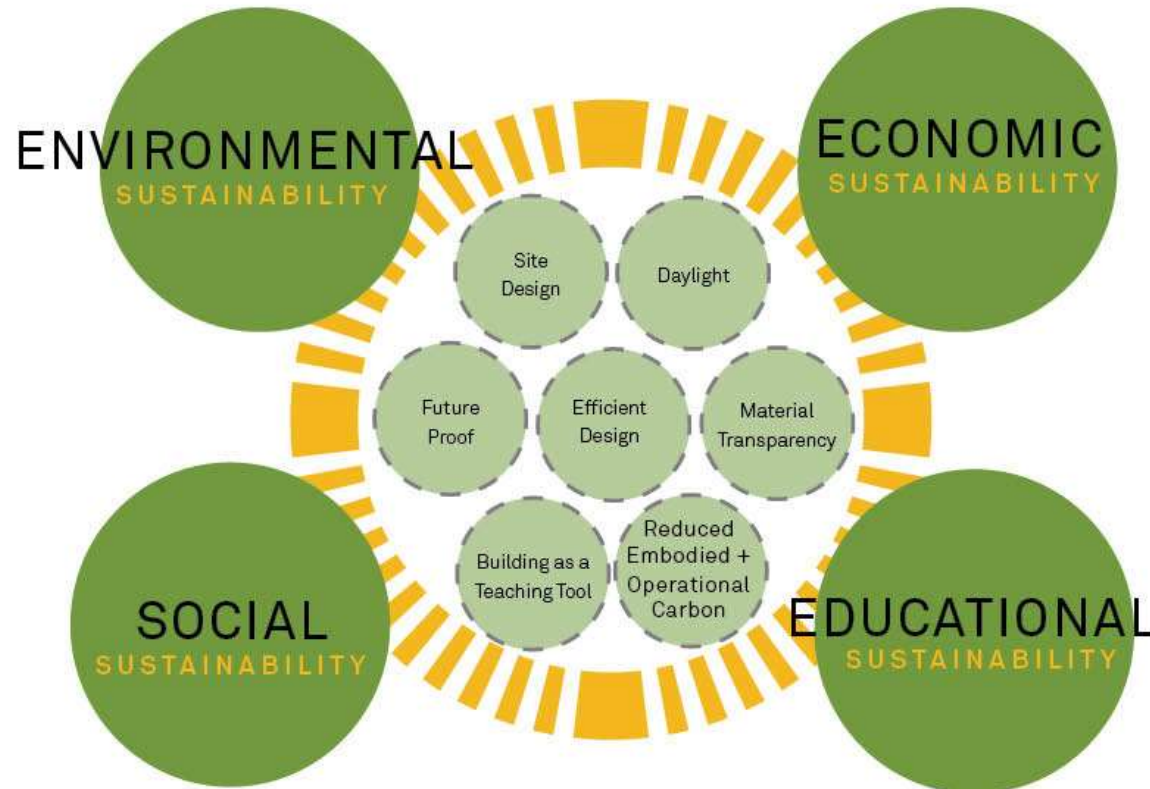


**Client**



**Architect**

# Project: New Public High School

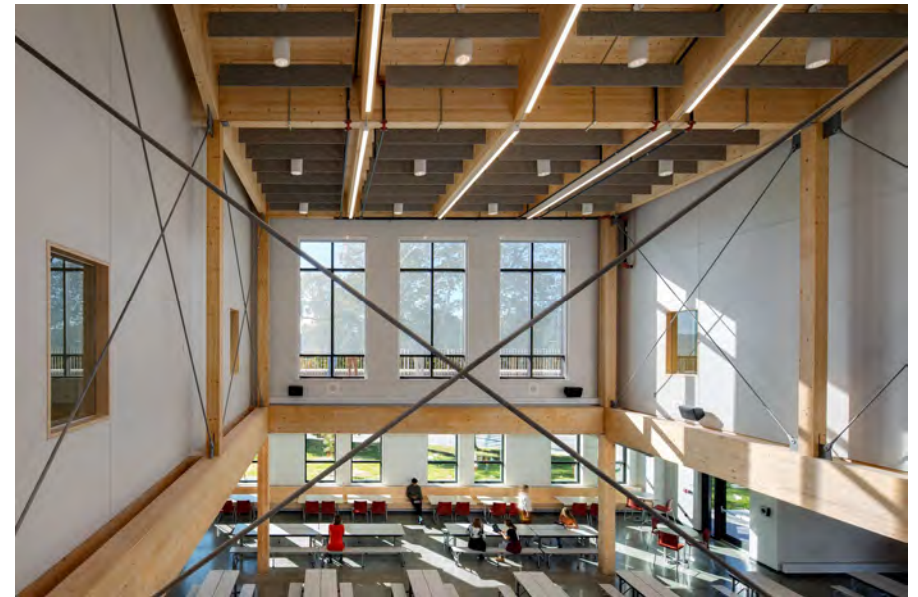
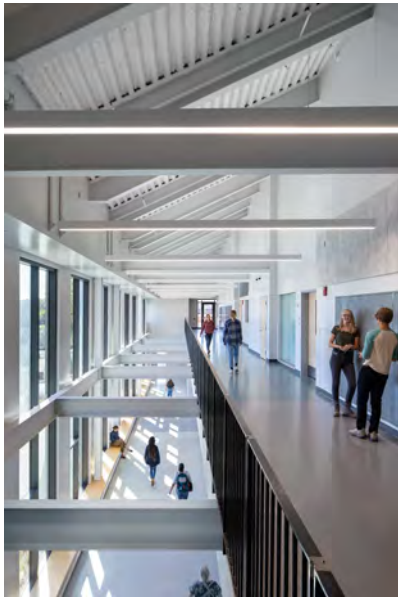




# Project: New Public High School Education



# Project: New Public High School Efficient Design



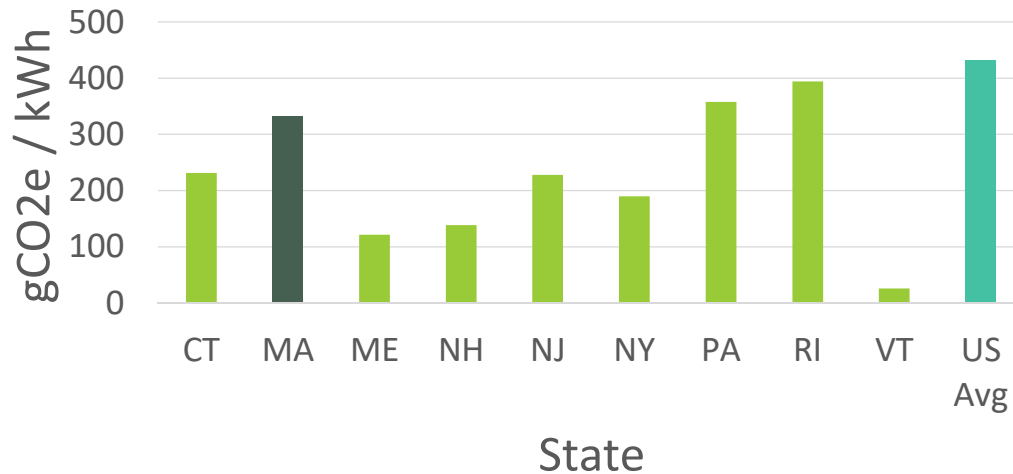
# Project: New Public High School

## Operational Carbon



### Location

Carbon Intensity - Northeast US  
(gCO<sub>2</sub>e / kWh)



Goals

EUI  
25

LPD  
0.4

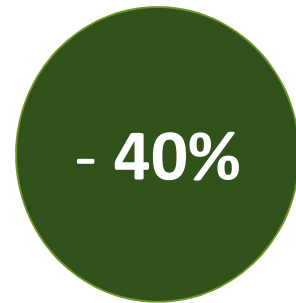
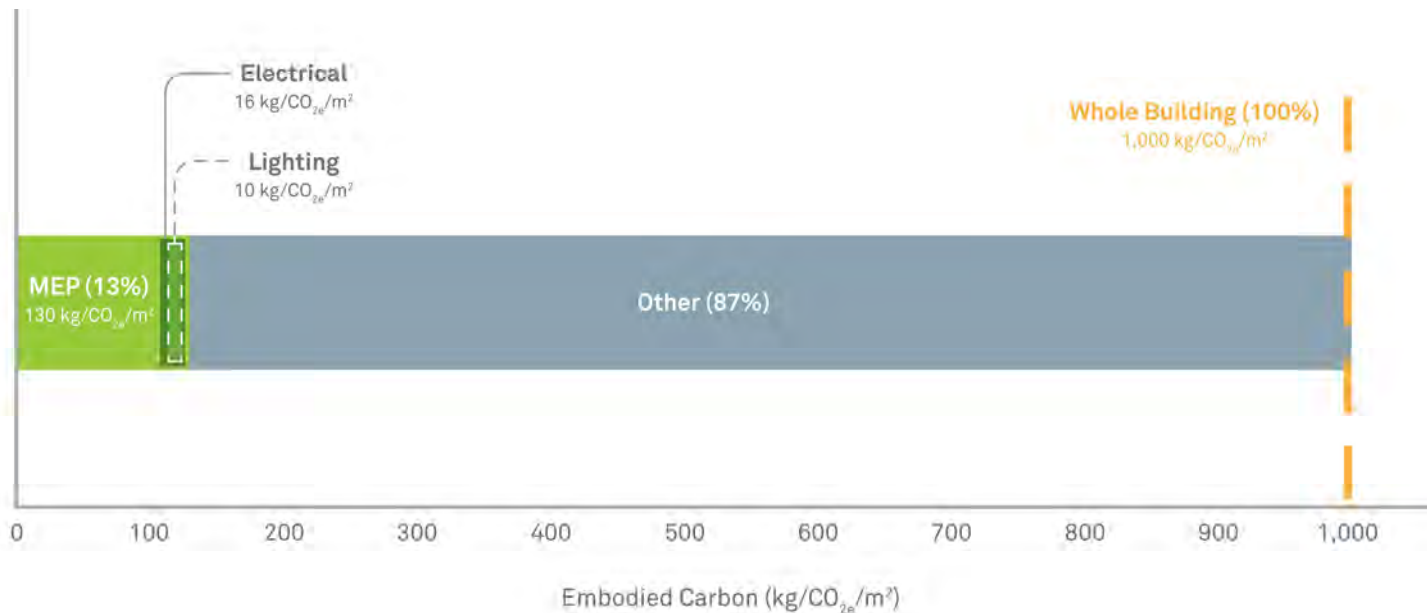
Information from EPA EGrid 2018, via Pak, A. (2022, 1 1). *Embodied Carbon: Key Considerations for Key Materials*. Retrieved from Canadian Architect : <https://www.canadianarchitect.com/embodied-carbon-key-considerations-for-key-materials/>

# Project: New Public High School Embodied Carbon



## Project Benchmark

## Goal



Information from:

Hamot, L. (2021, November 20). *Getting to grips with whole-life carbon*. Retrieved from CIBSE Journal : <https://www.cibsejournal.com/general/getting-to-grips-with-whole-life-carbon/>

(2019). *Life Cycle Assessment of Mechanical, Electrical and Plumbing in Commercial Office Buildings*. The Carbon Leadership Forum.

London Energy Transformation Initiative . (2020). *LETI Embodied Carbon Primer Supplementary Guidance to the Climate Emergency Guide*. London: London Energy Transformation Initiative .

Pak, A. (2022, 1 1). *Embodied Carbon: Key Considerations for Key Materials*. Retrieved from Canadian Architect : <https://www.canadianarchitect.com/embodied-carbon-key-considerations-for-key-materials/>

BuildingEnergy Boston 2022 | Lighting the Way: Strategies for Achieving Life Cycle Goals

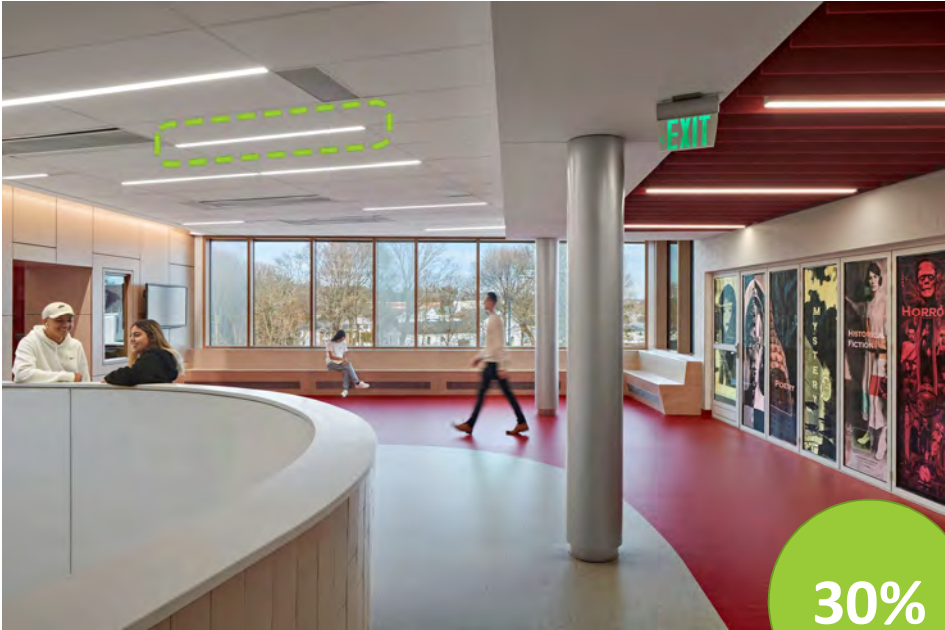


# Project: New Public High School

## Material Health



40%

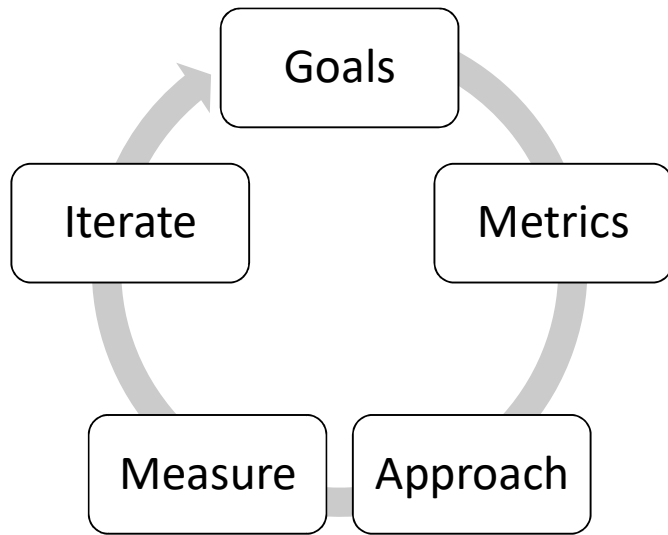


30%

# Project: New Public High School



# Summary Actions



Convey goals and successes to clients and consultants

Design for holistic sustainability

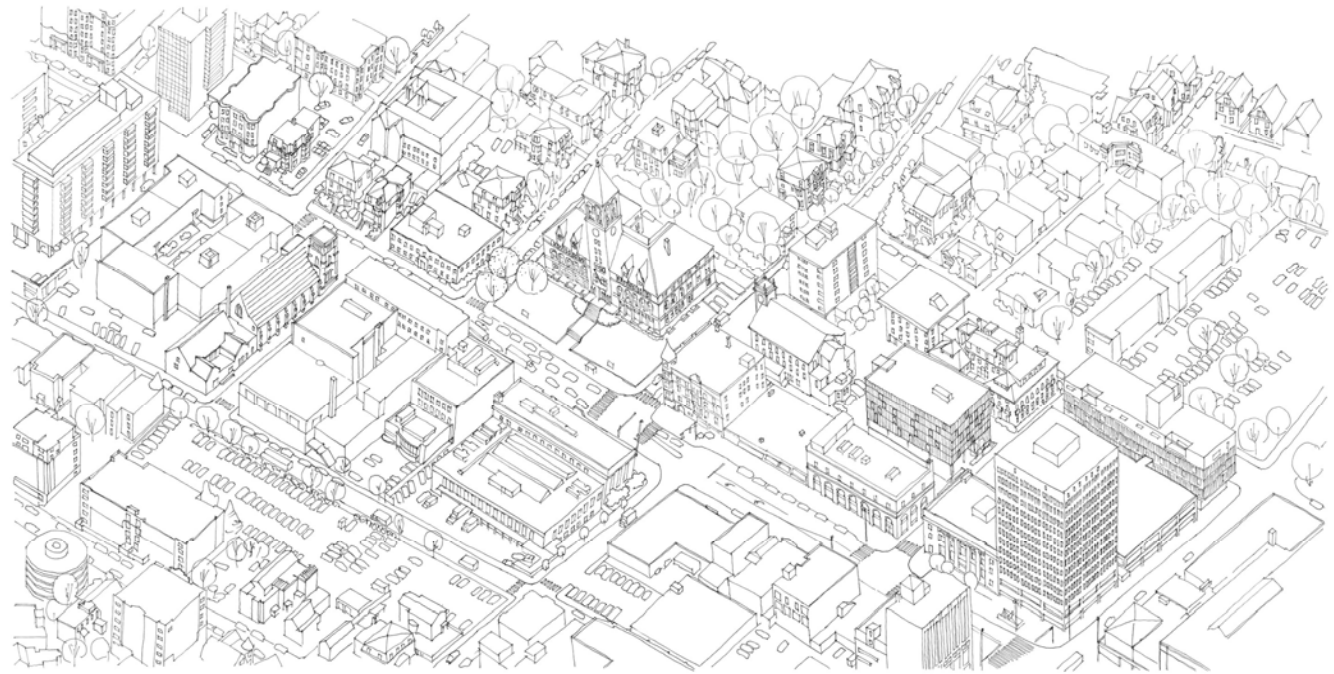
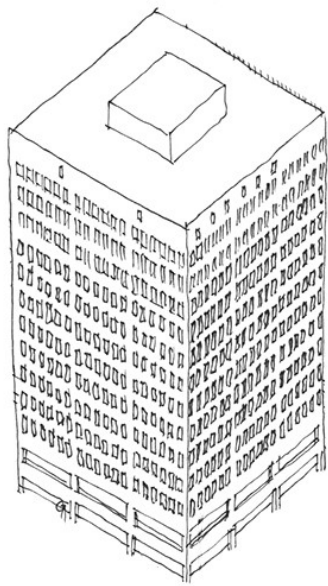
Require transparency documentation for most commonly used products

Set EUI and LPD targets

Consider warranties, repairs and maintenance

Changing how we measure and communicate about our designs

# We can't solve this one building at a time!



# Identifying measurement and reporting frameworks



# Examples of Sustainability Labels & Declarations



	Human Health	Climate Health	Ecosystem Health	Social Health & Equity	Circular Economy	
	✓	✓	✓	✓	✓	<a href="https://www.c2ccertified.org/">https://www.c2ccertified.org/</a>
	✓	x	x	x	✓	<a href="https://declare.living-future.org/">https://declare.living-future.org/</a>
	✓	✓	✓	✓	x	<a href="https://living-future.org/lpc/">https://living-future.org/lpc/</a>
	✓	✓	✓	x	✓	<a href="https://lightingforgood.org/">https://lightingforgood.org/</a>
	✓	x	x	Coming Soon	x	<a href="https://www.hpd-collaborative.org/">https://www.hpd-collaborative.org/</a>

# Join or Follow Organizations Working on This



**Carbon Leadership Forum**

<https://carbonleadershipforum.org>



**IES Sustainability Committee**

<https://ies.org>



**Mindful Materials**

<https://www.mindfulmaterials.com>



**Lytei – Hub for Share Lighting Ideas**

<https://www.lytei.com/>



**AIA Committee on the Environment**

<https://network.aia.org/committeentheenvironment/>



**Built Environments Plus**

[Home - Built Environment Plus](https://www.builtenvironmentsplus.com)



**Green Light Alliance**

<https://www.greenlight-alliance.com>

# Sign the Lighting Advocacy Letter



<https://www.mindfulmaterials.com/lighting-advocacy-letter>

**ABOUT THE LIGHTING ADVOCACY LETTER**

The Lighting Advocacy Letter is an initiative by lighting specifiers to accelerate the sustainability of lighting products. Inspired by the AIA Materials Pledge, the letter is intended to inspire a collective dialogue with the lighting manufacturing community about how to align intent and action around a common framework for sustainability. If you are a lighting designer or specifier, this letter is your opportunity to publicly commit to making more informed material choices and specification changes and supporting an ongoing dialogue with manufacturers to reduce the impacts of the built environment.

July 14, 2021

## LIGHTING ADVOCACY LETTER

Dear Lighting Manufacturer,

As members of the lighting specifier community, we are working to accelerate a transformation in the manufacturing industry. Inspired by the 2019 AIA Materials Pledge, we are united across disciplines in a common goal: ensuring that healthy, high performing luminaires become the industry standard. We all want our projects to positively impact human health, the climate, the environment, and society.

As designers and specifiers, we are committed to the five areas of concern in the 2019 AIA Materials Pledge:

- **Human Health** - Preferring products which support and foster life throughout their life cycles and seek to eliminate the use of substances that are hazardous to humans.
- **Climate Health** - Selecting/giving preference to products with lower embodied carbon.
- **Ecosystem Health** - Preferring products which sustain and regenerate the natural air, water, and biological cycles of life through thoughtful supply chain management and restorative company practices.
- **Social Health and Equity** - Preferring products from manufacturers who secure human rights in their operations and supply chains, and which provide positive impacts for their workers and the communities where they operate.
- **Circular Economy** - Preferring products that are designed for long life, with end-of-life solutions in mind and enabling a closed-loop manufacturing cycle.

To address these concerns and meet our goal of transforming the industry, we commit to continuously updating our specifications and sharing best practices, tools, and education to require transparency on material content and optimized luminaires. We further commit to giving priority in our specifications to those products and manufacturers that:

- Provide publicly available material ingredient disclosure information
- Provide publicly available environmental impact disclosure information
- Do not stop at material transparency, but strive for optimization

To achieve this goal, we must work together as designers, specifiers, building owners, developers, manufacturers, and contractors to build awareness, share knowledge, drive demand, and deliver solutions. We ask you as responsible manufacturers for your commitment to working towards luminaire industry transformation. To accelerate this mission and to leverage cross-industry insight and expertise, we seek your partnership in advancing this conversation at upcoming industry conferences and tradeshows.

We value our relationship with each of you and understand that the change we seek will not be accomplished overnight. Please join us in continued dialogue and collaboration as we learn from each other and improve our lighting industry together.

Sincerely,

LIGHTING MATERIALS PLEDGE SIGNATORIES

The bottom section of the letter features logos for the signatories. From left to right, they are: HMFH ARCHITECTS (yellow and black text), Green Specifier (green circular logo with a leaf), Green Specifier (green circular logo with a leaf), Hartranft Lighting Design (black and red logo), CANNONDESIGN (red and black logo), Cushing Terrell (blue and black logo), and Lam Partners (blue and black logo).



# Join the Next Steps Webinar this Thursday, March 3rd



<https://www.eventbrite.com/e/lighting-the-way-advocacy-action-for-lighting-design-tickets-219340863427>





**Thank you**