LEDucation
Trade Show and Conference

Designers Lighting Forum

Championing Sustainable Lighting Specification Processes

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BD + C
March 18, 2025

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Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.

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Learning Objectives

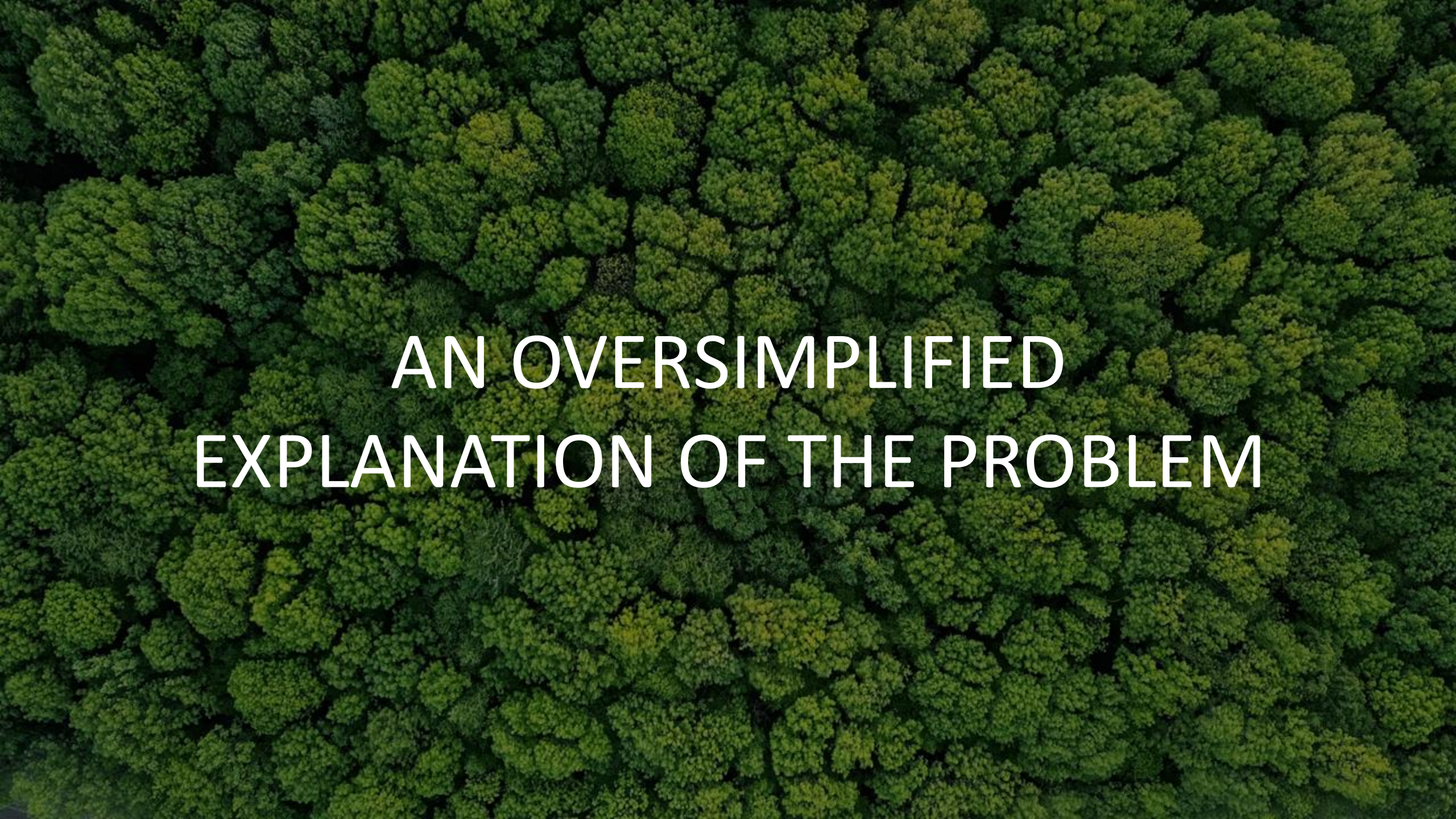
At the end of this course, participants will be able to:

1. Attendees will be able to understand the importance of standardizing sustainable lighting fixture sourcing.

2. Attendees will be able to identify light fixtures, materials, and manufacturing processes with lower environmental impacts than traditional versions.

3. Attendees will be able to apply sustainable sourcing strategies within their organization, making the effort firm-wide.

4. Attendees will be able to gain buy-in from project stakeholders to use sustainably sourced lighting materials that make it to the final project.


AN OVERSIMPLIFIED
EXPLANATION OF THE PROBLEM

Anthropogenic Global Warming

- Human Impact has raised temperature of Earth's atmosphere by ~1°C compared to pre-Industrial levels (IPCC SR15, 2018)
- Primarily from the "greenhouse effect" where the Earth's atmosphere traps heat from the sun. Emissions from fossil fuels accelerate this effect.

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Climate Catastrophe

- With no change to global emissions, global temperatures could rise **1.5°C** by 2040 and **4°C** by 2100
- 4°C of warming is catastrophic for life on earth – sea levels rise by more than 8 meters (26 feet), agriculture starts to fail, half of all species face extinction

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What are we doing about it?

- The 2015 Paris Agreement established a framework to limit global warming to 2°C with a stretch goal of 1.5°C
- Our planet will be different at 1.5 or 2°C warmer, but we can avoid the most catastrophic effects of global warming
- Reduce emissions, explore renewable energy sources, remove carbon dioxide from atmosphere

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M.G. Fracassini, 2022 (Pen & Colored Pencil on Recycled Newsprint)

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UN Sustainable Development Goals

- 17 Goals, 169 Targets
- Climate Action
- Health & Well-Being
- Sustainable Cities

United Nations

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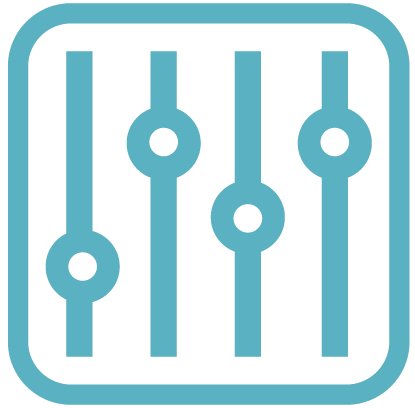
Lighting Industry Actions

Reductions in Allowable LPD

Light Pollution Reduction

Near Elimination of Mercury



Advancements in Lighting Controls

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ELEMENTS OF SUSTAINABILITY

Elements of Sustainability

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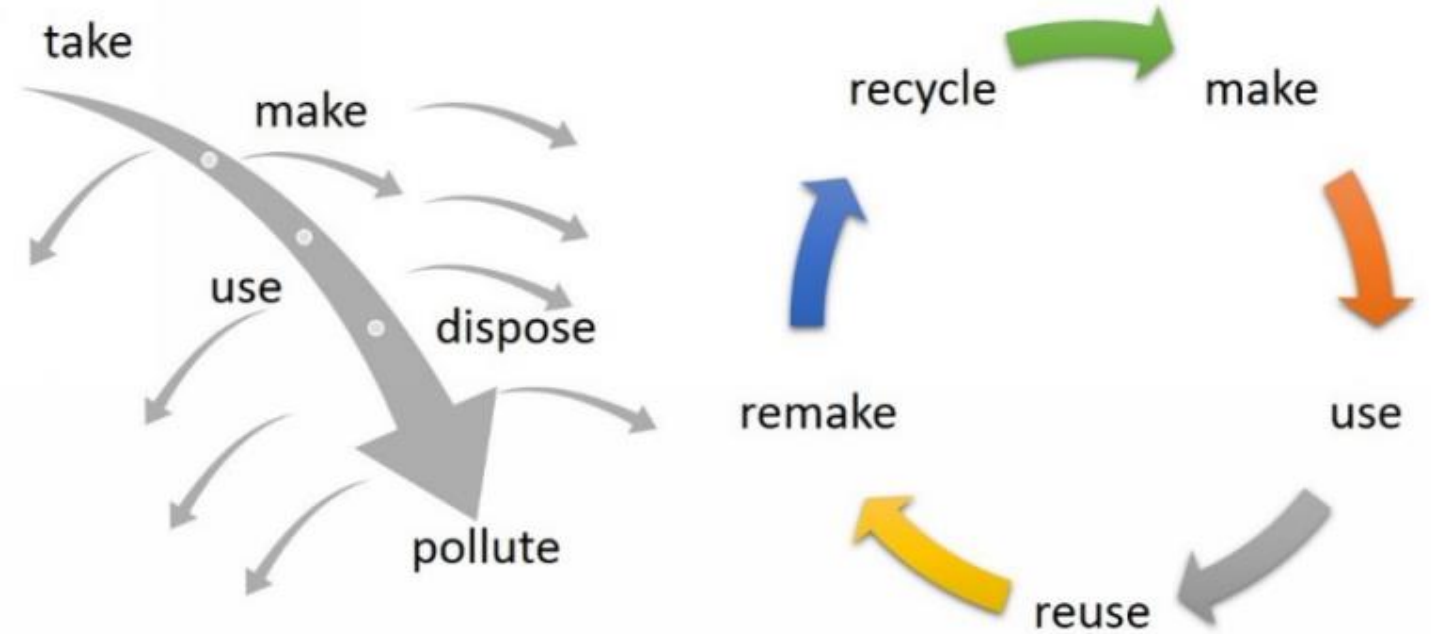
Circularity

Linear versus Circular Economy



CC 3.0 Catherine Weetman 2016

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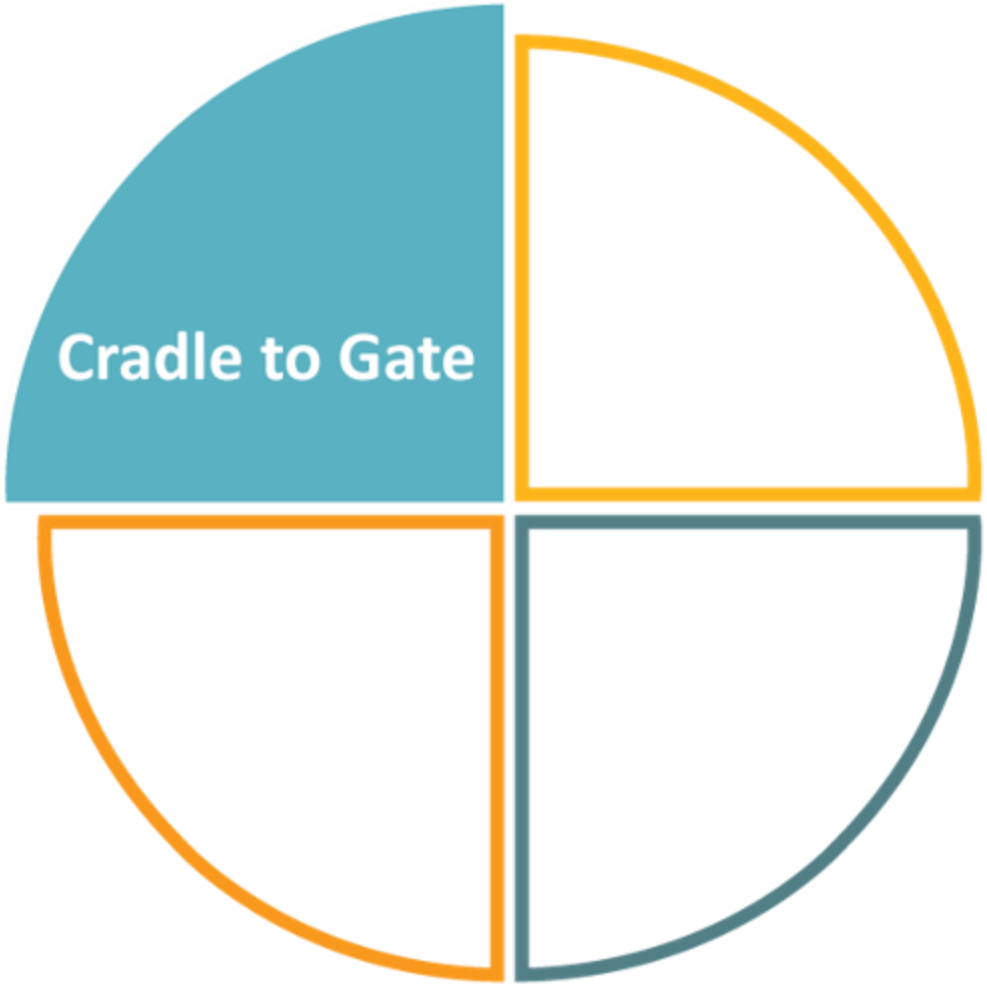
Key Elements: Cradle to Gate



CO_2 Emissions

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- Embodied: Materials & Manufacture
- Operational: Energy Consumption

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Cradle to Gate:
Recycled Steel & Aluminum

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Cradle to Gate:
Recycled Steel & Aluminum

CO_2 Per Pound of Material Produced *(pounds)*	Material	CO_2 Produced in making 10,000 luminaires with 10 pounds of material *(pounds)*
12	Aluminum	1,200,000
2.1	Recycled Aluminum	210,000
1.8	Steel	180,000
0.4	Recycled Steel	40,000

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Cradle to Gate:
Recycled Steel & Aluminum

Material	Aggregate Recycled Content %
Sheet Steel	25-30%
Die-Cast Aluminum	80%
Extruded Aluminum	54.2%

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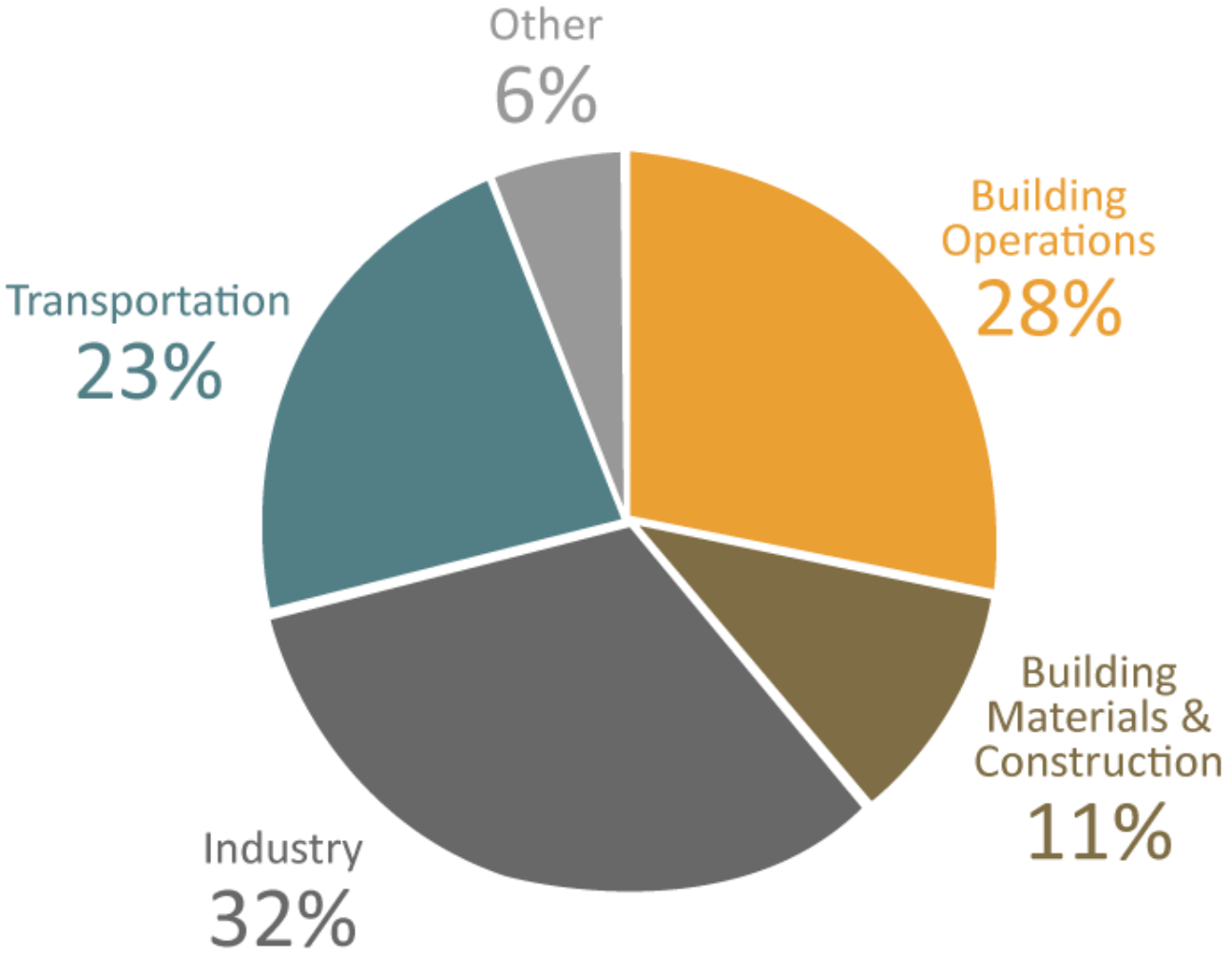
Cradle to Gate:
Recycled Steel & Aluminum



Source: Global Alliance for Buildings & Construction
2020 Global Status Report for Buildings & Construction

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Cradle to Gate:
Recycled Steel & Aluminum

- Opportunities
  - Consider Location
  - Reduce Packaging

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Cradle to Gate:
Location, Location, Location

- Components Location
- Assembly Location
- Project Location

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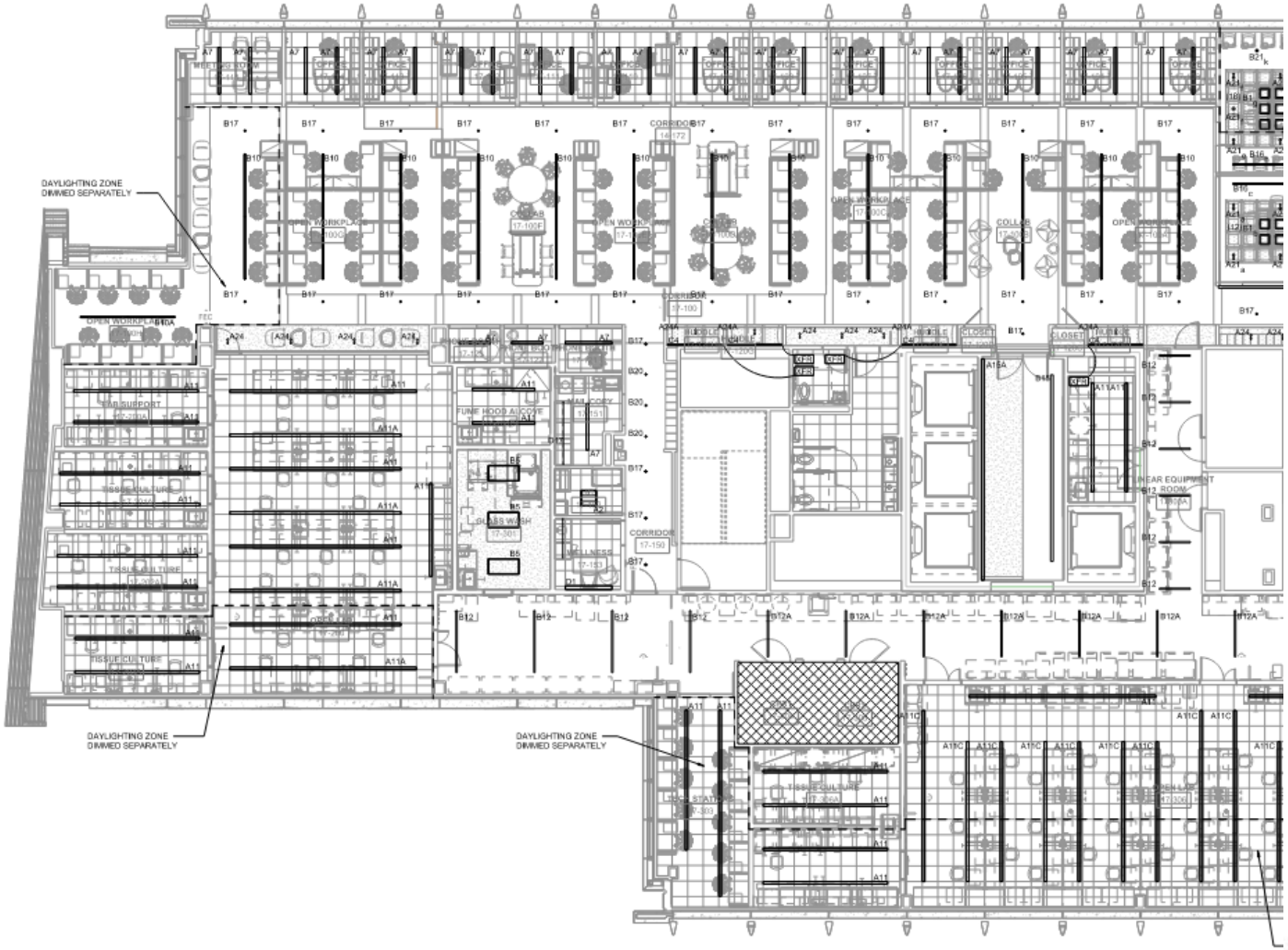
Cradle to Gate:
Location, Location, Location



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Cradle to Gate:
Reduce Packing Materials

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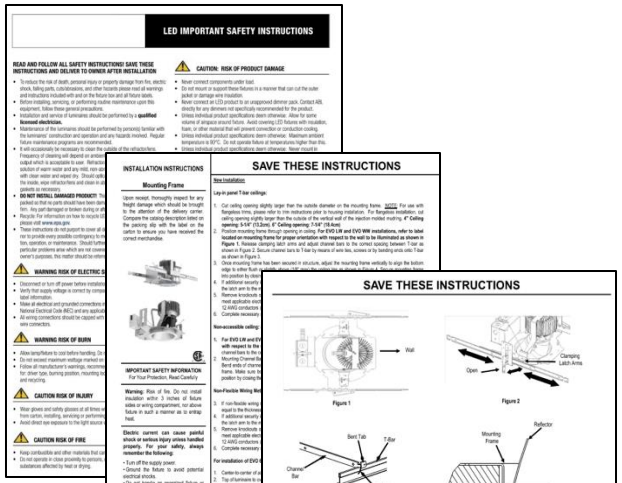
Cradle to Gate:
Eliminate Paper Instructions



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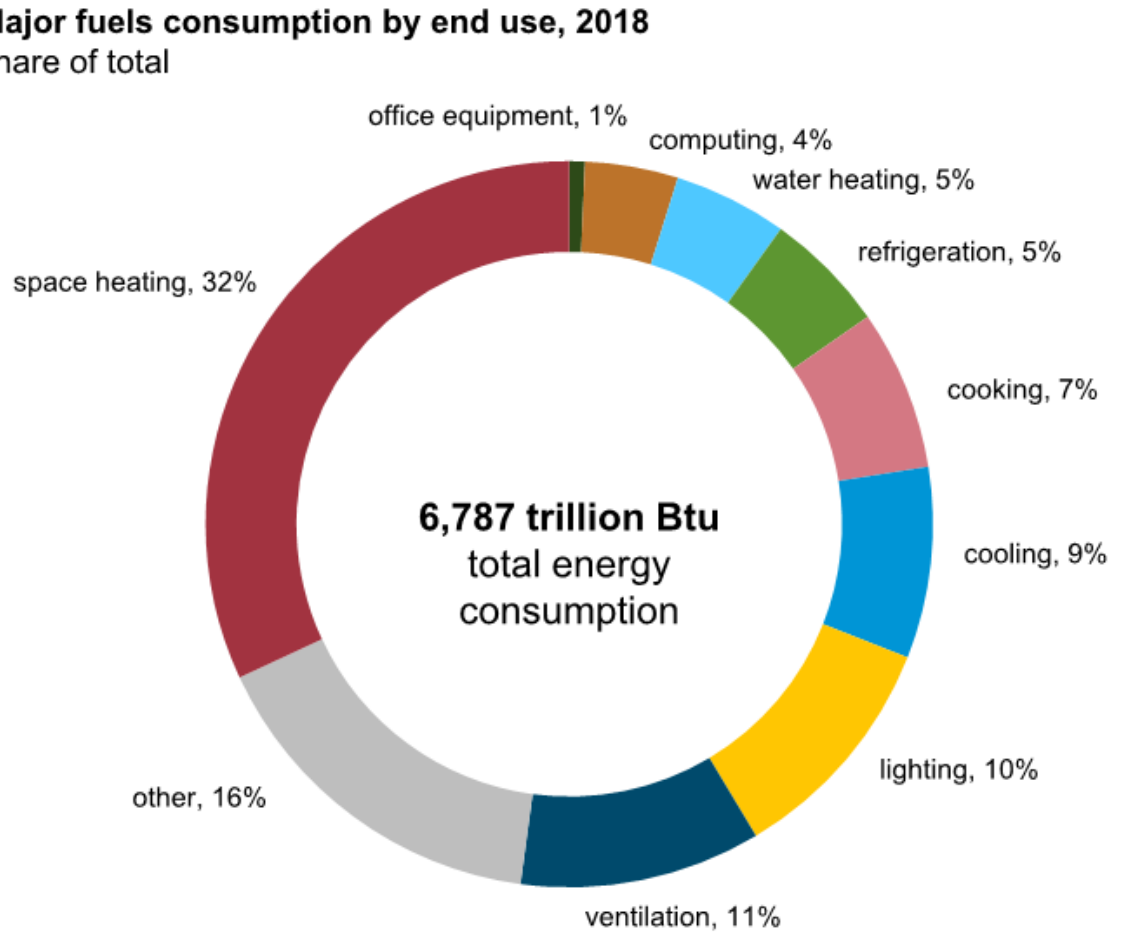
Key Elements: Gate to Grave

Gate to Grave:
Energy Consumption



CBECS 2018

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Gate to Grave:
Energy Consumption

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Gate to Grave:
Circular Economy… More than Emissions

- From “IALD Position Paper on Circular Economy”

The study states that energy efficiency benefits from optimized lighting applications are obtained not only through the adoption of high efficacy luminaires, but also through well refined design options. Lighting design that incorporates utilance, daylight contributions

(via controls and design), apply occupancy control and surface reflectance, can all contribute to energy saving opportunities. The IALD believes that it is firmly within lighting designers’

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Gate to Grave:
Application Efficacy

- Source Efficacy
- Luminaire Efficacy
- Application Efficacy

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Gate to Grave:
Application Efficacy

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Gate to Grave:
Extending Lifespan

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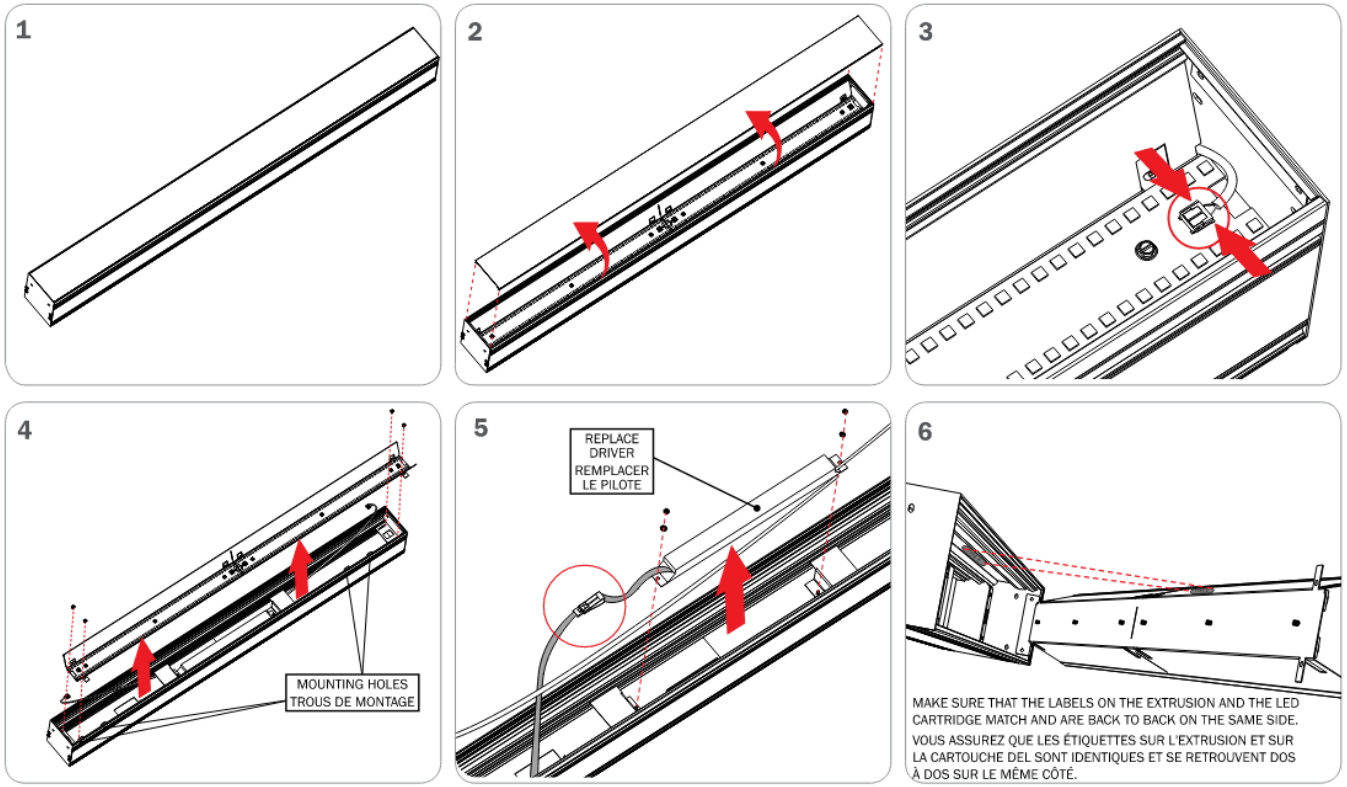
Gate to Grave:
Extending Lifespan

- Replacement Parts
- Replacement Lamps/ Boards/ Drivers
- Accessible & Available



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Gate to Grave:
Extending Lifespan – Re-Use

We re-use buildings…
Why not luminaires?

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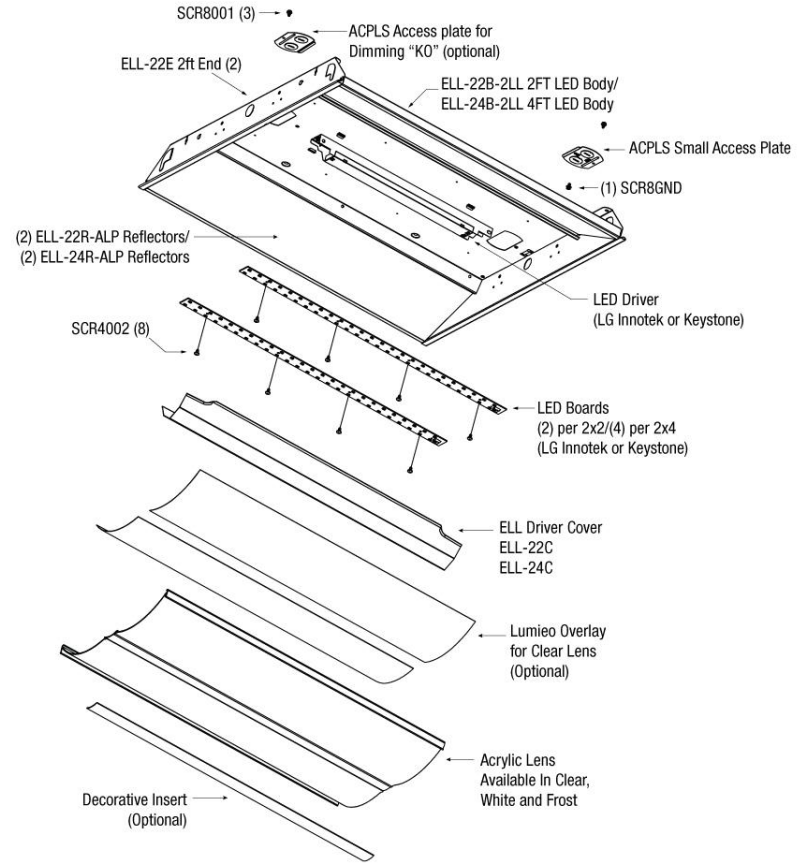
Gate to Grave:
What's in a Light Fixture?

- Steel
- Aluminum

- Glass
- Plastic

- LED Boards
- Drivers
- Wire



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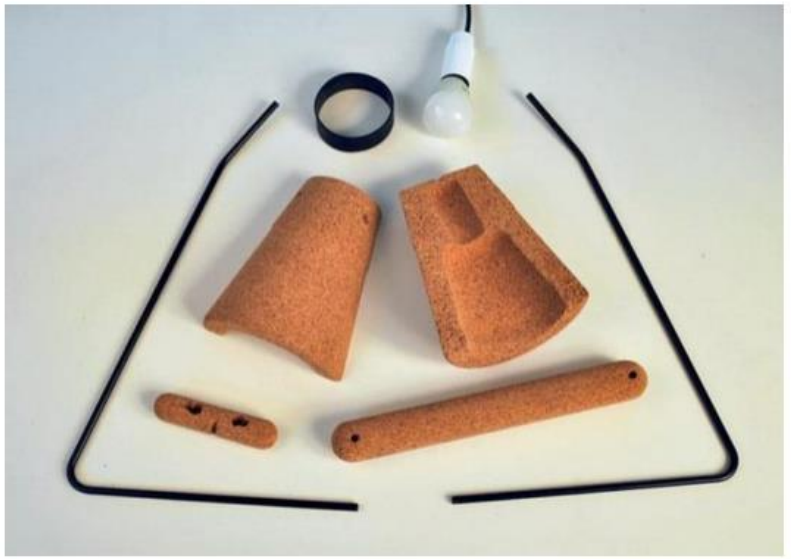
Gate to Grave:
Extending Lifespan – Recycle

- Ease of Disassembly
- Design for Disassembly (DfD)
- Scaled up from consumer efforts



idlights.com

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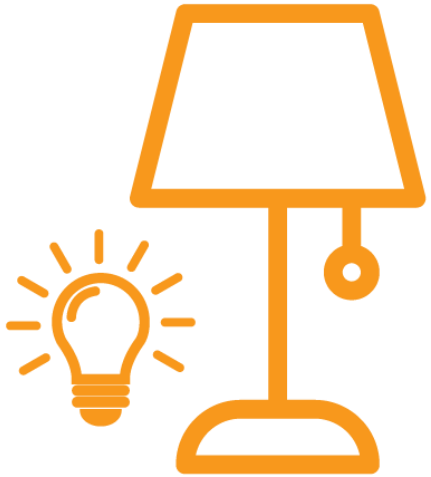
Key Elements: Materials Responsibility

Materials Responsibility:
Materials Transparency

- Luminaires & Components
- Eliminating Hazardous Materials
- Materials Disclosures



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Materials Responsibility:
Materials Transparency

			LEED	LBC	WELL
Mfg. Driven	Luminaire Design	Material Sourcing/Ingredient Disclosure	X	X	X
		Life Cycle Assesment	X		
Specifier Driven	Lighting Performance & Application	Energy Performance	X	X	
		Visual Lighting Design/Light Quality	X		X
		Occupant Controlled Lighting Scenes	X		X
		Daylighting & Views	X	X	X
		Circadian Lighting Design			X
		Light Pollution	X		

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Materials Responsibility:
EPD: Cradle to Gate

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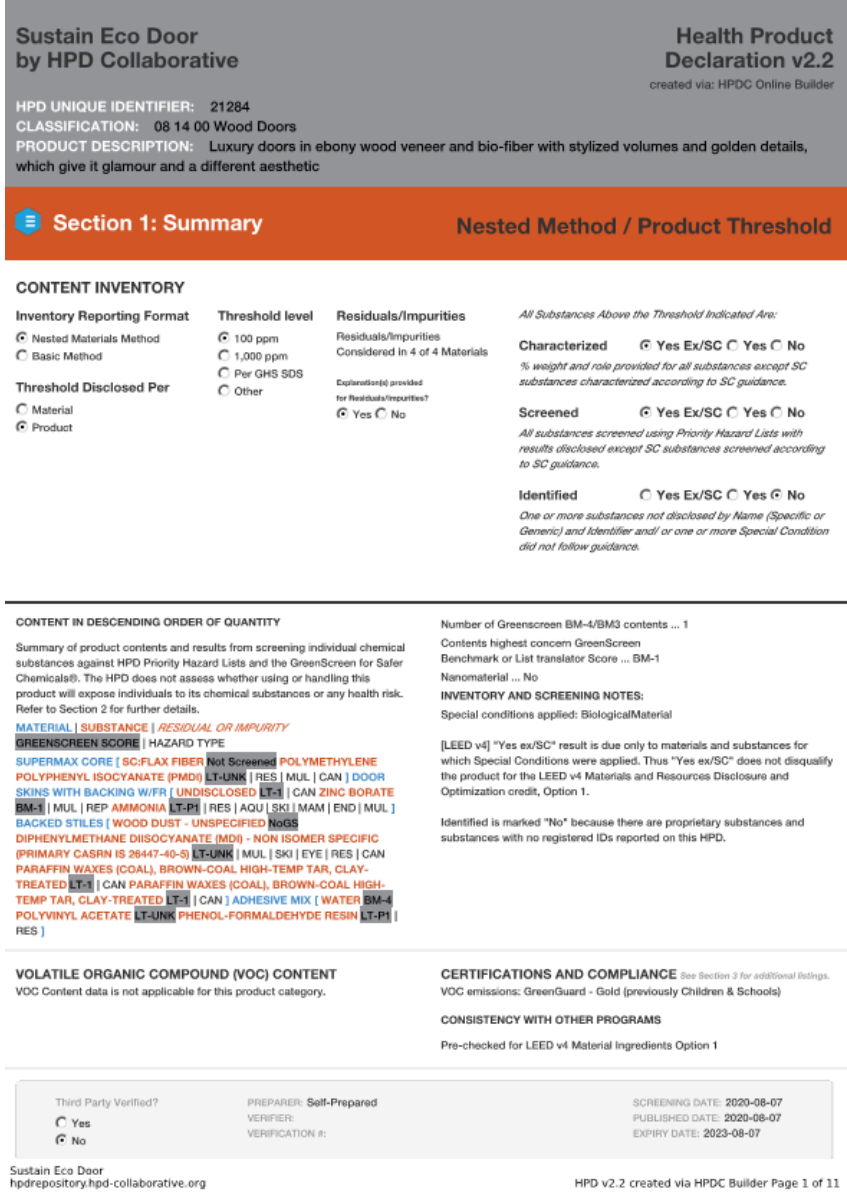
Materials Responsibility:
Health Product Declaration

- Open Industry Standard
- Every chemical listed with PPM
- 3rd Party Verification

hpdcollaborative.org



Sustain Eco Door
by HPD Collaborative

Health Product Declaration v2.2
created via: HPDC Online Builder

HPD UNIQUE IDENTIFIER: 21284
CLASSIFICATION: 08 14 00 Wood Doors
PRODUCT DESCRIPTION: Luxury doors in ebony wood veneer and bio-fiber with stylized volumes and golden details, which give it glamour and a different aesthetic

Section 1: Summary — Nested Method / Product Threshold

CONTENT INVENTORY

Inventory Reporting Format: (•) Nested Materials Method ( ) Basic Method
Threshold Disclosed Per: ( ) Material (•) Product
Threshold level: (•) 100 ppm ( ) 1,000 ppm ( ) Per GHS SDS ( ) Other
Residuals/Impurities: Residuals/Impurities Considered In 4 of 4 Materials
Explanation(s) provided for Residuals/Impurities? (•) Yes ( ) No

All Substances Above the Threshold Indicated Are:

Characterized: (•) Yes Ex/SC ( ) Yes ( ) No
% weight and role provided for all substances except SC substances characterized according to SC guidance.

Screened: (•) Yes Ex/SC ( ) Yes ( ) No
All substances screened using Priority Hazard Lists with results disclosed except SC substances screened according to SC guidance.

Identified: ( ) Yes Ex/SC ( ) Yes (•) No
One or more substances not disclosed by Name (Specific or Generic) and Identifier and/ or one or more Special Condition did not follow guidance.

CONTENT IN DESCENDING ORDER OF QUANTITY

Summary of product contents and results from screening individual chemical substances against HPD Priority Hazard Lists and the GreenScreen for Safer Chemicals®. The HPD does not assess whether using or handling this product will expose individuals to its chemical substances or any health risk. Refer to Section 2 for further details.

MATERIAL | SUBSTANCE | *RESIDUAL OR IMPURITY*
GREENSCREEN SCORE | HAZARD TYPE

SUPERMAX CORE [SC:FLAX FIBER Not Screened POLYMETHYLENE POLYPHENYL ISOCYANATE (PMDI) LT-UNK | RES | MUL | CAN] DOOR SKINS WITH BACKING W/FR [UNDISCLOSED LT-1 | CAN ZINC BORATE BM-1 | MUL | REP AMMONIA LT-P1 | RES | AQU | SKI | MAM | END | MUL] BACKED STILES [WOOD DUST - UNSPECIFIED NoGS DIPHENYLMETHANE DIISOCYANATE (MDI) - NON ISOMER SPECIFIC (PRIMARY CASRN IS 26447-40-5) LT-UNK | MUL | SKI | EYE | RES | CAN PARAFFIN WAXES (COAL), BROWN-COAL HIGH-TEMP TAR, CLAY-TREATED LT-1 | CAN PARAFFIN WAXES (COAL), BROWN-COAL HIGH-TEMP TAR, CLAY-TREATED LT-1 | CAN] ADHESIVE MIX [WATER BM-4 POLYVINYL ACETATE LT-UNK PHENOL-FORMALDEHYDE RESIN LT-P1 | RES]

Number of Greenscreen BM-4/BM3 contents ... 1
Contents highest concern GreenScreen Benchmark or List translator Score ... BM-1
Nanomaterial ... No

INVENTORY AND SCREENING NOTES:
Special conditions applied: BiologicalMaterial

[LEED v4] "Yes ex/SC" result is due only to materials and substances for which Special Conditions were applied. Thus "Yes ex/SC" does not disqualify the product for the LEED v4 Materials and Resources Disclosure and Optimization credit, Option 1.

Identified is marked "No" because there are proprietary substances and substances with no registered IDs reported on this HPD.

VOLATILE ORGANIC COMPOUND (VOC) CONTENT
VOC Content data is not applicable for this product category.

CERTIFICATIONS AND COMPLIANCE See Section 3 for additional listings.
VOC emissions: GreenGuard - Gold (previously Children & Schools)

CONSISTENCY WITH OTHER PROGRAMS
Pre-checked for LEED v4 Material Ingredients Option 1

Third Party Verified? ( ) Yes (•) No
PREPARER: Self-Prepared
VERIFIER:
VERIFICATION #:
SCREENING DATE: 2020-08-07
PUBLISHED DATE: 2020-08-07
EXPIRY DATE: 2023-08-07

Sustain Eco Door
hpdrepository.hpd-collaborative.org
HPD v2.2 created via HPDC Builder Page 1 of 11

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Materials Responsibility: Declare. Label

Declare.

- Red List & Watch List Chemicals
- Final Assembly Location
- % Recycled Content
- 3rd Party Verification

https://living-future.org/declare/basics/

Red List Free
INTERNATIONAL LIVING FUTURE INSTITUTE

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Materials Responsibility:
EPD – Cradle to Grave / Life Assessment

CIBSE

TM66 CIRCULARITY LIA | CIBSE

lighting for good

PCDS PRODUCT CIRCULARITY DATA SHEET LUXEMBOURG

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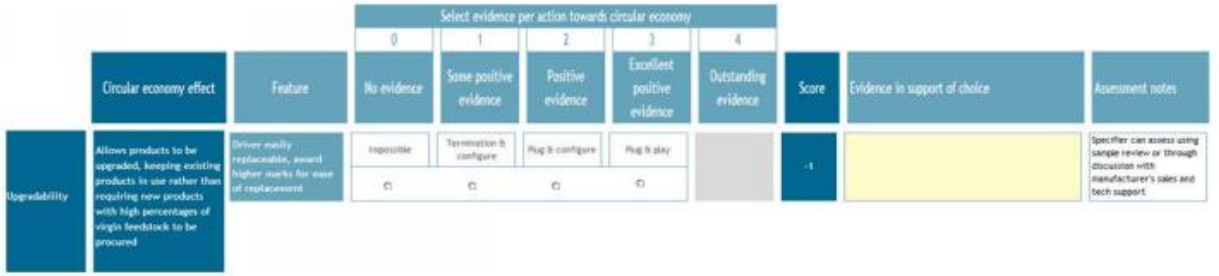
Materials Responsibility: CIBSE/ LIA TM-66

- TM66 Assured
- Self-Certification
- “Make” and “Specify” Options



			Select evidence per action towards circular economy							
			0	1	2	3	4			
	Circular economy effect	Feature	No evidence	Some positive evidence	Positive evidence	Excellent positive evidence	Outstanding evidence	Score	Evidence in support of choice	Assessment notes
Upgradability	Allows products to be upgraded, keeping existing products in use rather than requiring new products with high percentages of virgin feedstock to be procured	Driver easily replaceable, award higher marks for ease of replacement	Impossible	Termination & configure	Plug & configure	Plug & play		-1		Specifier can assess using sample review or through discussion with manufacturer's sales and tech support
			☐	☐	☐	☐				

Result

Category	Points Scored	Maximum possible points	Assessment
Product design	21.0	35.0	2.4
Manufacturing	10.9	11.0	3.9
Materials	5.0	16.0	1.3
Ecosystem	15.0	22.0	2.7
Overall performance	51.9	84.0	2.6

How to analyse the score	
0 to 0.5	Very poor circular economy performance
0.5 to 1.5	Some circular economy functionality
1.5 to 2.5	Definite/substantial progress to circularity
2.5 to 4.0	Excellent circularity

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Materials Responsibility: Lighting for Good

- Life Cycle Analysis (LCA)
- Tools for Manufacturers & Specifiers
- L70 Life, Color Quality, Ease of Maintenance, Source & Driver Efficacy

Your Details	
Company Name	
Contact Person	
Contact E-Mail	
Fitting & Driver reference	

Mandatory Criteria			Yes	No
Packaging	A	Certified cardboard (100%FSC, FSC Mix, or FSC Recycled)		
	B	Wrapping		
	C	Recycling compatible glue		
	D	Biochemicals for printing		

		Score of 1	Score of 2	Score of 3	Score of 4	Score of 5	Environmental Impact		
Criteria							Score (0-5)	Ratio	Amount
1. Durability	1.1. Lumen maintenance	30 000H	50 000H	100 000H	150 000H	200 000H	5	1.2	6
2. Luminaire Efficacy	2.1. Efficacy of the LED module	70lm/W	85lm/W	100lm/W	115lm/W	130lm/W	5	5.2	26
	2.2. Light output ratio	75%	80%	85%	90%	95%	5	2.8	14
	2.3. Kglm/kgs of the luminaire	>2	>3	>4	>5	>6	5	1.1	5.5
3. Quality of Light	3.1. Colour deviation	5 steps	4 steps	3 steps	2 steps	1 step	5	0.5	2.5
	3.2. Colour rendition index	tm30-15 Rf=90	tm30-15 Rf=92	tm30-15 Rf=94	tm30-15 Rf=96	tm30-15 Rf=98	5	1.6	8
4. Maintainability	4.1. LED module replacement	Needs Tools (1)		Tooless (3)		Tooless Reversible (5)	5	0.3	1.5
	4.2. Standardized sizes for light engine	yes (1)	no (0)				1	1.7	1.7
	4.3. Interchangeable optical system	yes (1)	no(0)				1	2.9	2.9
	4.4. Quick electrical connector	yes (1)	no (0)				1	1.7	1.7
	4.5. ISO lumen after maintenance	yes (1)	no (0)				1	8.9	8.9
5. Driver's Efficacy	5.1. Power Factor	0.90	0.93	0.95	0.97	0.99	5	0.6	3
	5.2 Total Harmonic Distortion (THD)	>10W = <20%		>100W = <10%		>300W = <5%	5	0.3	1.5
	5.3. Driver lifetime	30@80°Tc	50@80°Tc	75 @80°Tc	100@80°Tc	150 @80°Tc	5	0.6	3
	5.4. Thermal protection of drivers	yes (1)	no (0)				1	2.8	2.8
	5.5. Dimming level with +80% efficacy	at 80% output	at 60% output	at 40% output	at 20% output	at 1% output	5	0.9	4.5
	5.6. Flicker	<3%	<1%	IEEE1789 Low risk	IEEE1789 No effect	IEEE1789 Low risk with 6dB margin (half)	5	0.5	2.5
	5.7. Standby power	>1W		<1W		=0W	5	0.1	0.5
6. Materials	6.1. Recycled luminaire materials	>10%	>30%	>50%	>70%	>90%	5	0.2	1
	6.2. Recycled drivers materials	>1%	>5%		15%	>20%	5	0.5	2.5
								TOTAL	100

Double Page Mode
Goto First Page

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Materials Responsibility:
Product Circularity Data Sheet

- Manufacturer Tool
- 3-Party Verification
- T/F Questions determine level of Circularity in 5 categories

SECTIONS			STATEMENTS (EXAMPLES)
1		GENERAL INFORMATION	
2		COMPOSITION	THE PRODUCT CONTAINS > 75-95 % POST-CONSUMER RECYCLED CONTENT BY WEIGHT THE PRODUCT DOES NOT CONTAIN SUBSTANCES OF VERY HIGH CONCERN FROM THE REACH CANDIDATE LIST IN CONCENTRATION ABOVE 0.1% BY WEIGHT
3		DESIGNED FOR BETTER USE	THE PRODUCT CAN BE MAINTAINED & REPAIRED BY UNTRAINED PERSONNEL AT THE LOCATION OF THE PRODUCT USE
4		DESIGNED FOR DISSASSEMBLY	THE PRODUCT IS DESIGNED TO BE INSTALLED AND DEMOUNTED USING REVERSIBLE CONNECTORS
5		DESIGNED FOR RE-USE	THE PRODUCT IS DESIGNED FOR RE-USE AS-IS OR WITH MINIMAL MODIFICATION THE PRODUCT IS DESIGNED FOR COMPOSTING IN A HOME COMPOSTER

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Key Elements: Health, Wellness, Social Responsibility


ROBERTS CENTER
FOR PEDIATRIC RESEARCH


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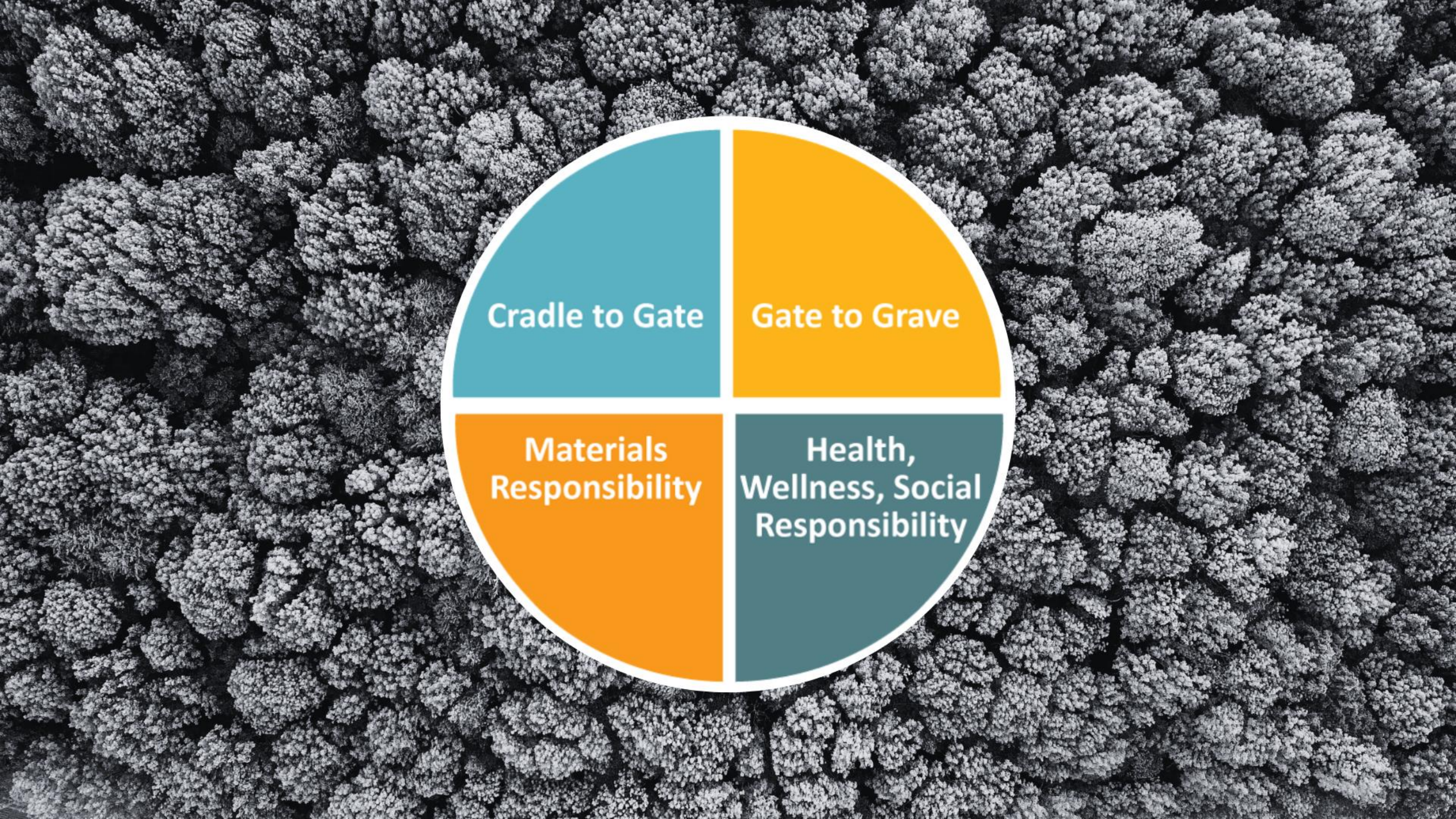
Cradle to Gate
Gate to Grave
Materials Responsibility
Health, Wellness, Social Responsibility

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This concludes The American Institute of Architects Continuing Education Systems Course

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