

**Welcome! We will begin shortly.**

**This presentation was brought to you by:**



**This workshop is funded by California utility customers and administered by PG&E, SCE, SCG, and SDG&E under the auspices of the California Public Utilities Commission.**

# CALGreen & USGBC LEED v4

## “Understanding and Implementation”

### UC CSU IOU Energy Efficiency Partnership Program



September 24, 2018 / 8:00 – 4:pm UCI  
November 19, 2018 / 8:00 – 4:pm UCSF

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# CALGreen & USGBC LEEDv4

Credit(s) earned on completion of this course will be reported to AIA CES for AIA members.

Certificates of Completion for both AIA members and non-AIA members are available upon request.

This course is registered with AIA CES for continuing professional education. As such, it does not include content that may be deemed or construed to be an approval or endorsement by the AIA of any material of construction or any method or manner of handling, using, distributing, or dealing in any material or product.

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



## “Understanding and Implementation” UC CSU IOU Energy Efficiency Partnership Program



# CALGreen & USGBC LEEDv4

Credit(s) earned on completion of this course may *also* be self reported to ICC and USGBC.

Certificates of Completion are available upon request.

Report CE hours for Green Associate and Specialty Credentials at: <http://www.usgbc.org/cm/report>

Report CEU's for ICC Certificate Renewals at: <http://www.iccsafe.org/myicc/>



**“Understanding and Implementation”  
UC CSU IOU Energy Efficiency Partnership Program**



# CALGreen & USGBC LEEDv4

## Learning Objectives:

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

- Learn what's new in CALGreen and in LEED v4
- Learn how to save time and money on LEED certification by using the same documentation for select CALGreen mandatory measures and LEED credits
- Understand the energy efficiency differences & similarities of CALGreen and LEED v4
- Learn about the latest updates and upcoming developments in the green building section of UC's Sustainability Practices Policy
- Review relevant UCOP Facilities Manual References
- Utility Energy Efficiency Partnership Opportunities





# CALGreen & USGBC LEEDv4



# CALGreen 2013 & USGBC LEEDv4

## StopWaste.Org

- Public agency governed by the Alameda County Waste Management Authority, the Alameda County Source Reduction and Recycling Board, and the Energy Council.



**Wes Sullens, LEED Fellow**  
Director, Codes Technical Development

2101 L St, NW, Suite 500  
Washington, DC 20037

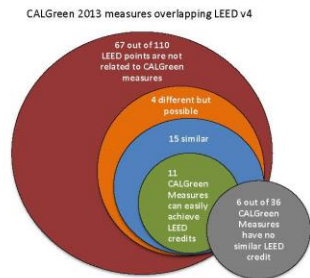
Direct 202 297-4229  
Email [wsullens@usgbc.org](mailto:wsullens@usgbc.org)

[www.usgbc.org](http://www.usgbc.org)

CALGreen 2013 Nonresidential Mandatory Measures Comparison to LEED Version 4 - Snapshot Chart

The following is a comparative analysis between the 2013 Nonresidential California Green Building Standards Code (CALGreen 2013) and the third party rating system "Leadership in Energy and Environmental Design - Building Design & Construction, New Construction version 4" (LEED v4). The analysis only compares CALGreen 2013 code mandatory measures against LEED v4 prerequisites & credits that have aligned or similar intent. The purpose of the comparison is to identify the number of LEED points that can be achieved on a new construction project when meeting the requirements of CALGreen 2013 code mandatory measures.

This comparative analysis includes assumptions for LEED and CALGreen, as determined by industry-leading Green Building experts. Actual LEED v4 points achieved may vary depending on a multitude of project specific circumstances. The following comparison should only be used as a reference for evaluation purposes.



KEY

	LEED points that can easily be achieved by meeting the CALGreen Requirements. Exact or similar standards overlap by comparison.
	Additional LEED points that can be achieved with minimal changes. LEED standards are slightly different than CALGreen.
	Additional LEED points that can be achieved with major changes. LEED standards are significantly different than CALGreen.
	CALGreen Measures for which there is no LEED overlap.

CALGreen 2013 New Building Mandatory Measures and LEEDv4 - Comparison

Code/ Rating System	Measure or Credit Number	CALGreen 2013 Mandatory Measure LEEDv4 Prerequisite/Credit	Points for LEED Standards that meet or exceed CAL Green	Points for LEED standards ≠ CAL Green, but which are achievable with some changes	Points for LEED standards that are significantly different than CAL Green
CALGreen 2013	5.106.1	Storm Water Soil Loss Prevention Plan	0		
LEEDv4	SSp1	Prerequisite: Construction Activity Pollution Prevention			
CALGreen 2013	5.106.4.1	Short-Term and long-term bicycle parking			1
LEEDv4	LT6	Bicycle Facilities			
CALGreen 2013	5.106.5.2	Designated Parking			2
LEEDv4	LT7	Reduced Parking Footprint			
	LT8	Green Vehicles			
CALGreen 2013	5.106.8	Light Pollution Reduction	1		
LEEDv4	SS6	Light Pollution Reduction			
CALGreen 2013	5.106.10	Grading and Paving			
LEEDv4	N/A	N/A			
CALGreen 2013	5.201.1	Energy Efficiency		2	16
LEEDv4	EAp2	Minimum Energy Performance (Title 24 part 6 - 2013)			
	EAc1	Optimize Energy Performance			
CALGreen 2013	5.303.1	Water Meters and Submeters	1		
LEEDv4	WEp3	Prerequisite: Building Level Water Metering			
	WEc4	Water Metering			
	5.303.2	Water Reduction			
CALGreen 2013	5.303.3	Water Conserving Plumbing Fixtures and Fittings		4	2
	5.303.4	Wastewater Reduction			
LEEDv4	WEp2	Prerequisite: Indoor Water Use Reduction			
	WEc2	Indoor Water Use Reduction 25 - 50%			
	5.304.1	Water budget			
CALGreen 2013	5.304.2	Outdoor Potable Water Use		2	
	5.304.3	Irrigation Design			
LEEDv4	WEp1	Prerequisite: Outdoor Water Use Reduction			
	WEc1	Outdoor Water Use Reduction			
CALGreen 2013	5.407.1	Weather Protection			
LEEDv4	N/A	N/A			
CALGreen 2013	5.407.2	Moisture Control: Sprinklers, entries and openings, flashings			
LEEDv4	N/A	N/A			

# CALGreen 2016 & USGBC LEEDv4

- Prepared by Atelier Ten and Urban Fabrick for the City of San Francisco
- Today's speakers from Atelier Ten and Urban Fabrick include:

**Kyle Pickett, MSOD**

Co-founder & COO

URBAN FABRICK Inc.

(415) 738-2334, [kyle@urbanfabrick.com](mailto:kyle@urbanfabrick.com)

**Emilie Hagen, LEED Fellow**

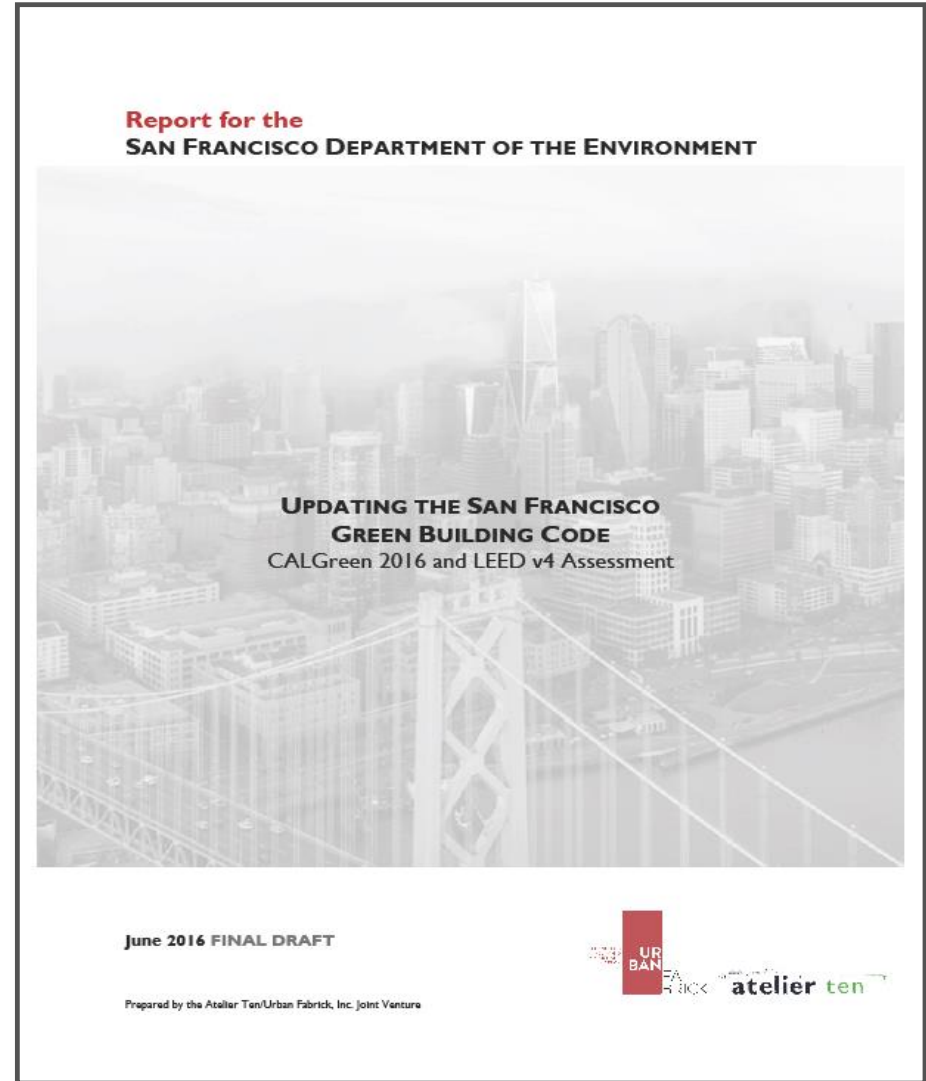
Associate Director

Atelier Ten

(415) 351-2100 x109,

[emilie.hagen@atelierten.com](mailto:emilie.hagen@atelierten.com)

**[Download full report here.](#)**



# **CALGreen AND LEEDv4 UC POLICY**

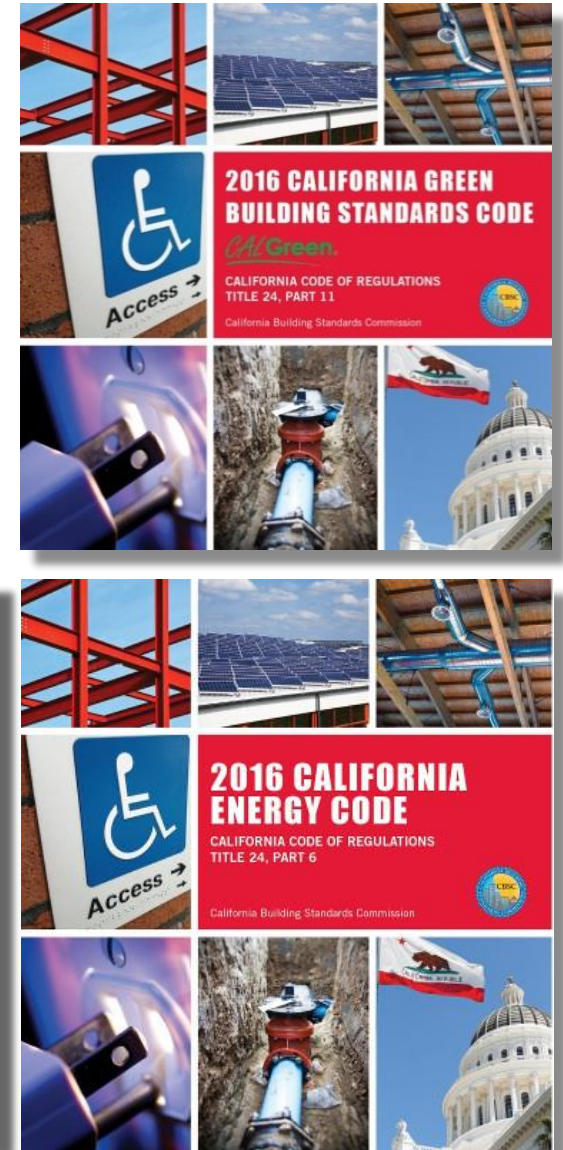
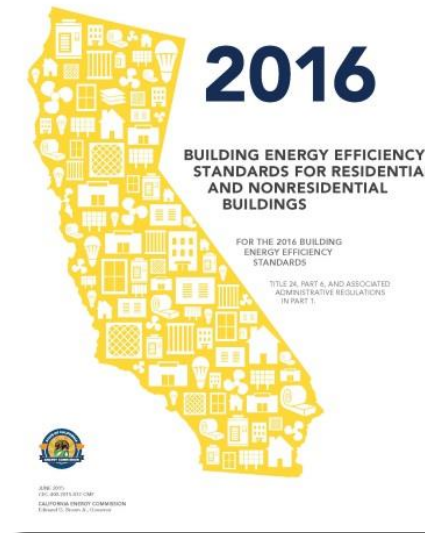


# CALGreen & USGBC LEEDv4

## UCOP Facilities Manual

### Code & Regulation:

- All Facility projects and construction projects must comply with all applicable state building code requirements and all applicable local, state and federal agency regulation and UC Policies.



# FACILITIES MANUAL

## EDPA – EXECUTIVE DESIGN PROFESSIONAL AGREEMENT

### EXAMPLE OF EXHIBIT X

for the  
AMENDMENT OF THE EXECUTIVE DESIGN AGREEMENT  
between  
THE REGENTS OF THE UNIVERSITY OF CALIFORNIA  
and

dated \_\_\_\_\_, to act as Design Professional for the University of California,  
{Campus}, is hereby amended as follows:  
Select the appropriate amendment(s)

#### GREEN BUILDING DESIGN

1. The Design Professional shall incorporate green building strategies into the design needed to meet the credits listed as baseline in the University Green Building Baseline form in the Exhibits {University's Campus Green Building Baseline}. The Design Professional shall incorporate additional strategies into the design as needed to achieve a minimum Silver level certification under the {University's program equivalent to the} United States Green Building Council's (USGBC) LEED program.
2. The proposed design shall outperform Title 24 energy standards by 30%. If process loads are present, recommend strategies to reduce process loads to 20% less than expected for a building designed to current institutional standards.
3. Design Professional shall prepare and/or assist with the preparation of credit documentation for this program. OPTIONAL: Design Professional shall collect LEED documentation from the University indicated as the University's responsibility on the Green Building Baseline in the Exhibits, combine it with their own documentation and make the submittals to the USGBC.
4. The following provision is added to this Agreement:  
University Representative: Detail the specific provisions.

All terms and conditions of this Agreement shall remain in full force and effect unless expressly modified herein or by another duly executed Amendment.

Delete the section break and the note below if the Amendment can fit on one page

\* Signature located on the following page

# FACILITIES MANUAL

## EDPA – EXECUTIVE DESIGN PROFESSIONAL AGREEMENT

University of California, Santa Cruz

Campus Green Building  
Baseline Narrative

Submitted To:  
University of California  
Office of the President  
Facilities Administration  
Planning, Design and Construction

June 30, 2005  
Revision 1: August 29, 2005

Submitted By:  
Office of Physical Planning and Construction  
University of California  
Santa Cruz



Frank Zwart, AIA  
Campus Architect  
Associate Vice Chancellor  
Physical Planning and Construction

# UCOP Facilities Manual Contact Information

**For questions about the Facilities Manual, please contact:**

**Josephine Ortega, A.I.A, C.B.O, LEED AP**

Construction Specialist, Construction Services

University of California Office of the President

[Josephine.Ortega@ucop.edu](mailto:Josephine.Ortega@ucop.edu)

(510) 287-3852

**For Questions about design/construction contract templates, please contact:**

**Yvonne Li, J.D., LL.M.**

Contracts Specialist, Construction Services

University of California Office of the President

[Yvonne.Li@ucop.edu](mailto:Yvonne.Li@ucop.edu)

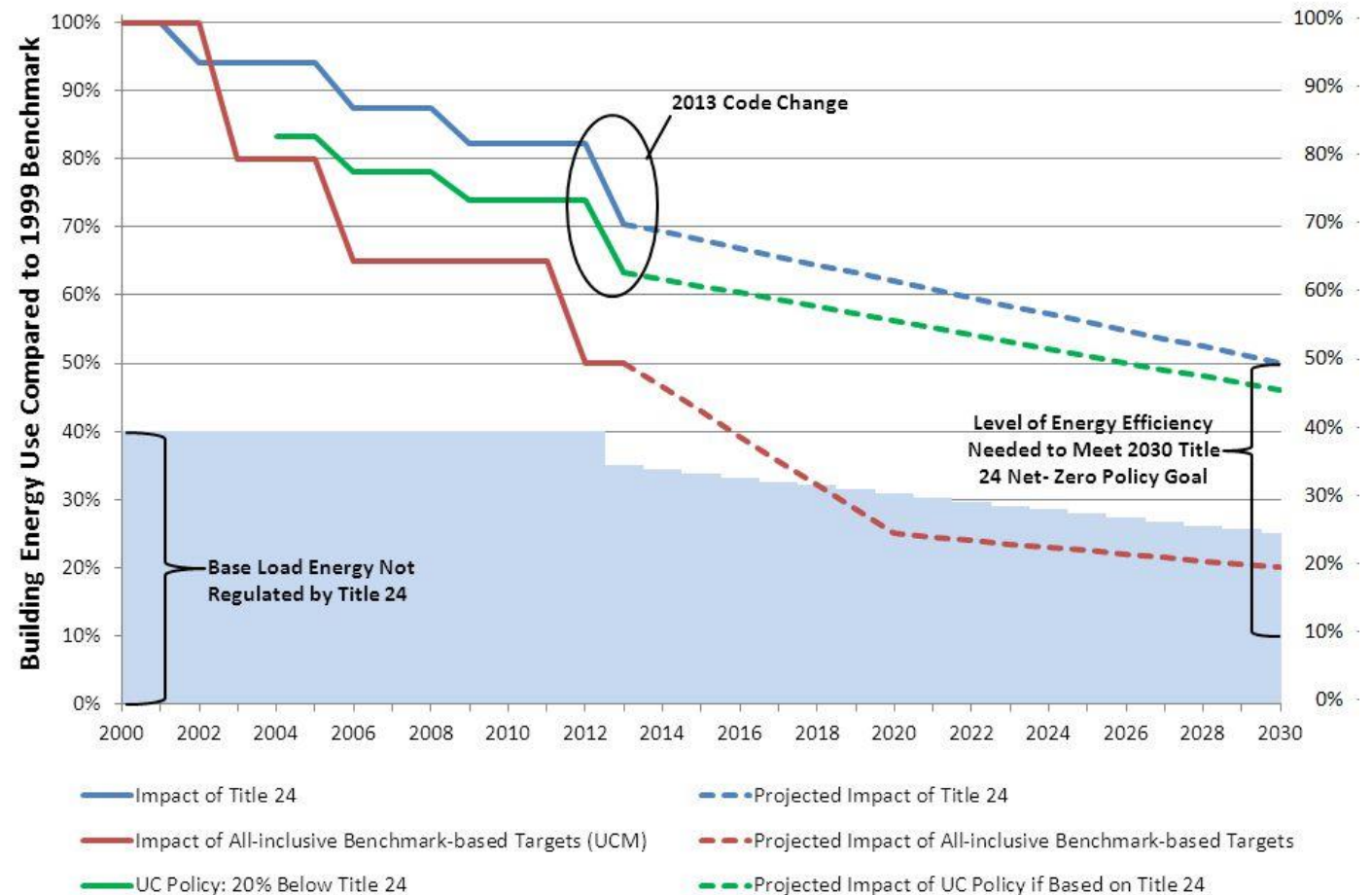
(510) 287-3843

# University of California

## Sustainability Policy

- **Alternative compliance path using whole-building, benchmark-based energy performance targets**
- **New policy calling for no onsite fossil fuel combustion for space and water heating in new buildings that aren't connected to an existing central thermal plant**
- **Life-cycle cost analysis and more daylighting of long-term energy planning considerations in capital projects**

## Benefits of Whole-Building Energy Performance Targets



# **CALGreen AND LEEDv4 CSU POLICY**



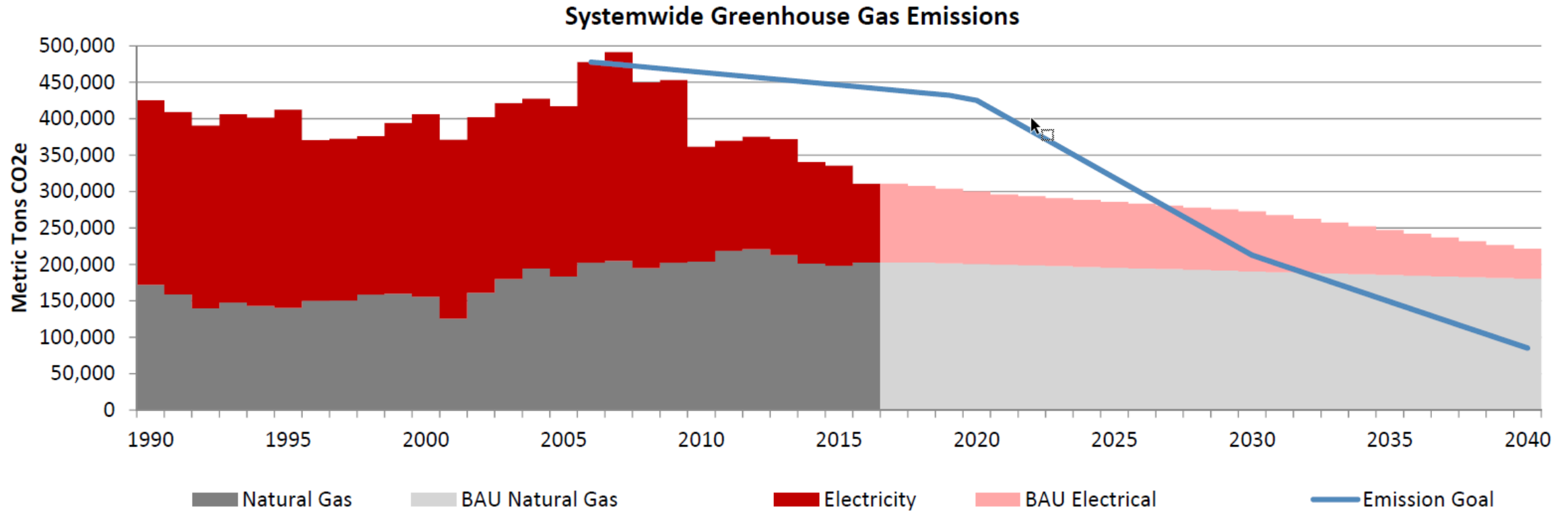
# 2020 CSU sustainability policy and campus-level green building practices

**Presenters: Caitlin Steele & Nick Kordesch  
San Francisco State University**

# CSU Sustainability Policy

- 2014 sustainability policy: LEED Silver or equivalent
- 2020 policy (DRAFT):
  - systemwide carbon neutrality by 2045
  - no new investment in GHG-producing infrastructure
  - flexible approach relying on AASHE STARS baseline





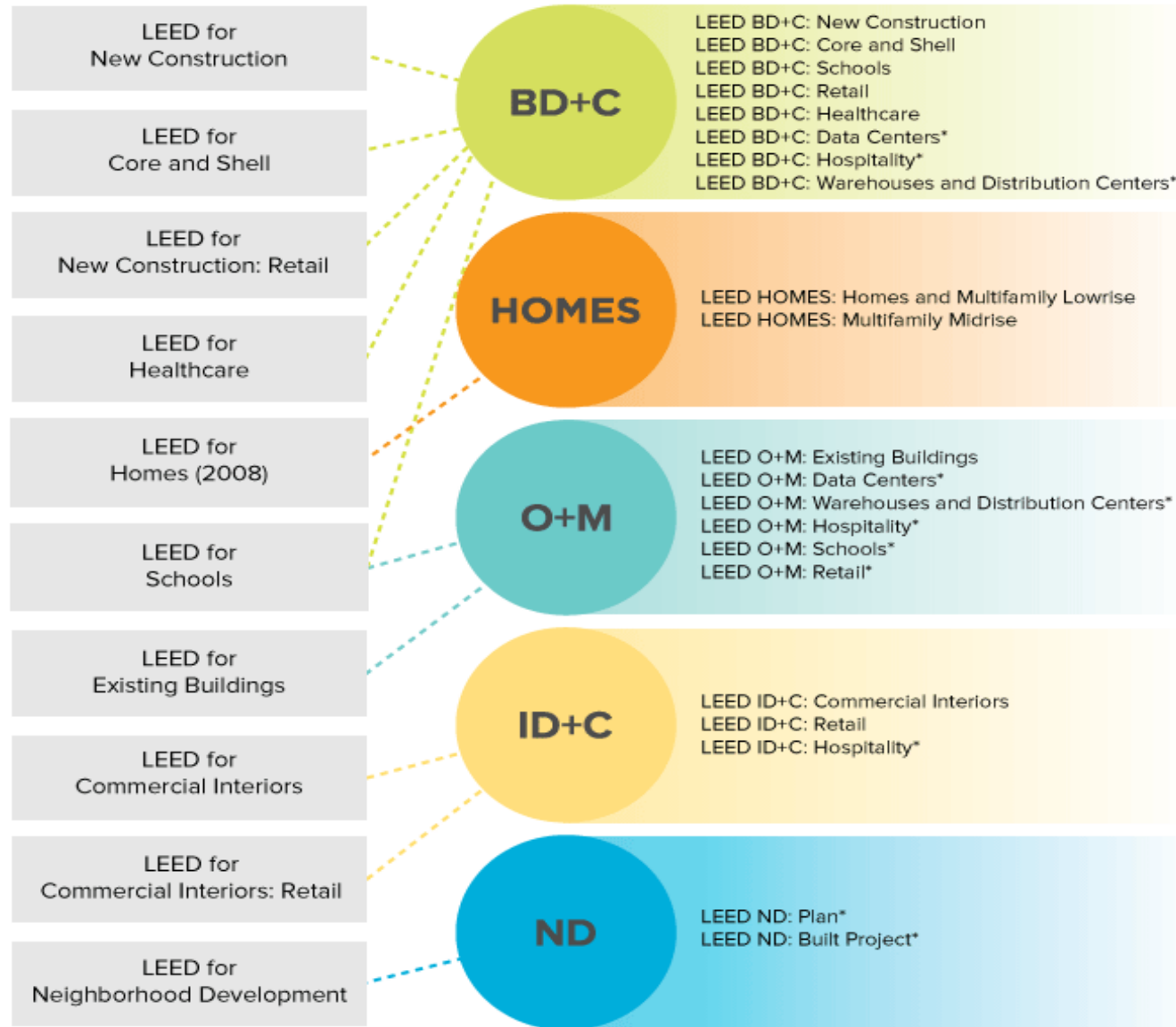
# **LEEDv4**

## **WHAT'S NEW?**

# 2009

# v4

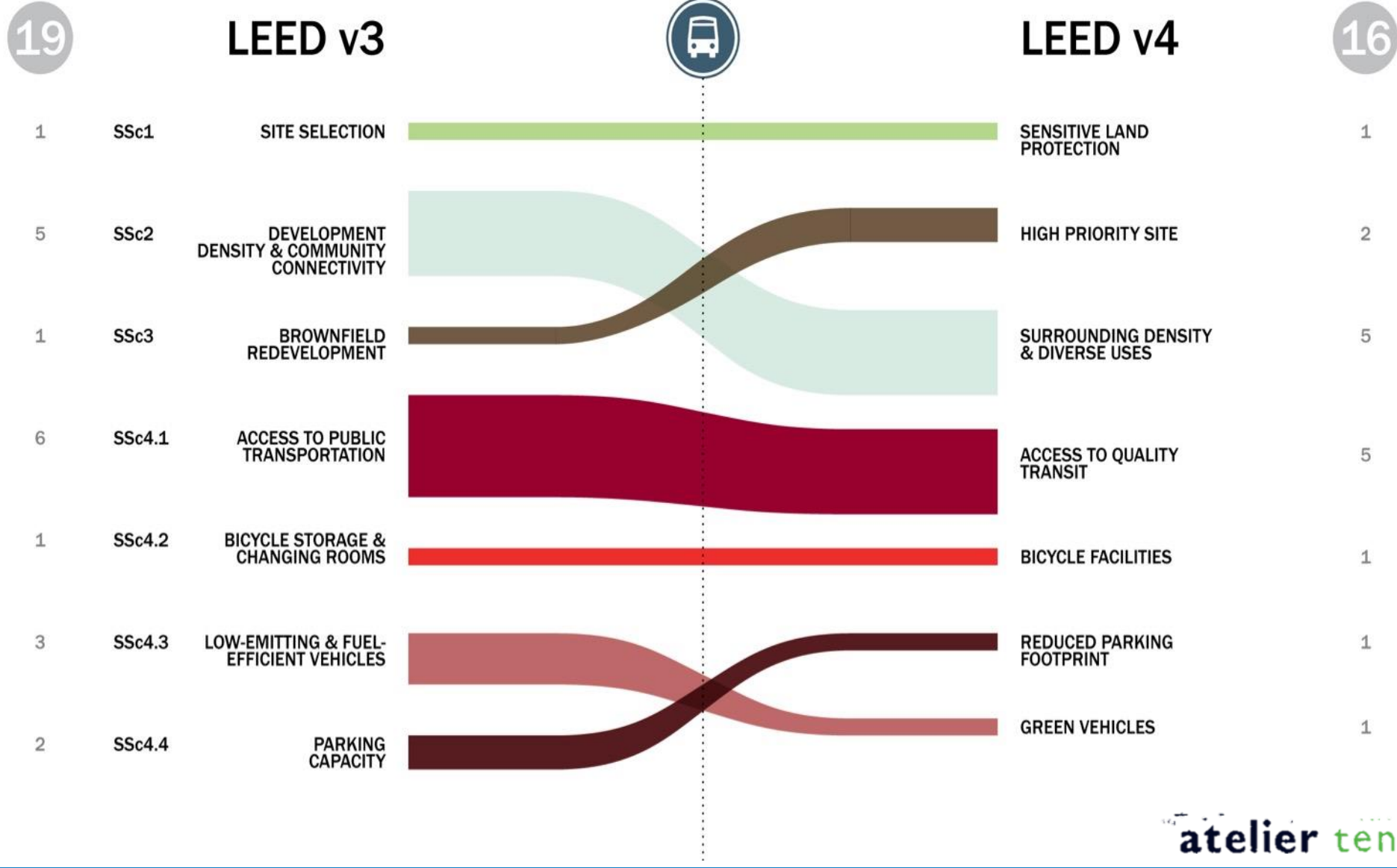
\* denotes new for v4



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# LOCATION & TRANSPORTATION



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# SUSTAINABLE SITES

7

LEED v3



LEED v4

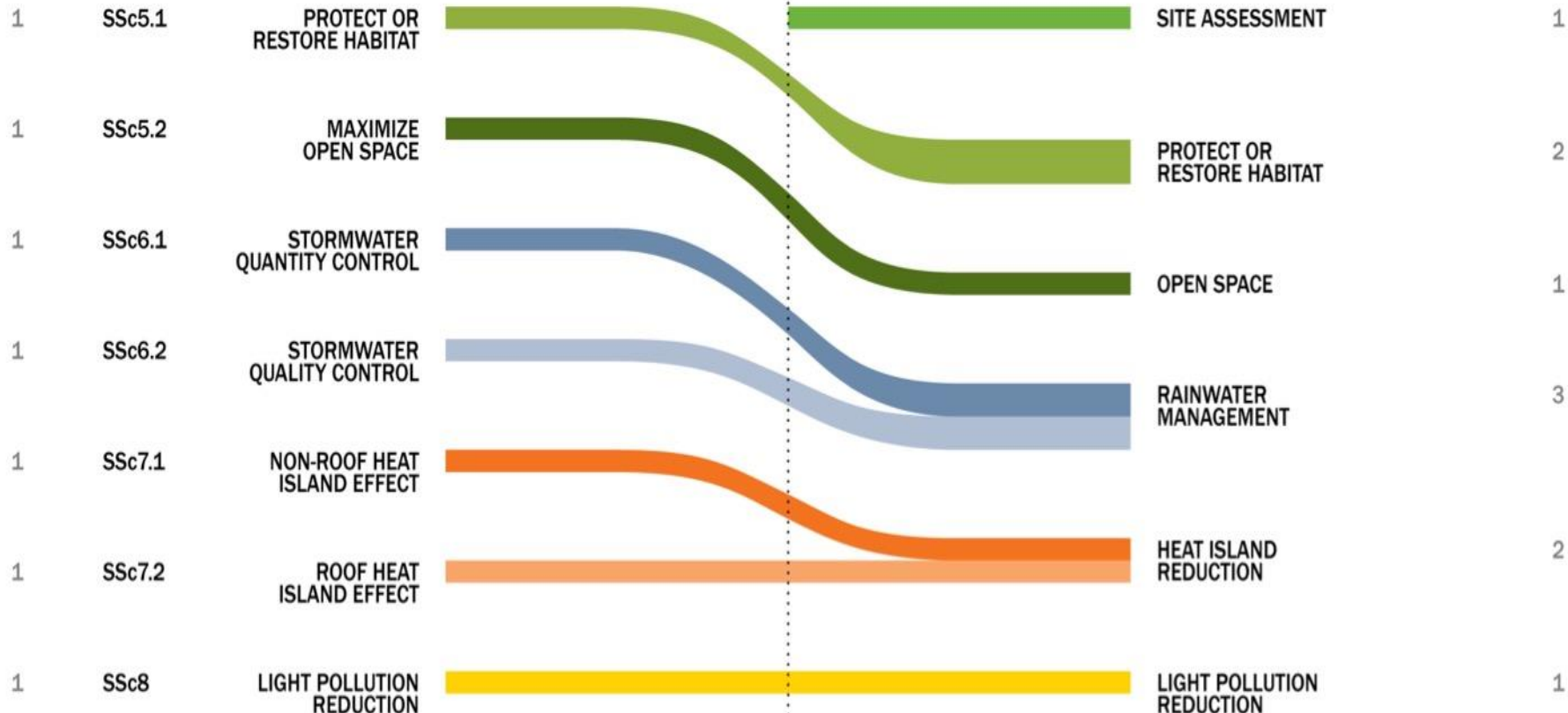
10

PREREQUISITES

SSp1 CONSTRUCTION ACTIVITY POLLUTION PREVENTION

CONSTRUCTION ACTIVITY POLLUTION PREVENTION

CREDITS



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# WATER EFFICIENCY

10

LEED v3



LEED v4

11

PREREQUISITES

WEp1

WATER USE REDUCTION

OUTDOOR WATER USE REDUCTION

INDOOR WATER USE REDUCTION

BUILDING LEVEL WATER METERING

CREDITS

4

WEc1

WATER EFFICIENT LANDSCAPING

OUTDOOR WATER USE REDUCTION

2

2

WEc2

INNOVATIVE WASTEWATER TECHNOLOGIES

WATER USE REDUCTION

6

COOLING TOWER WATER USE

2

4

WEc3

WATER USE REDUCTION

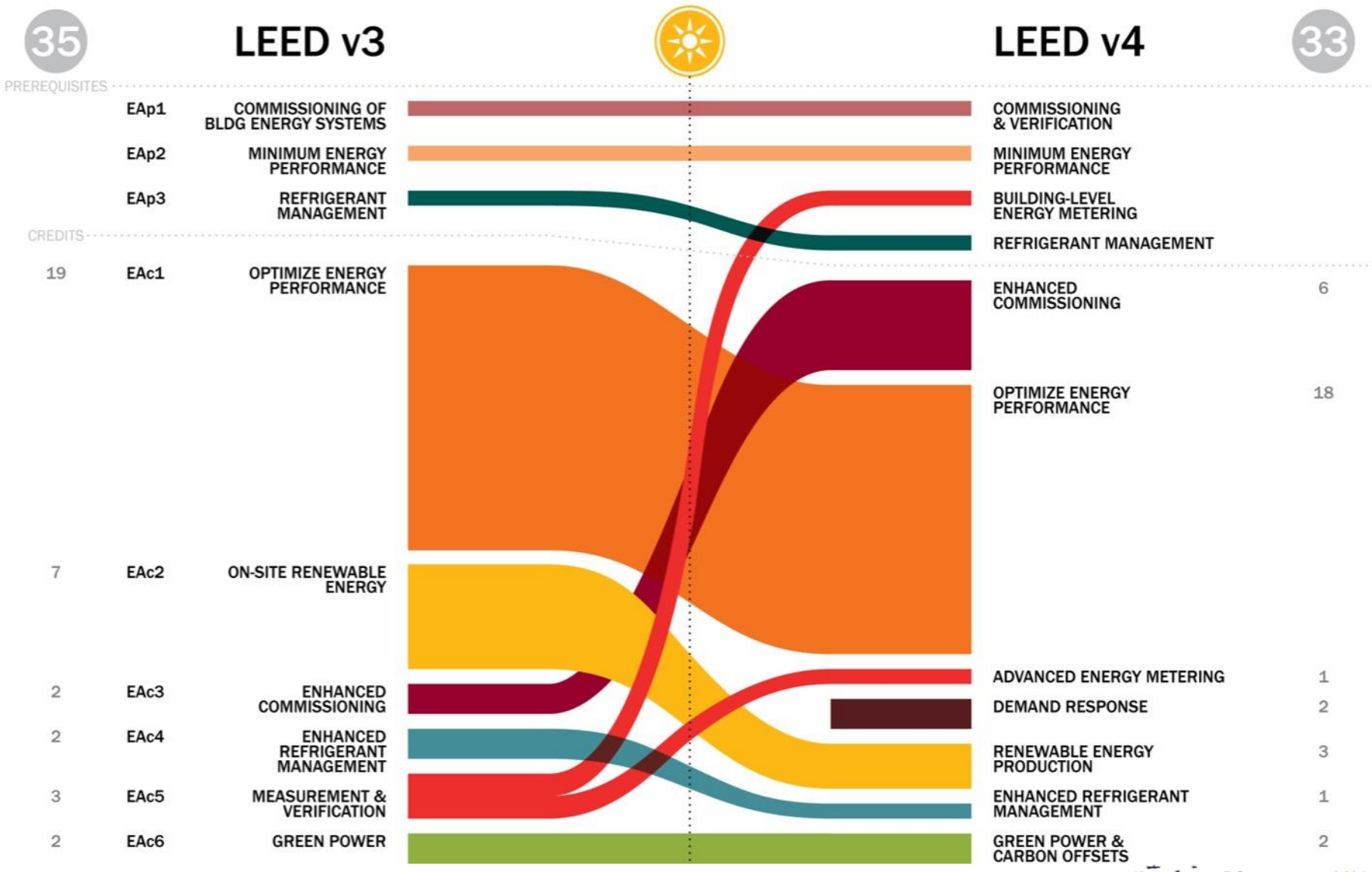
WATER METERING

1

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# ENERGY & ATMOSPHERE



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# MATERIALS & RESOURCES

14

LEED v3



LEED v4

13

PREREQUISITES

MRp1 STORAGE & COLLECTION OF RECYCLABLES



STORAGE & COLLECTION OF RECYCLABLES

CONSTRUCTION & DEMOLITION WASTE MANAGEMENT PLANNING



CREDITS

3 MRc1.1 MAINTAIN EXISTING STRUCTURE



BUILDING LIFE-CYCLE IMPACT REDUCTION

5

1 MRc1.2 MAINTAIN EXISTING NON-STRUCTURAL ELEMENTS



2 MRc2 CONSTRUCTION WASTE MGMT



C+D WASTE MANAGEMENT

2

2 MRc3 MATERIAL REUSE



BUILDING PRODUCT DISCLOSURE — ENVIRO PRODUCT DECLARATION

2

2 MRc4 RECYCLED CONTENT



BUILDING PRODUCT DISCLOSURE — MATERIAL SOURCING

2

2 MRc5 REGIONAL MATERIALS



BUILDING PRODUCT DISCLOSURE — MATERIAL INGREDIENTS

2

1 MRc6 RENEWABLE MATERIALS



1 MRc7 CERTIFIED WOODS



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# INDOOR ENVIRONMENTAL QUALITY

15

LEED v3



LEED v4

16

PREREQUISITES

IEQp1	MINIMUM IAQ PERFORMANCE		MINIMUM INDOOR AIR QUALITY PERFORMANCE
IEQp2	ENVIRONMENTAL TOBACCO SMOKE CONTROL		ENVIRONMENTAL TOBACCO SMOKE CONTROL

CREDITS

1	IEQc1	OUTDOOR AIR DELIVERY MONITORING		ENHANCED INDOOR AIR QUALITY STRATEGIES	2
1	IEQc2	INCREASED VENTILATION			
1	IEQc3.1	IAQ MANAGEMENT PLAN (DURING CONSTRUCTION)		LOW-EMITTING MATERIALS	3
1	IEQc3.2	IAQ MANAGEMENT PLAN (BEFORE OCCUPANCY)		CONSTRUCTION INDOOR AIR QUALITY MANAGEMENT PLAN	1
1	IEQc4.1	ADHESIVES & SEALANTS			
1	IEQc4.2	PAINTS & COATINGS		INDOOR AIR QUALITY ASSESSMENT	2
1	IEQc4.3	FLOORING SYSTEMS			
1	IEQc4.4	COMPOSITE WOOD & AGRIFIBER PRODUCTS			
1	IEQc5	INDOOR CHEMICAL & POLLUTANT SOURCE CONTROL		THERMAL COMFORT	1
1	IEQc6.1	LIGHTING SYSTEM CONTROLLABILITY		INTERIOR LIGHTING	2
1	IEQc6.2	THERMAL COMFORT SYSTEM CONTROLLABILITY			
1	IEQc7.1	THERMAL COMFORT DESIGN		DAYLIGHT	3
1	IEQc7.2	THERMAL COMFORT VERIFICATION		QUALITY VIEWS	1
1	IEQc8.1	DAYLIGHT		ACOUSTIC PERFORMANCE	1
1	IEQc8.2	VIEWS			

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# INTEGRATIVE PROCESS

0

LEED v3



LEED v4

1

INTEGRATIVE PROCESS

1

# INNOVATION IN DESIGN

6

5

ID1

INNOVATION



INNOVATION

6

5

1

ID2

LEED ACCREDITED  
PROFESSIONAL

LEED ACCREDITED  
PROFESSIONAL

1

# REGIONAL PRIORITY

4

4

RP1

REGIONAL PRIORITY



REGIONAL PRIORITY

4

4

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# **LEEDv4 at UC CASE STUDY**

**UCSF Neuroscience Building**  
**Mark Cavagnero Associates + SmithGroupJJR**  
**LEED v4 BD+C New Construction**





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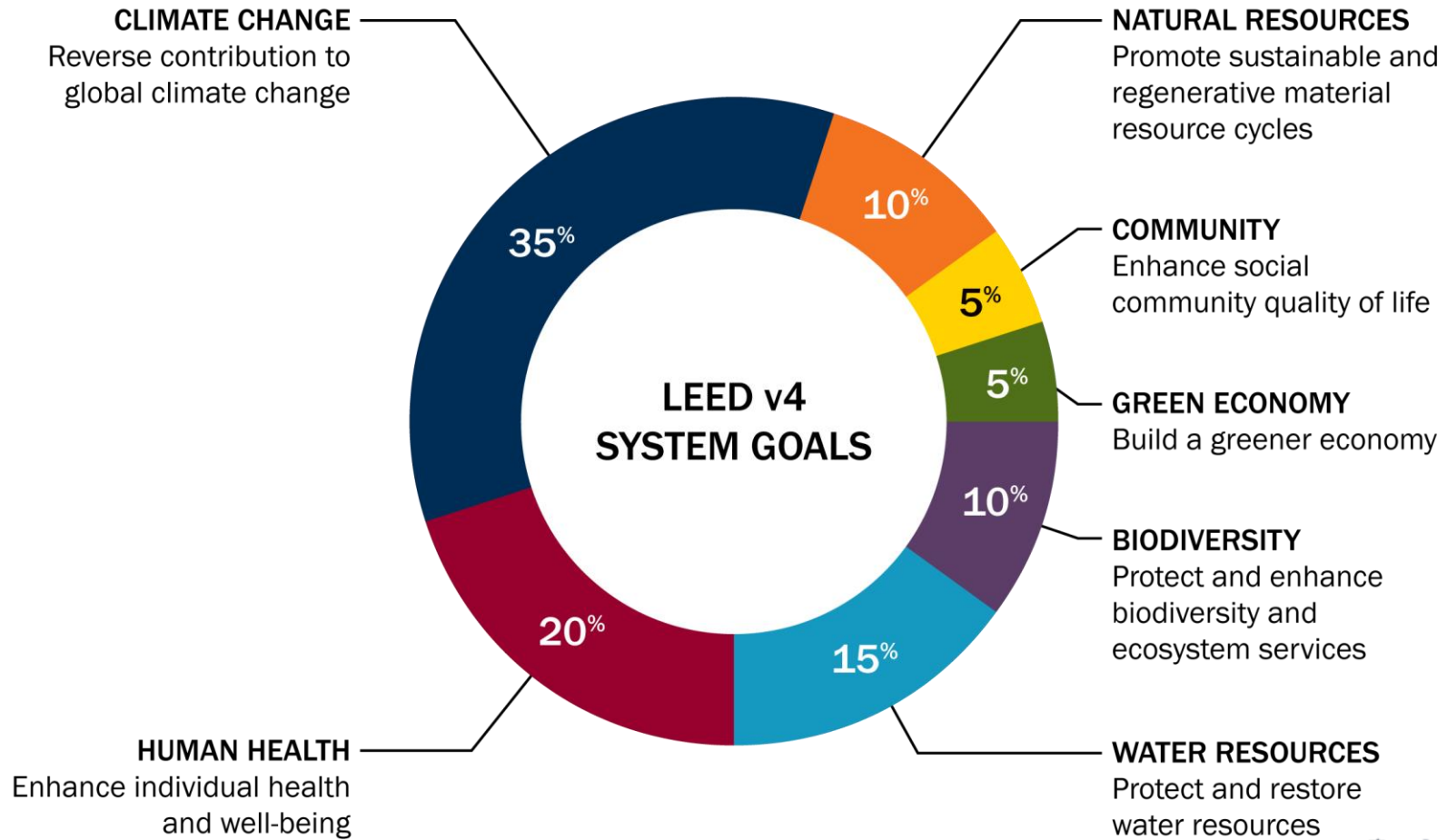






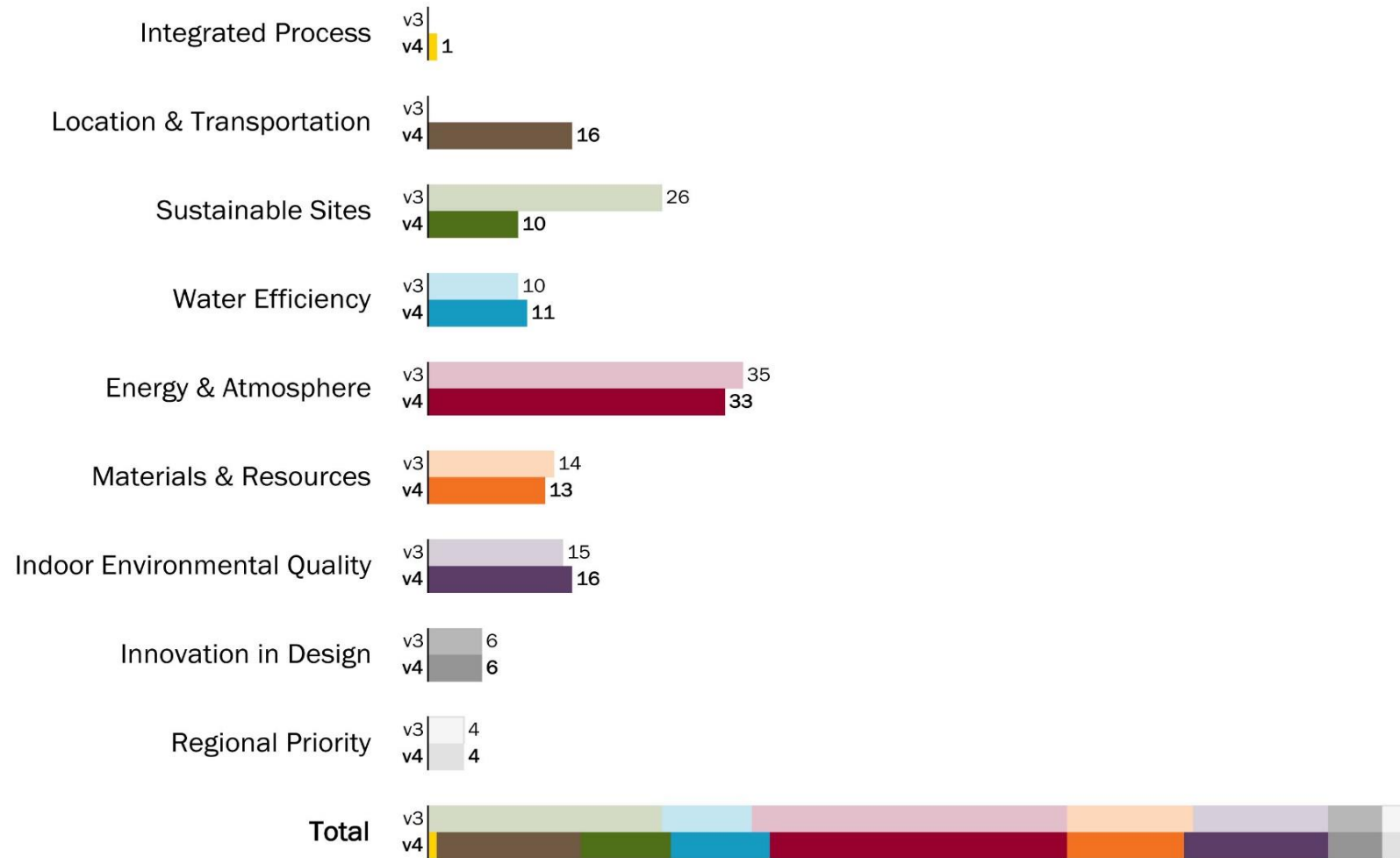
# LEED v4 System Goals

What should a LEED project accomplish?



# LEED v4: What's new? What's the same?

## LEED for New Construction Credit Categories - v2009 vs v4

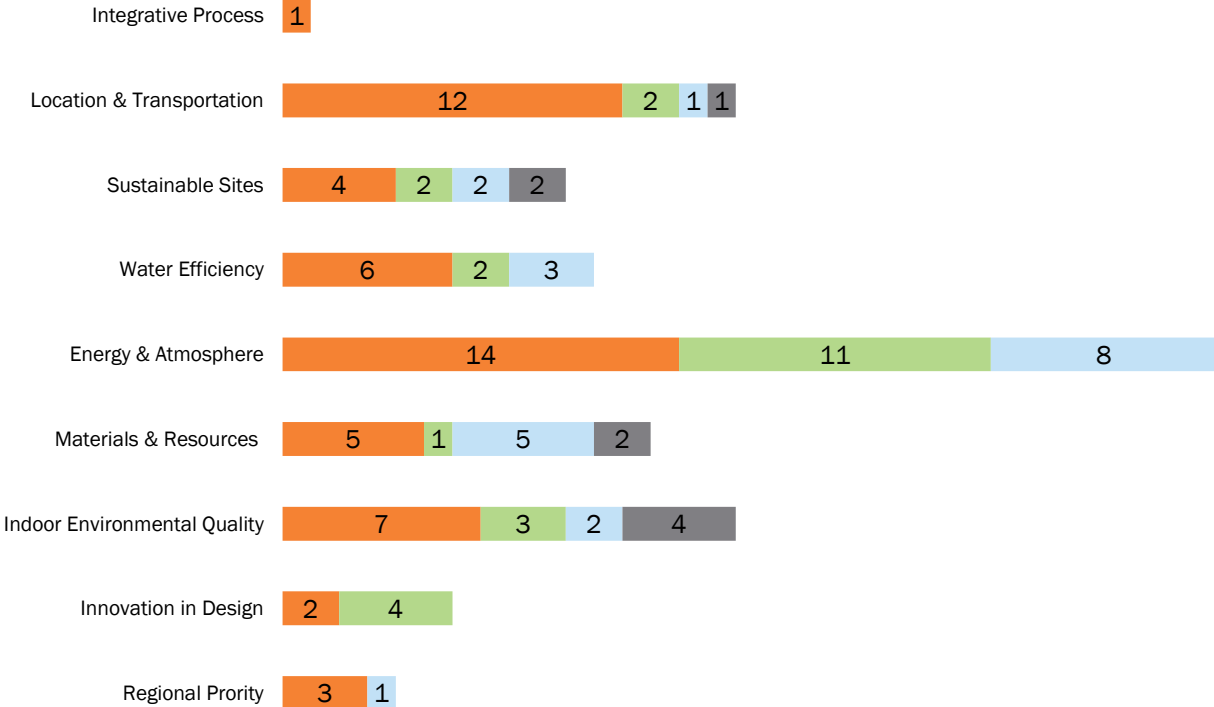




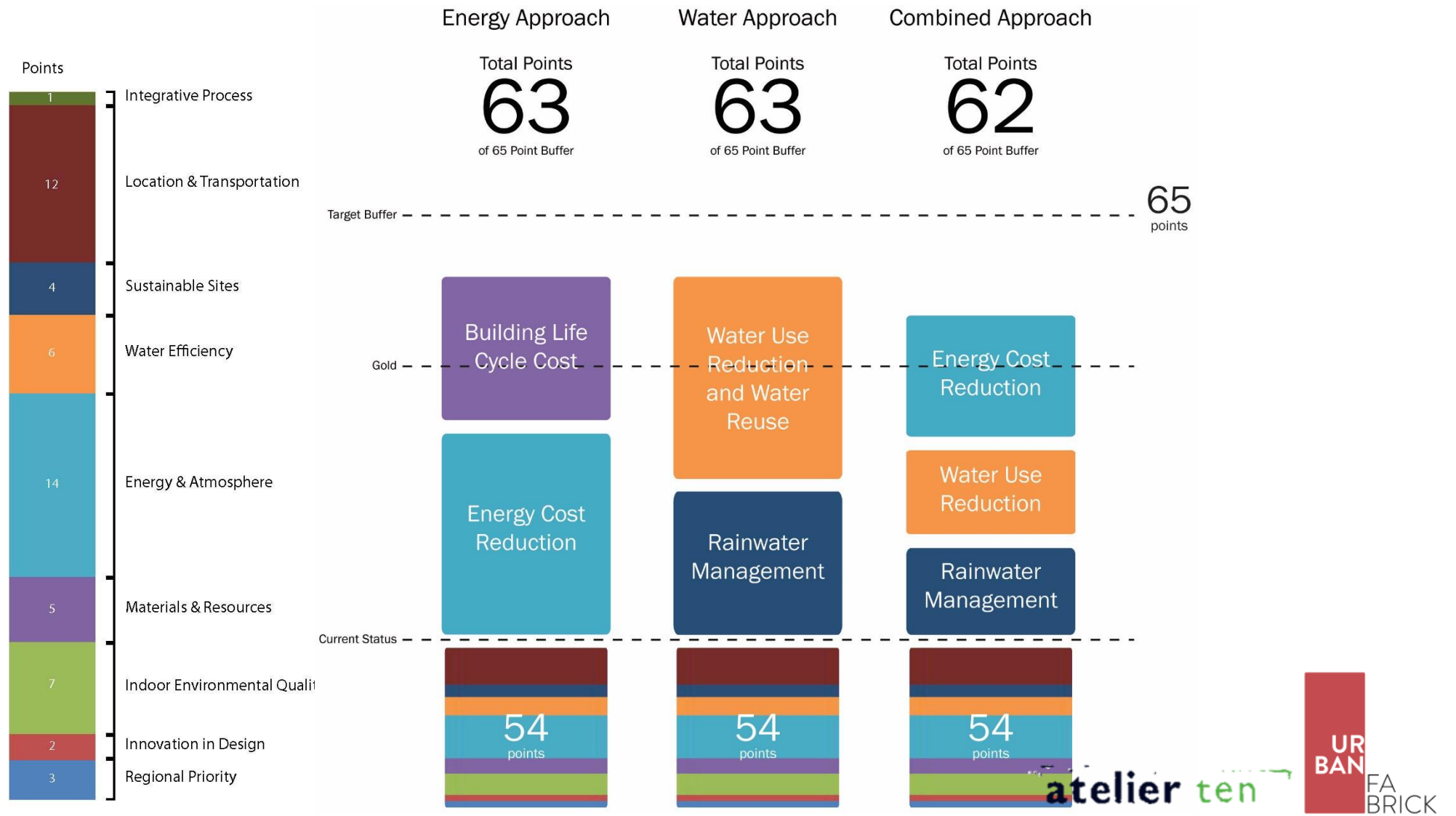
## LEED v4: Key Upgrades

- More pre-requisites (e.g. 30% outdoor water use reduction, energy and water metering)
- Integrative approaches to design
- Addresses building water use holistically, indoor and outdoor
- Focus on performance based evaluation: metering of energy and water
- Focus on holistic environmental performance of materials
- New material requirements: Building Product Disclosure & Optimization
- Low-emitting materials required to have VOC emissions testing
- Life Cycle Assessment approach

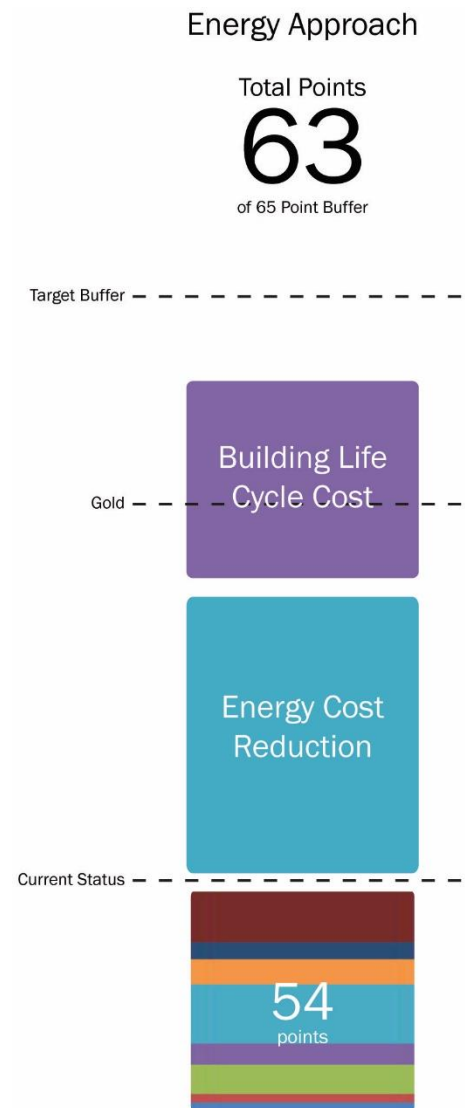
# LEED v4: Gold Approach



# LEED v4: Gold Approach



# LEED v4: Gold – Energy Approach



## Building Life Cycle Cost

Using a chilled beam system results in a reduction in envelope area. This reduction helps to reduce the overall building impact when conducting a life cycle assessment. This approach achieves 4 additional points.

## Energy Cost Reduction

Highly efficient systems and fixtures allow for the building to use less energy. The reduction results in a reduction in building energy costs. A 30% reduction achieves 5 additional points.



# LEED v4: Gold - Water Approach

## Water Use Reduction and Water Reuse

Highly efficient water fixtures combined with a rainwater and greywater reduction system allow the building to eliminate potable water use for irrigation and flushing. This approach achieves 6 additional points.

## Rainwater Management

A rainwater management plan allows for less runoff to leave the project site. Managing the runoff to the 98<sup>th</sup> percentile of regional or local rainfall events the project achieves an additional 3 points.

### Water Approach

Total Points

63

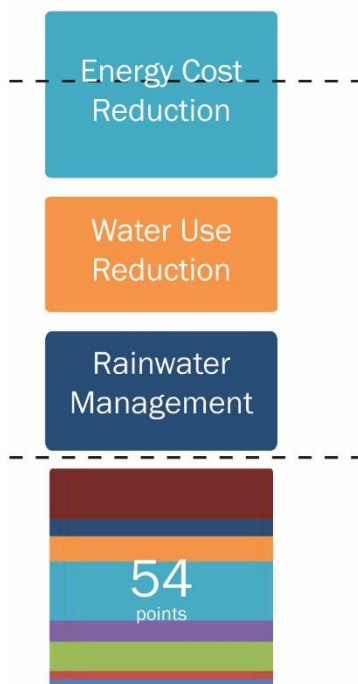
of 65 Point Buffer



# LEED v4: Gold – Combined Approach

## Combined Approach

Total Points  
**62**  
of 65 Point Buffer



## Energy Cost Reduction

Highly efficient systems and fixtures allow for the building to use less energy. The reduction results in a reduction in building energy costs. A 22% reduction achieves 1 additional points.

## Water Use Reduction

Highly efficient water fixtures allow the building to use less water. A 50% reduction in building water use over the baseline achieves 2 additional points.

## Rainwater Management

A rainwater management plan allows for less runoff to leave the project site. Managing the runoff to the 95<sup>th</sup> percentile of regional or local rainfall events the project achieves 2 additional point.

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**LET'S TAKE A BREAK**

# **LEEDv4 at CSU CASE STUDY**

**Cal State Los Angeles Administration Building**  
**ZGF Architects**  
**LEED v4 BD+C – Renovation project**



# Sustainability Priorities



**NET ZERO READY**



**USER EXPERIENCE /  
QUALITY WORKSPACE**



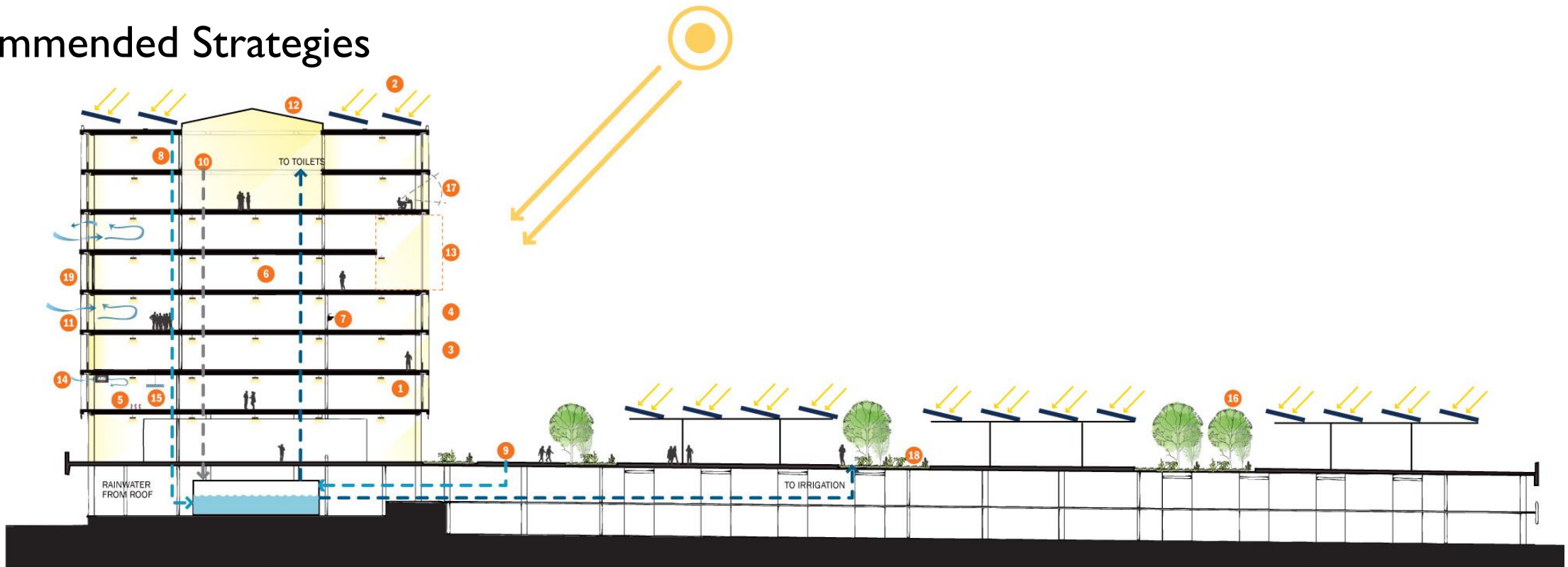
**PLAZA ACTIVATION & COMFORT**



**WATER CONSERVATION**



# Recommended Strategies

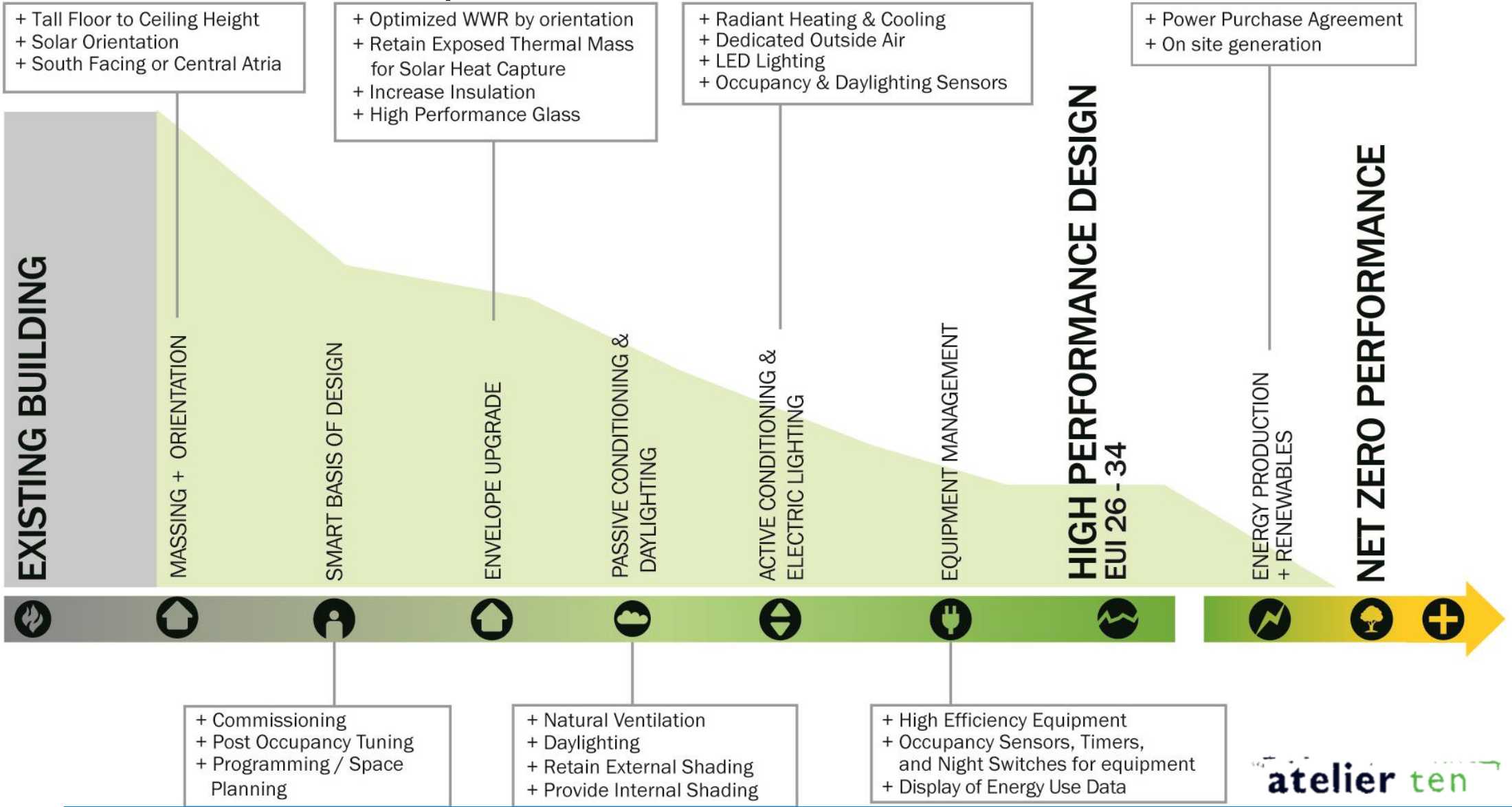


## POTENTIAL STRATEGIES

- 1 NATURAL DAYLIGHTING TO REGULARLY OCCUPIED SPACES
- 2 SOLAR PHOTOVOLTAIC (PV) ARRAY
- 3 HIGH-PERFORMANCE CLEAR GLAZING
- 4 RETAIN EXISTING EXTERIOR SHADING
- 5 EXPOSED THERMAL MASS
- 6 ENERGY EFFICIENT INTERIOR LIGHTING W/ CONTROLS
- 7 EFFICIENT FIXTURES
- 8 RAINWATER COLLECTION & REUSE
- 9 STORMWATER RETENTION WITH REUSE FOR IRRIGATION
- 10 GREYWATER COLLECTION WITH REUSE FOR FLUSHING & IRRIGATION
- 11 NATURAL VENTILATION WHEN AIR QUALITY ALLOWS
- 12 CENTRAL ATRIUM IN TOP TWO FLOORS
- 13 DOUBLE HEIGHT SOUTH FACING ATRIA
- 14 DE-COUPLED VENTILATION WITH ENERGY RECOVERY
- 15 RADIANT HEATING & COOLING
- 16 SHADE TREES: REDUCE HEAT ISLAND EFFECT & OUTDOOR THERMAL COMFORT
- 17 VIEWS TO OUTDOORS
- 18 VEGETATION FOR STORMWATER CONTROL & OUTDOOR THERMAL COMFORT
- 19 ENVELOPE INSULATION



# Path to Net Zero Ready





# LEED v4 Approach

## Cal State LA Admin Building

Achievability			
hi	med	low	NP
47	34	17	11

Certified 40 to 49 points Silver 50 to 59 points Gold 60 to 79 points Platinum 80 or more points  
 Achievability rating: Hi = 90%, Med = 60%, Low = 10%, NP = not possible.

### 64 Projected Points

Prerequisites					
Y				SS Prereq 1	Construction Activity Pollution Prevention
Y				WE Prereq 1	Outdoor Water Use Reduction: 30%
Y				WE Prereq 2	Indoor Water Use Reduction: 20%
Y				WE Prereq 3	Building-Level Water Metering
Y				EA Prereq 1	Fundamental Commissioning and Verification
Y				EA Prereq 2	Minimum Energy Performance
Y				EA Prereq 3	Building-Level Energy Metering
Y				EA Prereq 4	Fundamental Refrigerant Management
Y				MR Prereq 1	Storage & Collection of Recyclables
Y				MR Prereq 2	Construction and Demolition Waste Management Planning
Y				IEQ Prereq 1	Minimum IAQ Performance
Y				IEQ Prereq 2	Environmental Tobacco Smoke (ETS) Control

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# LEED v4 Approach

## Cal State LA Admin Building

Achievability			
hi	med	low	NP
47	34	17	11

Certified 40 to 49 points   Silver 50 to 59 points   Gold 60 to 79 points   Platinum 80 or more points  
 Achievability rating: Hi = 90%, Med = 60%, Low = 10%, NP = not possible.

### 64 Projected Points

1	0	0	0
1			

#### Integrative Process

IP Credit 1   Integrative Process

11	2	0	3
			16
			1
			2
5			
4	1		
1			
	1		
1			

#### Location & Transportation

LT Credit 1   LEED for Neighborhood Development Location  
 LT Credit 2   Sensitive Land Protection  
 LT Credit 3   High Priority Site  
 LT Credit 4   Surrounding Density and Diverse Uses  
 LT Credit 5   Access to Quality Transit  
 LT Credit 6   Bicycle Facilities  
 LT Credit 7   Reduced Parking Footprint  
 LT Credit 8   Green Vehicles

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# LEED v4 Approach

## Cal State LA Admin Building

Achievability			
hi	med	low	NP
47	34	17	11

Certified 40 to 49 points   Silver 50 to 59 points   Gold 60 to 79 points   Platinum 80 or more points  
 Achievability rating: Hi = 90%, Med = 60%, Low = 10%, NP = not possible.

### 64 Projected Points

4	2	1	3	Sustainable Sites	
1				SS Credit 1	Site Assessment
			2	SS Credit 2	Site Development: Protect or Restore Habitat
			1	SS Credit 3	Open Space
	2	1		SS Credit 4	Rainwater Management
2				SS Credit 5	Heat Island Reduction
1				SS Credit 6	Light Pollution Reduction

4	4	3	0	Water Efficiency	
1				WE Credit 1	Outdoor Water Use Reduction: 50% Reduction
	1			WE Credit 1	Outdoor Water Use Reduction: No Potable Water
3				WE Credit 2	Water Use Reduction: 25% / 30% / 35%
	3			WE Credit 2	Water Use Reduction: 40% / 45% / 50%
		2		WE Credit 3	Cooling Tower Water Use
		1		WE Credit 4	Water Metering

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# LEED v4 Approach

## Cal State LA Admin Building

Achievability			
hi	med	low	NP
47	34	17	11

Certified 40 to 49 points   Silver 50 to 59 points   Gold 60 to 79 points   Platinum 80 or more points  
 Achievability rating: Hi = 90%, Med = 60%, Low = 10%, NP = not possible.

### 64 Projected Points

7	19	3	4	Energy & Atmosphere	
3	1	2		EA Credit 1	Enhanced Commissioning
3				EA Credit 2	Optimize Energy Performance: 6% / 8% / 10%
	3			EA Credit 2	Optimize Energy Performance: 12% / 14% / 16%
	3			EA Credit 2	Optimize Energy Performance: 18% / 20% / 22%
	3			EA Credit 2	Optimize Energy Performance: 24% / 26% / 29%
	3			EA Credit 2	Optimize Energy Performance: 32% / 35% / 38%
	3			EA Credit 2	Optimize Energy Performance: 42% / 46% / 50%
		1		EA Credit 3	Advanced Energy Metering
			2	EA Credit 4	Demand Response
	3			EA Credit 5	Renewable Energy Production: 1% / 5% / 10%
1				EA Credit 6	Enhanced Refrigerant Management
			2	EA Credit 7	Green Power and Carbon Offsets

# LEED v4 Approach

## Cal State LA Admin Building

Achievability			
hi	med	low	NP
47	34	17	11

Certified 40 to 49 points Silver 50 to 59 points Gold 60 to 79 points Platinum 80 or more points  
 Achievability rating: Hi = 90%, Med = 60%, Low = 10%, NP = not possible.

### 64 Projected Points

6	3	3	0	<b>Materials &amp; Resources</b>	
2	3			MR Credit 1	Building Life-Cycle Impact Reduction
1		1		MR Credit 2	Building Product Disclosure & Optimization: Environmental Product Declarations
		2		MR Credit 3	Building Product Disclosure & Optimization: Sourcing of Raw Materials
1				MR Credit 4	Building Product Disclosure & Optimization: Material Ingredients
2				MR Credit 5	Construction & Demolition Waste Management: 50% / 75%

7	3	5	1	<b>Indoor Environmental Quality</b>	
1	1			IEQ Credit 1	Enhanced Air Quality Strategies
2	1			IEQ Credit 2	Low-Emitting Materials: 2 / 4 / 5 categories
1				IEQ Credit 3	Construction IAQ Management Plan
1		1		IEQ Credit 4	Indoor Air Quality Assessment
1				IEQ Credit 5	Thermal Comfort
1		1		IEQ Credit 6	Interior Lighting
		3		IEQ Credit 7	Daylight: 55% / 75%
	1			IEQ Credit 8	Quality Views
			1	IEQ Credit 9	Acoustic Performance



# LEED v4 Approach

## Cal State LA Admin Building

Achievability			
hi	med	low	NP
47	34	17	11

Certified 40 to 49 points   Silver 50 to 59 points   Gold 60 to 79 points   Platinum 80 or more points  
 Achievability rating: Hi = 90%, Med = 60%, Low = 10%, NP = not possible.

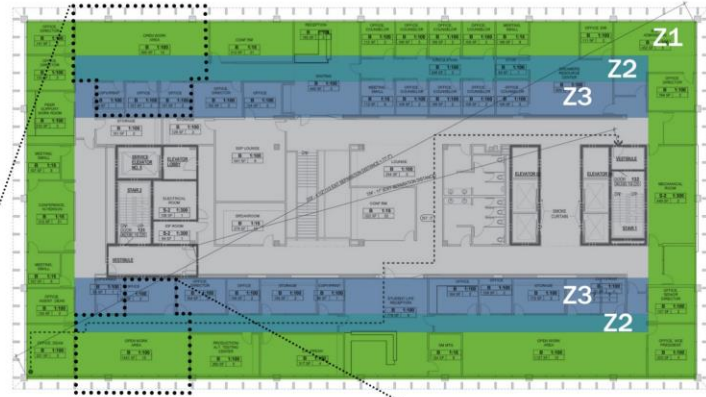
### 64 Projected Points

5	0	1	0	Innovation in Design	
1				ID Credit 1.1	Innovation in Design, Purchasing lamps
1				ID Credit 1.2	Innovation in Design, Green Building Education
1				ID Credit 1.3	Innovation in Design, PBT Source reduction Lead, cadmium and copper
1				ID Credit 1.4	Innovation in Design, Occupant comfort survey
		1		ID Credit 1.5	Innovation in Design, TBD
1				ID Credit 2	LEED™ Accredited Professional

2	1	1	0	Regional Priority	
1				RP Credit 1.1	Regional Priority, Access to quality transit
	1			RP Credit 1.2	Regional Priority, Rainwater Management
		1		RP Credit 1.3	Regional Priority, Optimise energy performance
1				RP Credit 1.4	Regional Priority, reduced parking footprint
				RP Credit	Regional Priority, Indoor water use reduction



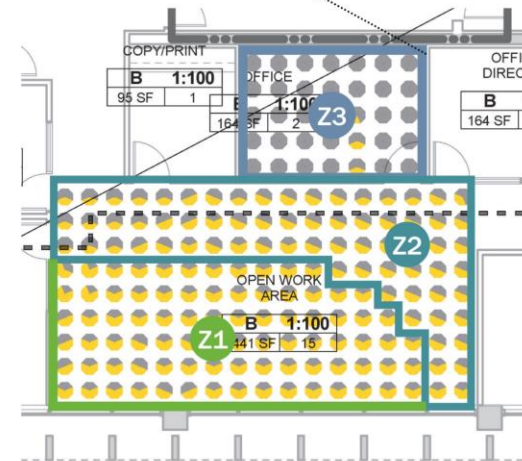
# Circadian Daylight



CIRCADIAN LIGHT ZONES - TYPICAL FLOOR PLATE



CIRCADIAN DAYLIGHT AVAILABILITY AT SOUTH WORKSTATIONS



CIRCADIAN DAYLIGHT AVAILABILITY AT SOUTH WORKSTATIONS

## Circadian Daylight Zones

See page 3 of this report for overall recommendations.

- Z1** PERIMETER ZONE
  - Medium to high circadian daylight availability.
  - Directional flexibility for workstation placement and orientation.
- Z2** INTERMEDIATE ZONE
  - Medium to low circadian daylight availability.
  - Lower flexibility for workstation placement and orientation.
- Z3** LOWER DAYLIGHT ZONE
  - Low circadian daylight availability.
  - Workstation placement restricted to areas with views through interior glazing to the outside.

■ DIRECTIONS AT GIVEN LOCATION THAT SATISFY WELL CIRCADIAN LIGHT PRECONDITION WITH DAYLIGHT

■ DIRECTIONS AT GIVEN LOCATION THAT DO NOT SATISFY THE WELL PRECONDITION WITH DAYLIGHT

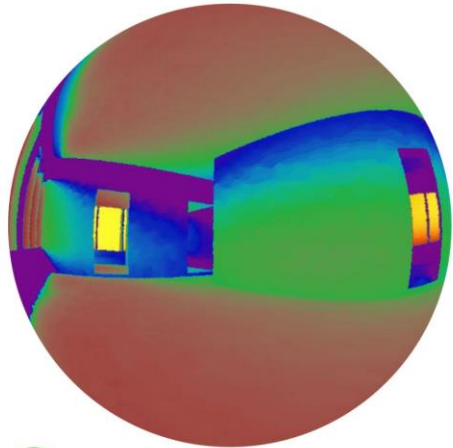
Note: This EML assessment focuses on daylight circadian availability only, not considering any contribution from electric light.



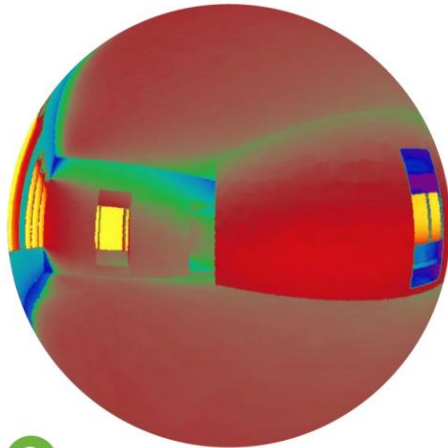
atelier ten

URBAN  
FA  
BRICK

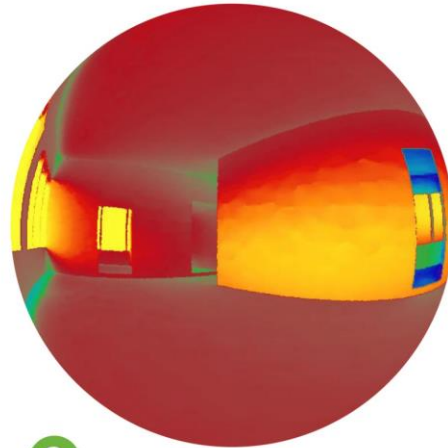
# Circadian Daylight



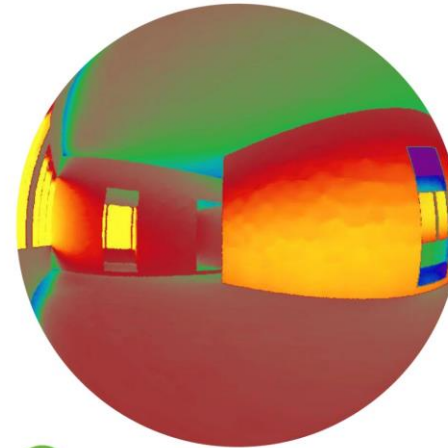
1 WHITE CEILING + WARM COLORED WALLS



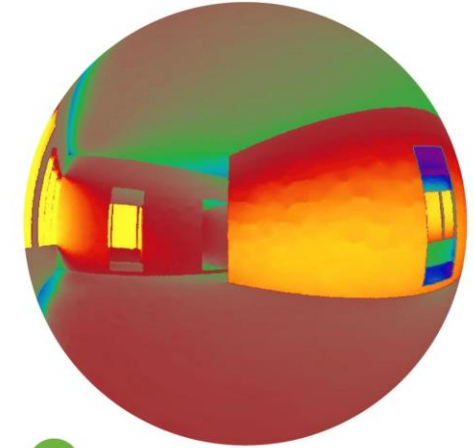
2 WHITE CEILING + COOL COLORED WALLS



3 WHITE CEILING + WHITE WALLS

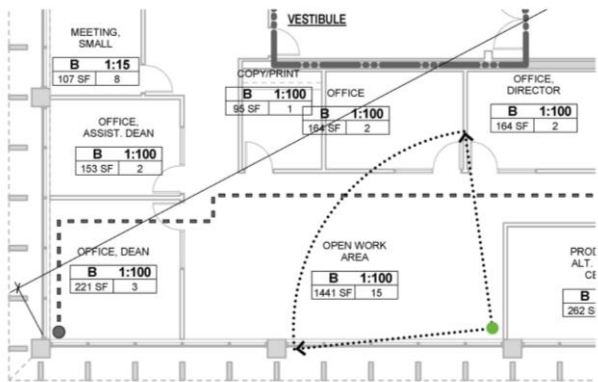


4 WARM COLORED CEILING + WHITE WALLS



5 LOW REFLECTANCE CEILING + WHITE WALLS

RECOMMENDED



KEYPLAN INDICATING POINT OF VIEW OF FALSECOLOR IMAGES

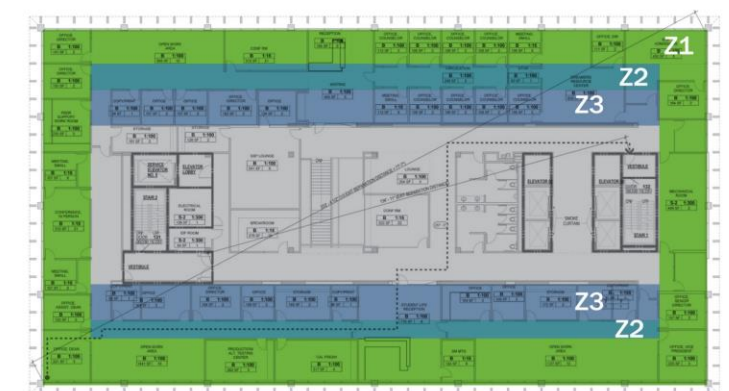
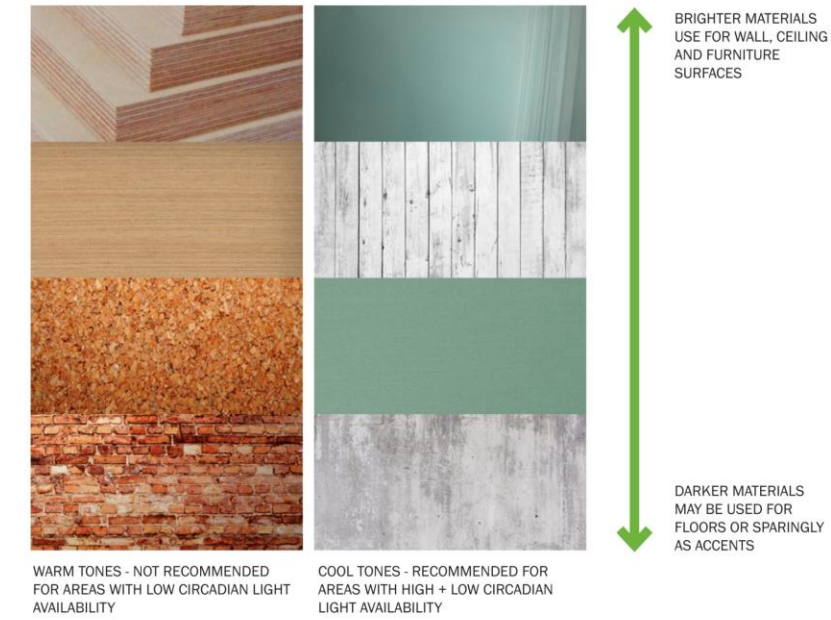


# Circadian Daylight

## Recommendations

	PROGRAMMING/ LAYOUT RECOMMENDATIONS	SURFACE FINISHES RECOMMENDATIONS
<b>Z1</b> NORTH PERIMETER ZONE Med-high circadian availability	<ul style="list-style-type: none"> <li>- Perimeter spaces benefit from high daylight availability, however glare potential can be a concern. Locate workstation perpendicular to exterior windows to reduce glare potential and increase visual comfort.</li> <li>- Include interior blinds and shades for higher control of direct sunlight and glare.</li> </ul>	<ul style="list-style-type: none"> <li>- Material selection is less important for occupants in zones with access to exterior views. However, the North perimeter spaces have less daylight availability than spaces on South. Thus cool and white colors in the walls and ceiling are recommended.</li> <li>- Avoid high specular materials, such as glass and metals to reduce glare potential. Cool tones can be found in high specular materials, however they can be a source of glare.</li> </ul>
<b>Z2</b> NORTH INTERMEDIATE ZONE Med-low circadian availability	<ul style="list-style-type: none"> <li>- Place workstations facing the East or West partition walls for optimized circadian light.</li> <li>- Supplement circadian daylight with recommended surface finishes and electric circadian lighting.</li> </ul>	<ul style="list-style-type: none"> <li>- Surfaces located in the occupant's field of vision, such as walls, ceilings and partitions are going to have a high impact on circadian stimulus. Consider the following:</li> <li>- Ceilings: white color are highly recommended</li> <li>- Walls: cool or white colors are recommended</li> </ul>
<b>Z3</b> NORTH & SOUTH LOW DAYLIGHT ZONE Low circadian availability	<ul style="list-style-type: none"> <li>- Consider one of the following:</li> <li>- Move these spaces to the perimeter.</li> <li>- Increase glass at interior partitions for increased circadian daylighting.</li> <li>- In addition, supplement circadian daylight availability with electric circadian lighting.</li> </ul>	<ul style="list-style-type: none"> <li>- Enclosed offices without direct access to exterior windows will benefit the most from material selection. For these spaces consider:</li> <li>- Ceilings &amp; Walls: cool colors are highly recommended</li> <li>- Furniture and blinds: cool or white colors are recommended</li> </ul>
<b>Z2</b> SOUTH INTERMEDIATE ZONE Med-high circadian availability	<ul style="list-style-type: none"> <li>- Place workstations facing the East or West partition walls for optimized circadian light.</li> <li>- Supplement circadian daylight with recommended surface finishes and electric circadian lighting.</li> </ul>	<ul style="list-style-type: none"> <li>- Surfaces located in the occupant's field of vision, such as walls, ceilings and partitions are going to have a high impact on circadian stimulus. Consider the following:</li> <li>- Ceilings: white colors are recommended, but grey colors can be acceptable.</li> <li>- Walls: cool or white colors are recommended.</li> </ul>
<b>Z1</b> SOUTH PERIMETER ZONE High circadian availability	<ul style="list-style-type: none"> <li>- Workstations layout benefit from a higher directional flexibility.</li> <li>- Locate workstations perpendicular to exterior windows to reduce glare potential.</li> <li>- Include interior blinds and shades for higher control of direct sunlight and glare.</li> </ul>	<ul style="list-style-type: none"> <li>- Material selection is less important for occupants in zones with access to exterior views. Thus warm or cool tones can be adopted.</li> <li>- Avoid high specular materials, such as glass and metals to reduce glare potential. Cool tones can be found in high specular materials, however they can be a source of glare.</li> </ul>

## Material Color and Brightness



CIRCADIAN LIGHT ZONES - TYPICAL FLOOR PLATE



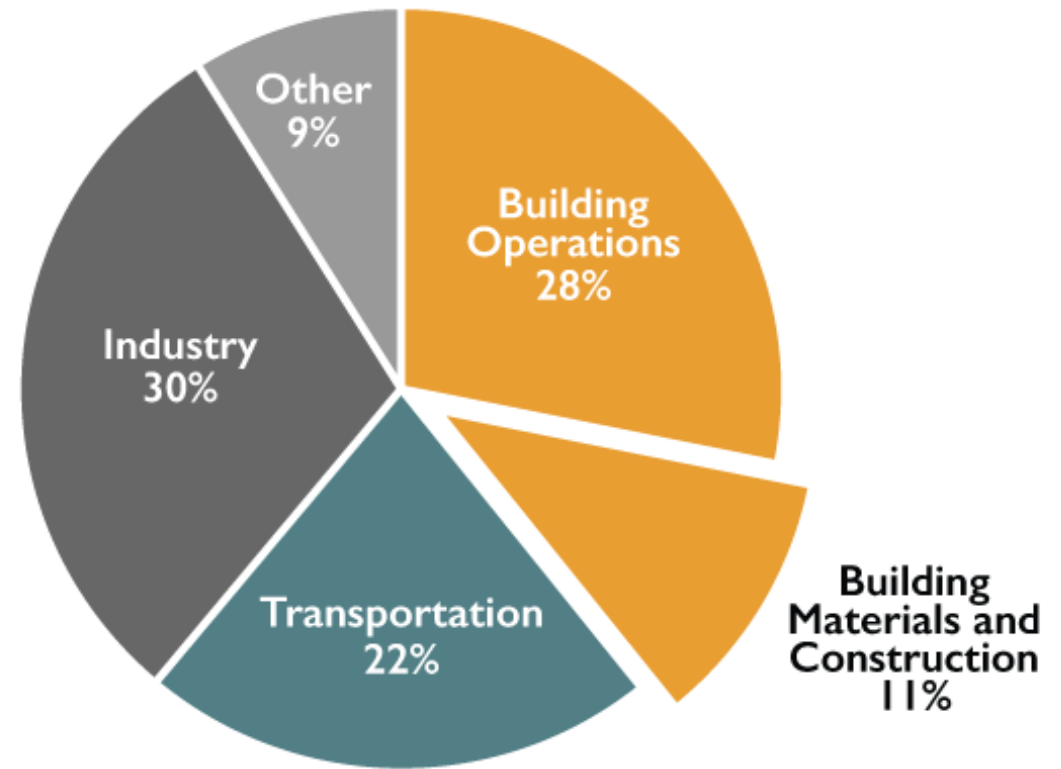


# Embodied Carbon

**Annually, embodied carbon is responsible 11% of global GHG emissions and 28% of global building sector emissions.**

The embodied carbon emissions of building products and construction represent a significant portion global emissions: concrete, iron, and steel alone produce ~9% of annual global GHG emissions; embodied carbon emissions from the building sector produce *11% of annual global GHG emissions.*

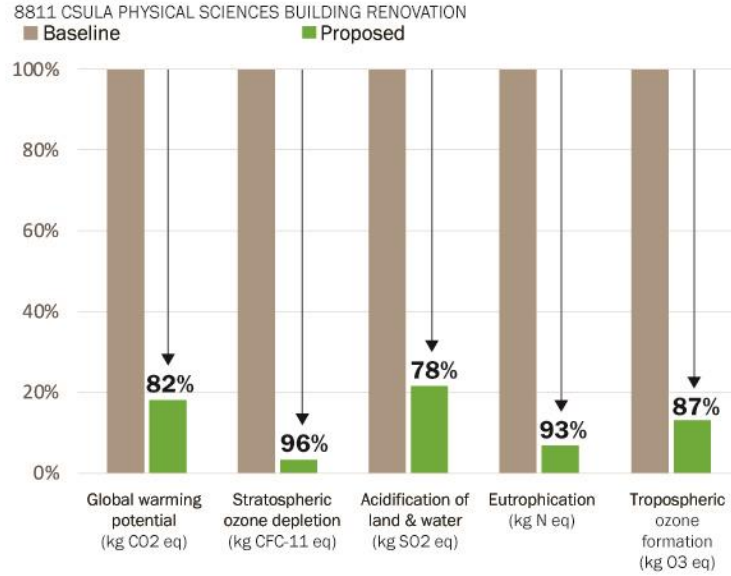
Global CO<sub>2</sub> Emission by Sector



Source: © 2018 2030, Inc. / Architecture 2030. All Rights Reserved.

# Life Cycle Assessment

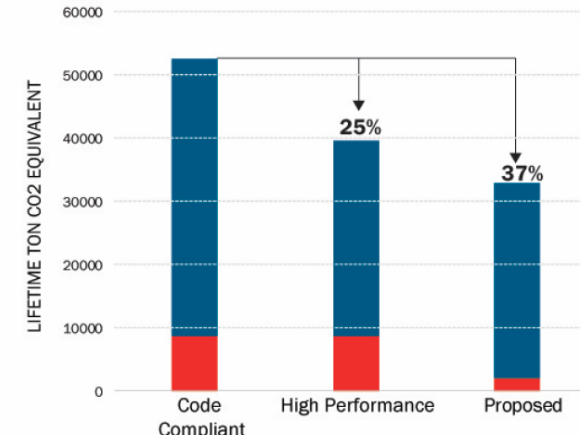
## EMBODIED ENVIRONMENTAL IMPACT ASSESSMENT - 60 YEARS



## LCA SCENARIO COMPARISON - 60 YEARS

8811 CSULA PHYSICAL SCIENCES BUILDING RENOVATION

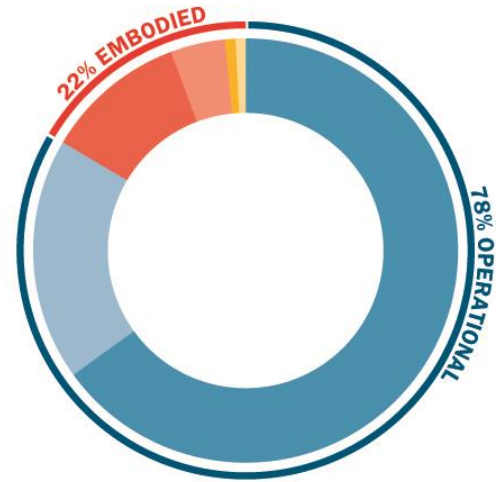
■ Embodied  
■ Operational



## LCA BASELINE CHARACTERIZATION - 60 YEARS

8811 CSULA PHYSICAL SCIENCES BUILDING RENOVATION

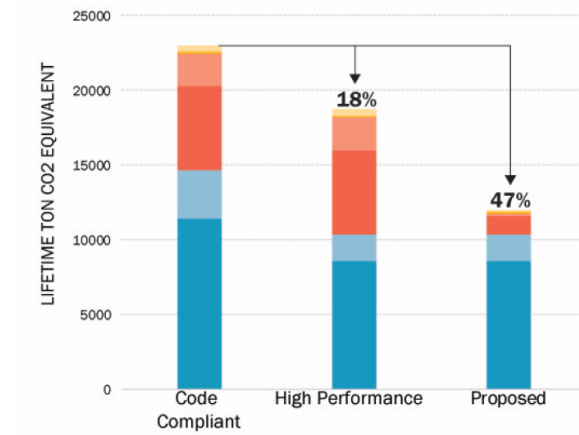
■ Product ■ Use ■ Electricity  
■ Construction ■ End of Life ■ Natural Gas



## LCA SCENARIO COMPARISON - 20 YEARS

8811 CSULA PHYSICAL SCIENCES BUILDING RENOVATION

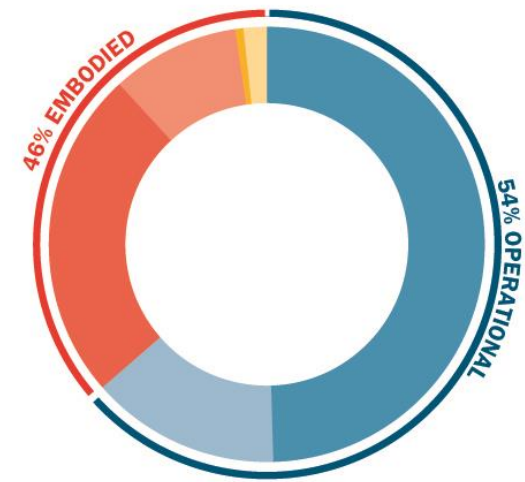
■ Product ■ Use ■ Electricity  
■ Construction ■ End of Life ■ Natural Gas



## LCA BASELINE CHARACTERIZATION - 20 YEARS

8811 CSULA PHYSICAL SCIENCES BUILDING RENOVATION

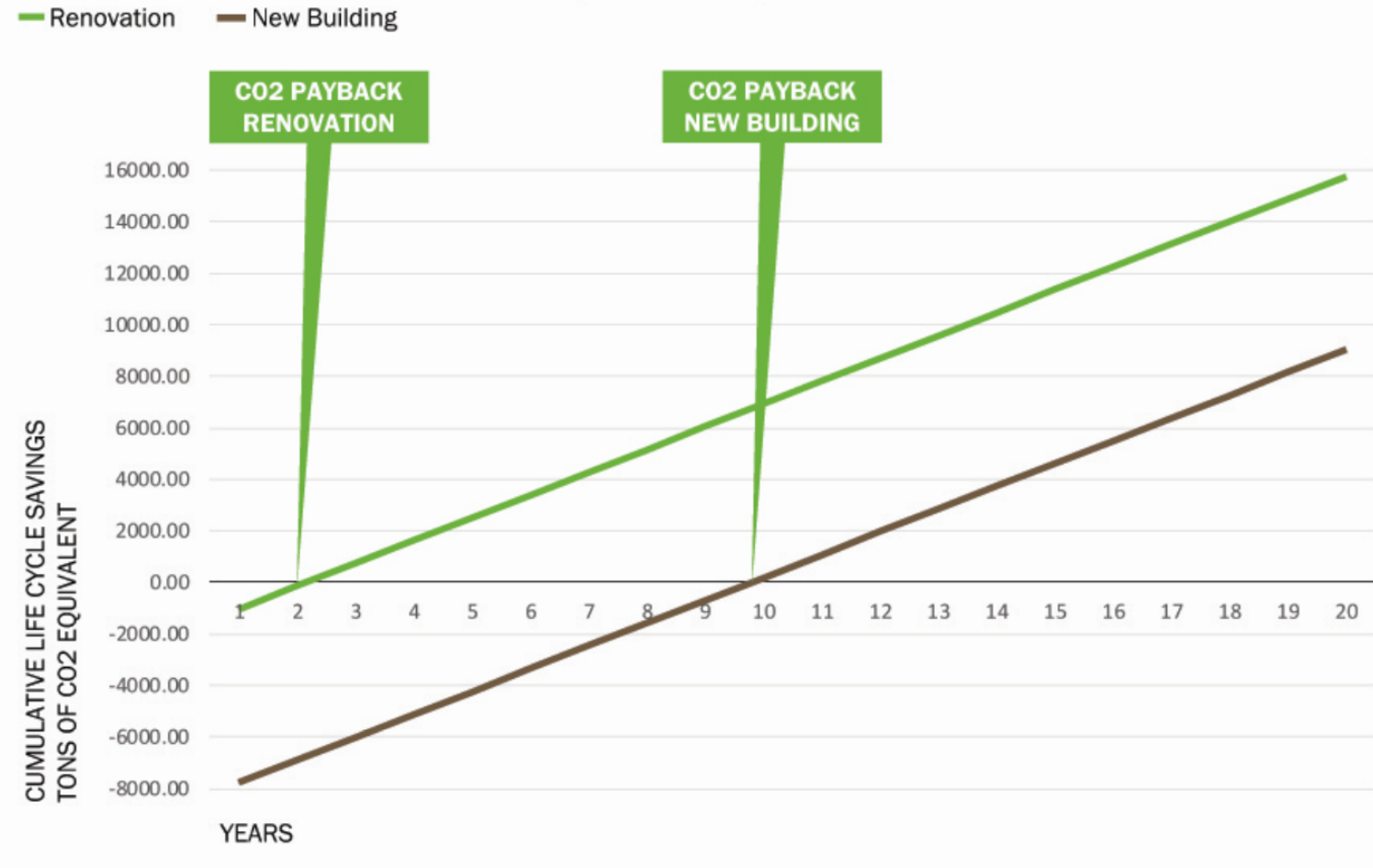
■ Product ■ Use ■ Electricity  
■ Construction ■ End of Life ■ Natural Gas



# Embodied Carbon

## TOTAL CARBON PAYBACK ASSESSMENT

8811 CSULA PHYSICAL SCIENCES BUILDING RENOVATION (ADMIN BUILDING)



atelier ten





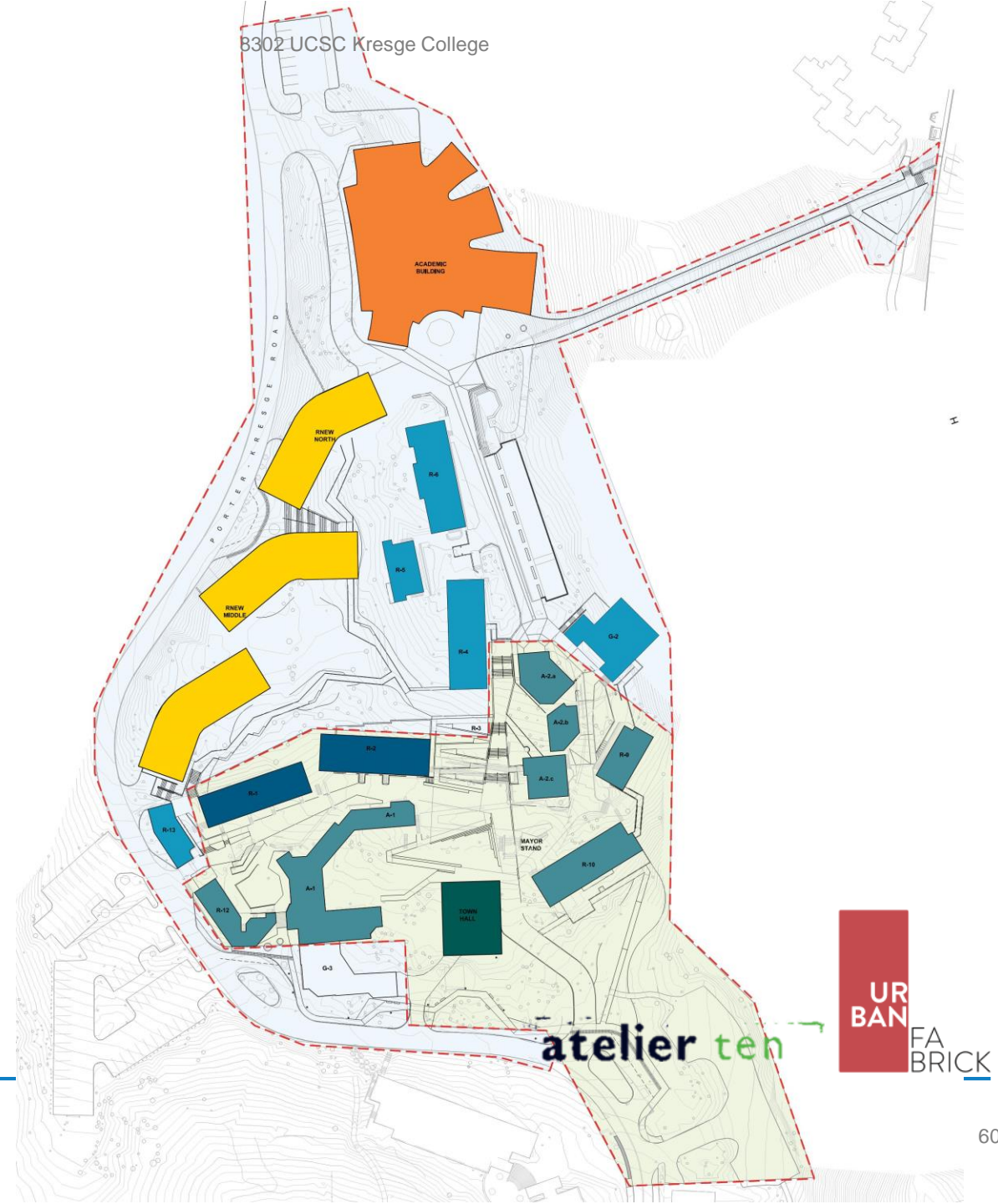
**LEEDv4**  
**EXERCISE:**  
**Materials Credits Strategy**

# UCSC Kresge College

## LEED Approach

- All buildings LEEDv4 NC
- Grouped by phase and type – new construction vs. renovation
- Also divided into Residential vs Academic building type
- Group certification based on lowest performing building in each credit category

- LEED v4 NC: Phase 1: New Residential
- LEED v4 NC: Phase 1: New Academic
- LEED v4 NC: Phase 1: Existing Residential/Admin
- LEED v4 NC: Phase 2: Existing Residential
- LEED v4 NC: Phase 2: Existing Admin
- LEED v4 NC: Phase 2: New Town Hall



# LEED v4 Materials Credits

- **MRc2 - BPDO: Environmental Product Declarations**
  - Option 1 (Disclosure)
  - Option 2 (Optimization)
- **MRc3 - BPDO: Sourcing of Raw Materials**
  - Option 1 (Disclosure)
  - Option 2 (Optimization)
- **MRc4 - BPDO: Material Ingredients**
  - Option 1 (Disclosure)
  - Option 2 (Optimization)
- **EQc2 - Low-Emitting Materials: 6 categories**
  - Paints & coatings
  - Adhesives & sealants
  - Flooring
  - Composite wood
  - Walls, ceilings, interior insulation (acoustic, thermal)
  - Furniture

*BPDO: Building Product  
Disclosure & Optimization*



# LEED v4 Materials Credits

- MRc2 - BPDO: Environmental Product Declarations
  - **Option 1 (Disclosure)**
  - Option 2 (Optimization)
- MRc3 - BPDO: Sourcing of Raw Materials
  - Option 1 (Disclosure)
  - **Option 2 (Optimization)**
- MRc4 - BPDO: Material Ingredients
  - **Option 1 (Disclosure)**
  - Option 2 (Optimization)
- EQc2 - Low-Emitting Materials: 6 categories
  - **Paints & coatings – aligns with CALGreen**
  - **Adhesives & sealants – aligns with CALGreen**
  - **Flooring**
  - **Composite wood – aligns with CALGreen**
  - Walls, ceilings, interior insulation (acoustic, thermal)
  - Furniture

*BPDO: Building Product Disclosure & Optimization*

Recommended options

# LEED v4 Materials Credits

## New Information Gathering Methods:

- **Option 1: Disclosure / Transparency**

Use at least 20 different permanently installed **products** sourced from at least 5 different **manufacturers** that meet the given criteria

- **Option 2: Optimization**

Use products that comply with credit criteria for percentage (%), **by cost**, of the total value of permanently installed products in the project.

## New Criteria for Sustainable Materials

- Environmental Product Declarations (EPDs),
- Third-party certifications,
- Raw material reports,
- Leadership extraction practices,
- Material ingredient reports,
- Health Product Declarations (HPDs), etc.

## New Approach to Regional Materials

- No longer a separate LEED MR credit
- Now an overlay on several MR credits (200% cost multiplier)





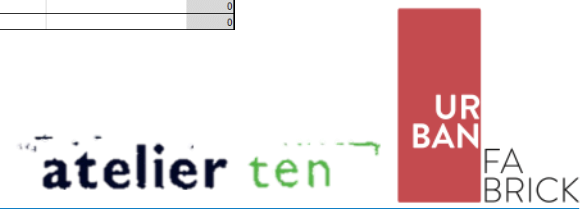
# Materials & Resources – Disclosure and Optimization

Green Building Services LEED v4 Material Database				ENVIRONMENTAL PRODUCT DECLARATIONS				SOURCING OF RAW MATERIALS (CSRs)		MATERIAL INGREDIENTS (HPDs, C2C)			
<i>*COPY AND PASTE ALL WHITE COLUMNS INTO RESPECTIVE BPDO TABS*</i>				TOTAL: 120				TOTAL: 51.5		TOTAL: 53			
Material Description	CSI Div	Is the material structure or enclosure?	Description of Material	Manufacturer Name	Program Operator	EPD Type	EPD Point Value	CSR Type	CSR Point Value	HPD or C2C	Optimization	HPD/C2C Point Value	
Concrete Blocks	3	No	Enviroblock Lightweight Blocks	Aggregate Industries	The International EPD System	Product-specific Type III	1		0			0	
Concrete	3	Yes	CeraTech Concrete	CeraTech	National Ready Mix Concrete Associa	Product-specific Type III	1		0			0	
Reinforcing Steel	3	Yes	Concrete reinforcing steel (rebar)	Commercial Metals Company	ASTM International	Product-specific Type III	1		0			0	
Steel Bars	3	Yes	Steel Deformed bars for concrete reinforcement	Ferrieravalsabbia	Environdec	Product-specific Type III	1		0			0	
Mortar	3	Yes	Hilti HIT-CT 1 injectable Mortar	Hilti	Hilti	Product-specific Type III	1		0			0	
Channel System	3	Yes	HAC anchor channel system	Hilti	IBU	Product-specific Type III	1		0			0	
Alipre	3	No	Alipre Alicem	Italcement Group	IEC	Product-specific Type III	1		0			0	
Waterstops	3	No	2 in 1 Reactive Resin Waterstop	Koster	IBU	Product-specific Type III	1		0			0	
Concrete	3	Yes	Concrete	Redi-Mix	NSF International	Product-specific Type III	1		0			0	
Concrete	3	Yes	Titan Concrete	Titan Concrete	NSF International	Product-specific Type III	1		0			0	
Epoxy Resin Primer	3	No	Uzin PE 460 epoxy resin primer	Uzin Utz AG	IBU	Product-specific Type III	1		0			0	
Leveling Compound	3	No	UZIN NC 170 LevelStar leveling compound	Uzin Utz AG	IBU	Product-specific Type III	1		0			0	
CMU	4	Yes	Ernest Maier Block, Brick, and Hardscapes with CarbonCure	Atlas Block Co. and Carbon Cure			0		0	Health Product Declaration		1	
CMU	4	Yes	Permacon with CarbonCure Normal Weight CMU	Atlas Block Co. and Carbon Cure			0		0	Health Product Declaration		1	
Anchor blocks	4	Yes	Anchor Normal Weight Gray Block with CarbonCure	Atlas Block Co. and Carbon Cure			0		0	Health Product Declaration		1	
Concrete Blocks	4	Yes	Brampton Brick 15 MPA Concrete Masonry Unit with CarbonCure	Atlas Block Co. and Carbon Cure			0		0	Health Product Declaration		1	
CMU	4	No	Midwest Block CMU	Midwest Block & Brick	NSF International	Product-specific Type III	1		0			0	
Mortar	4	Yes	Weber dry mortar	Saint-Gobain	Norwegian EPD Foundation	Product-specific Type III	1	Manufacturer Declared	0.5			0	
CMU	4	Yes	CMU	Superlife (Oldcastle)	NSF International	Product-specific Type III	1		0			0	
Steel	5	Yes	Light Gauge Steel Profiles	Akkon Steel	IBU	Product-specific Type III	1		0			0	
Steel	5	Yes	Structural Steel Sections and Plates	Bauforumstahl (TATA)	IBU	Product-specific Type III	1		0			0	
Steel Plate	5	Yes	Xlerplate	BlueScope	The Australasian EPD Programme	Product-specific Type III	1		0			0	
Metal Framing	5	No	ProSTUD Drywall Framing with DiamondPlus Coating	Clark Dietrich	NSF International	Product-specific Type III	1		0	Health Product Declaration		1	
Metals	5	Yes	Cold Formed Steel Products	Clark Dietrich	NSF International	Product-specific Type III	1		0	Health Product Declaration		1	
Steel Sheets	5	Yes	Profiled sheets made of steel for roof, wall, and deck constructions	IFBS	IBU	Product-specific Type III	1		0			0	
Steel Compartments	5	No	Steel plates/tubes/angles	INcor			0	Manufacturer Declared	0.5			0	
Stainless Steel	5	Yes	Hot-rolled stainless steel	Outokumpu Oyj	IBU	Product-specific Type III	1		0			0	
Cladding	5	Yes	Roll-formed cladding (aluminum or steel)	Pac-Clad	UL Environment	Product-specific Type III	1		0			0	
Rolled Zinc	5	Yes	RHEINZINK-prePATINA bright-rolled	Rheinznk	IBU	Product-specific Type III	1		0			0	
Aluminum Specialty Products	5	No	Aluminum Specialty Products	Varies	UL Environment	Industry-wide (generic)	0.5		0			0	
Aluminum	5	Yes	Hot-rolled aluminum (Email through Aluminum.org for EPD)	Varies	TBD	Industry-wide (generic)	0.5		0			0	
Aluminum	5	Yes	Cold-rolled aluminum	Varies	TBD	Industry-wide (generic)	0.5		0			0	
Aluminum	5	Yes	Extruded aluminum	Varies	TBD	Industry-wide (generic)	0.5		0			0	
Metals	5	Yes	Metal Composite Material Panels	Varies	UL Environment	Industry-wide (generic)	0.5		0			0	
Steel Panels	5	Yes	Roll-formed Steel Panels for Roofs and Walls	Varies	UL Environment	Industry-wide (generic)	0.5		0			0	
Steel Specialty Products	5	No	Steel Specialty Products	Varies	UL Environment	Industry-wide (generic)	0.5		0			0	
Acrylic Panels	6	Yes	Chroma Acrylic Panels	3Form	NSF International	Product-specific Type III	1		0			0	
Decking and Cladding	6	Yes	Decking and Cladding	Accoya	The International EPD System	Product-specific Type III	1		0			0	
Pipes	6	No	PVC Pressure and Non-pressure Pipe	Uni-Bell PVC Pipe Association	NSF International	Product-specific Type III	1		0			0	
Medium Density Fiberboard	6	Yes	Medium Density Fiberboard	Varies	UL Environment	Industry-wide (generic)	0.5		0			0	
Particle Board	6	Yes	Particle Board	Varies	UL Environment	Industry-wide (generic)	0.5		0			0	
High Pressure Laminate	6	No	High Pressure Laminate	Varies	IBU	Industry-wide (generic)	0.5		0			0	
Softwood Lumber	6	Yes	Softwood Lumber	Varies	UL Environment	Industry-wide (generic)	0.5		0			0	
Mineral Wood Board	6	No	Mineral Wood Board	Varies	UL Environment	Industry-wide (generic)	0.5		0			0	



## Early Actions - Disclosure

Prioritize manufacturers that have Environmental Product Declarations (EPDs) and Health Product Declarations (HPDs) available for their products. Inventories of products meeting these standards are available on sites such as UL Spot and HPD Repository.







# Materials & Resources – Disclosure and Optimization

Green Building Services LEED v4 Material Database				ENVIRONMENTAL PRODUCT DECLARATIONS			SOURCING OF RAW MATERIALS (CSRs)		MATERIAL INGREDIENTS (HPDs, C2C)			
*COPY AND PASTE ALL WHITE COLUMNS INTO RESPECTIVE BPDO TABS*				TOTAL: 120			TOTAL: 51.5		TOTAL: 53			
Material Description	CSI Div	Is the material structure or enclosure?	Description of Material	Manufacturer Name	Program Operator	EPD Type	EPD Point Value	CSR Type	CSR Point Value	HPD or C2C	Optimization	HPD/C2C Point Value
Concrete Blocks	3	No	Enviroblock Lightweight Blocks	Aggregate Industries	The International EPD System	Product-specific Type III	1		0			
Concrete	3	Yes	CeraTech Concrete	CeraTech	National Ready Mix Concrete Association	Product-specific Type III	1		0			
Reinforcing Steel	3	Yes	Concrete reinforcing steel (rebar)	Commercial Metals Company	ASTM International	Product-specific Type III	1		0			
Steel Bars	3	Yes	Steel Deformed bars for concrete reinforcement	Ferrier/Valsabbia	Environdec	Product-specific Type III	1		0			
Mortar	3	Yes	Hilti HIT-CT 1 injectable Mortar	Hilti	IBU	Product-specific Type III	1		0			
Channel System	3	Yes	HAC anchor channel system	Hilti	IBU	Product-specific Type III	1		0			
Alipre	3	No	Alipre Alicem	Italcementi Group	IEC	Product-specific Type III	1		0			
Waterstops	3	No	2 in 1 Reactive Resin Waterstop	Koster	IBU	Product-specific Type III	1		0			
Concrete	3	Yes	Concrete	Redi-Mix	NSF International	Product-specific Type III	1		0			
Concrete	3	Yes	Titan Concrete	Titan Concrete	NSF International	Product-specific Type III	1		0			
Epoxy Resin Primer	3	No	Uzin PE 460 epoxy resin primer	Uzin Utz AG	IBU	Product-specific Type III	1		0			
Leveling Compound	3	No	UZIN NC 170 LevelStar leveling compound	Uzin Utz AG	IBU	Product-specific Type III	1		0			
CMU	4	Yes	Ernest Maier Block, Brick, and Hardscapes with CarbonCure	Atlas Block Co. and Carbon Cure			0		0	Health Product Declaration		
CMU	4	Yes	Permacon with CarbonCure Normal Weight CMU	Atlas Block Co. and Carbon Cure			0		0	Health Product Declaration		
Anchor blocks	4	Yes	Anchor Normal Weight Gray Block with CarbonCure	Atlas Block Co. and Carbon Cure			0		0	Health Product Declaration		
Concrete Blocks	4	Yes	Brampton Brick 15 MPA Concrete Masonry Unit with CarbonCure	Atlas Block Co. and Carbon Cure			0		0	Health Product Declaration		
CMU	4	No	Midwest Block CMU	Midwest Block & Brick	NSF International	Product-specific Type III	1		0			
Mortar	4	Yes	Weber dry mortar	Saint-Gobain	Norwegian EPD Foundation	Product-specific Type III	1	Manufacturer Declared	0.5			
CMU	4	Yes	CMU	Superite (Oldcastle)	NSF International	Product-specific Type III	1		0			
Steel	5	Yes	Light Gauge Steel Profiles	Akzon Steel	IBU	Product-specific Type III	1		0			
Steel	5	Yes	Structural Steel Sections and Plates	Baiforumstahl (TATA)	IBU	Product-specific Type III	1		0			
Steel Plate	5	Yes	Xlerplate	BlueScope	The Australasian EPD Programme	Product-specific Type III	1		0			
Metal Framing	5	No	ProSTUD Drywall Framing with DiamondPlus Coating	Clark Dietrich	NSF International	Product-specific Type III	1		0	Health Product Declaration		
Metals	5	Yes	Cold Formed Steel Products	Clark Dietrich	NSF International	Product-specific Type III	1		0	Health Product Declaration		
Steel Sheets	5	Yes	Profiled sheets made of steel for roof, wall, and deck constructions	IFBIS	IBU	Product-specific Type III	1		0			
Steel Compartments	5	No	Steel plates/tubes/angles	Nucor			0	Manufacturer Declared	0.5			
Stainless Steel	5	Yes	Hot-rolled stainless steel	Outokumpu Oyj	IBU	Product-specific Type III	1		0			
Cladding	5	Yes	Roll-formed cladding (aluminum or steel)	Pac-Clad	UL Environment	Product-specific Type III	1		0			
Rolled Zinc	5	Yes	RHEINZINK-prePATINA bright-rolled	Rheinzink	IBU	Product-specific Type III	1		0			
Aluminum Specialty Products	5	No	Aluminum Specialty Products	Varies	UL Environment	Industry-wide (generic)	0.5		0			
Aluminum	5	Yes	Hot-rolled aluminum (Email through Aluminum.org for EPD)	Varies	TBD	Industry-wide (generic)	0.5		0			
Aluminum	5	Yes	Cold-rolled aluminum	Varies	TBD	Industry-wide (generic)	0.5		0			
Aluminum	5	Yes	Extruded aluminum	Varies	TBD	Industry-wide (generic)	0.5		0			
Metals	5	Yes	Metal Composite Material Panels	Varies	UL Environment	Industry-wide (generic)	0.5		0			
Steel Panels	5	Yes	Roll-formed Steel Panels for Roofs and Walls	Varies	UL Environment	Industry-wide (generic)	0.5		0			
Steel Specialty Products	5	No	Steel Specialty Products	Varies	UL Environment	Industry-wide (generic)	0.5		0			
Acrylic Panels	6	Yes	Chroma Acrylic Panels	3Form	NSF International	Product-specific Type III	1		0			
Decking and Cladding	6	Yes	Decking and Cladding	Accoya	The International EPD System	Product-specific Type III	1		0			
Pipes	6	No	PVC Pressure and Non-pressure Pipe	Uni-Bell PVC Pipe Association	NSF International	Product-specific Type III	1		0			
Medium Density Fiberboard	6	Yes	Medium Density Fiberboard	Varies	UL Environment	Industry-wide (generic)	0.5		0			
Particle Board	6	Yes	Particle Board	Varies	UL Environment	Industry-wide (generic)	0.5		0			
High Pressure Laminate	6	No	High Pressure Laminate	Varies	IBU	Industry-wide (generic)	0.5		0			
Softwood Lumber	6	Yes	Softwood Lumber	Varies	UL Environment	Industry-wide (generic)	0.5		0			
Mineral Wood Board	6	No	Mineral Wood Board	Varies	UL Environment	Industry-wide (generic)	0.5		0			



## Red List Material Ingredients – Optimization

Prioritize products that do not contain materials found on the LBC Red List. Products

that are compliant with these requirements carry a Declare label and can be found in the Declare Database. Other compliant labels include GreenScreen and Cradle to Cradle.



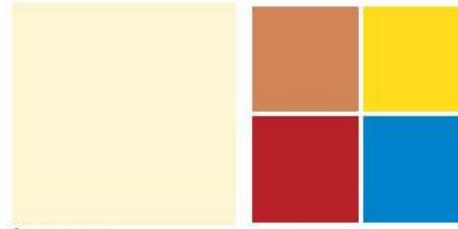
# Materials Strategy: Kresge Renovations

## STUCCO



1 STUCCO PAINTED  
FINISHED

## PAINT



2 BELLAMINHOSE  
FIELD PAINTING TAB

3 BELLAMINHOSE  
ASSORTED ACCENT COLORS



A1 PIAZZETTA

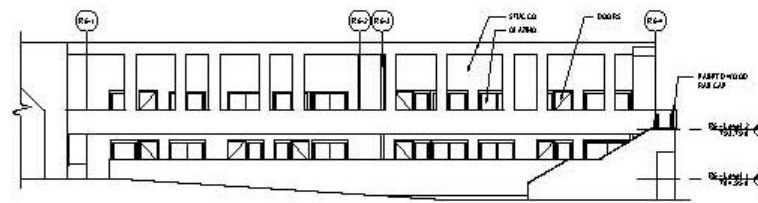


A1 EAST ELEVATION

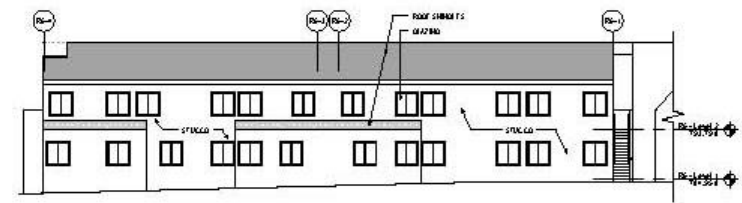


A2 MAIN ENTRY

TYPICAL FRONT ELEVATION



TYPICAL REAR ELEVATION



## GLAZING



4 LOW-E TRIPLE PANE GLAZING

## DOORS



5 INSULATED HOLLOW METAL  
ENTRANCE DOORS AND WINDOWS

## ROOFING



6 ASPHALT SHINGLES

## CONCRETE



7 CONCRETE  
INTERNAL FINISH COLOR TIED

## TRAFFIC COATING

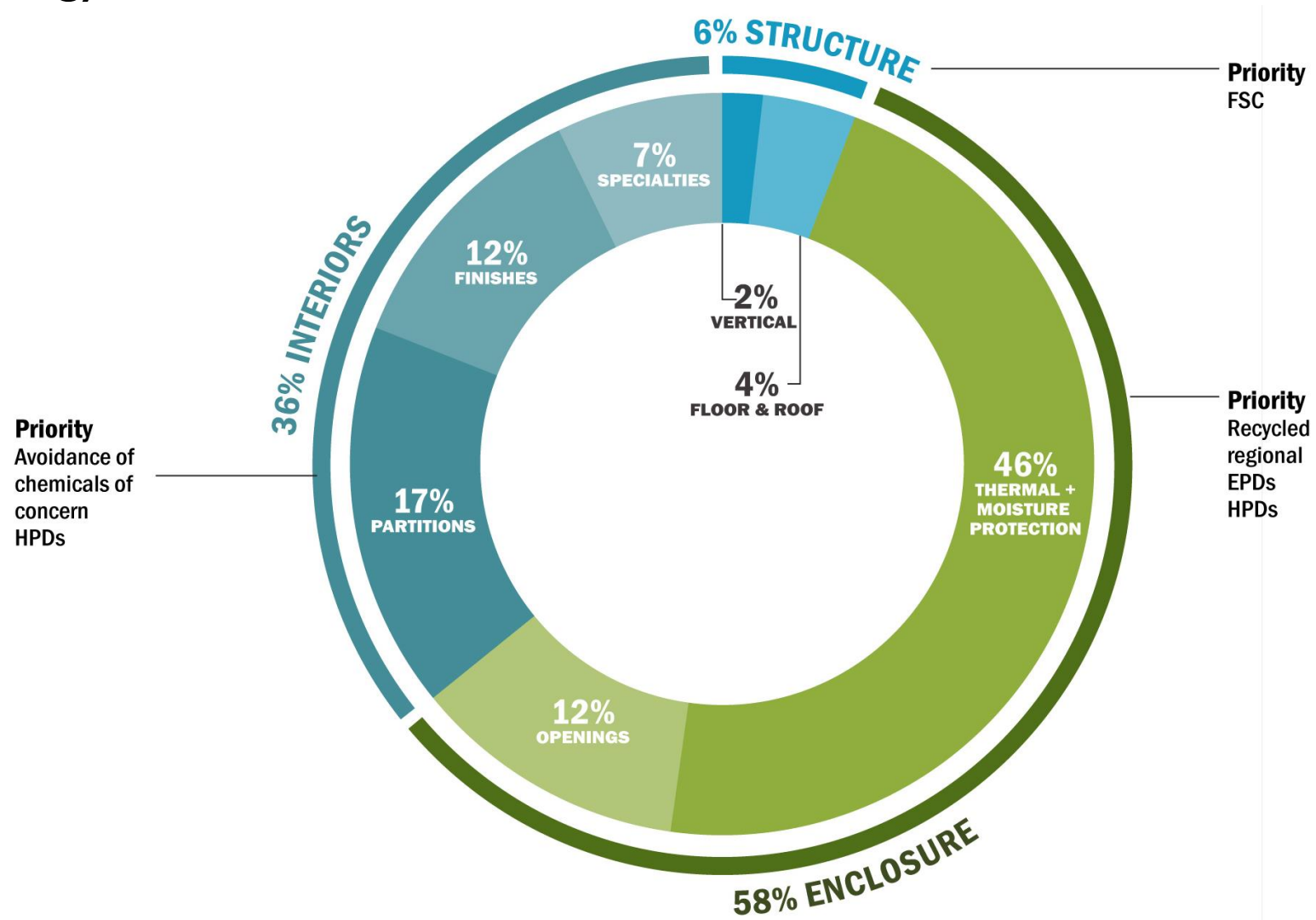


8 ANTI-SLIP TRAFFIC COATING

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# Materials Strategy: Renovations



# Materials Strategy: Kresge New Academic

## METAL CLADDING

## GLAZING

OPTIONS

**MTL-3** FLAT SEAM ZINC CLADDING

PAINTED ALUMINUM

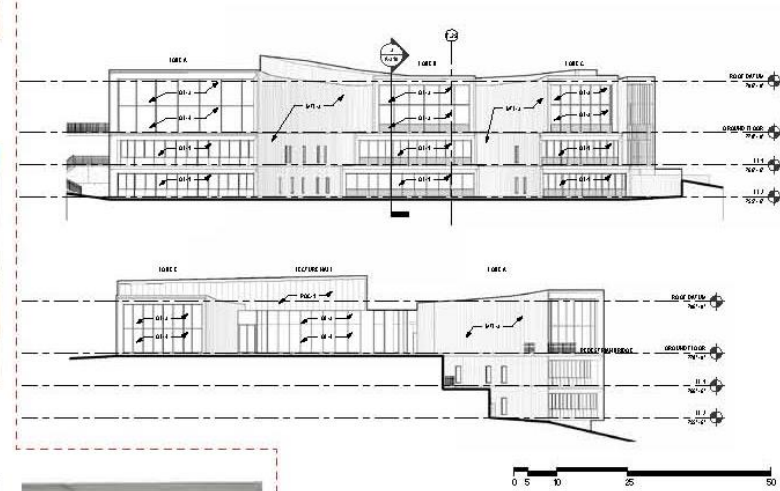
CORRUGATED ALUMINUM WITH COATING

ANODIZED COPPER

SURFACE TREATED FLAT-LOCK COPPER

TEXTURED COPPER

ZINC/ALUM./COPPER SHINGLE



**GL-3** 1" IGU W/ LOW-E COATING ON #2 SURFACE, CLEAR VISION WITH CERAMIC FRIT



**POC-1** POLYCARBONATE MULTIWALL SHEET

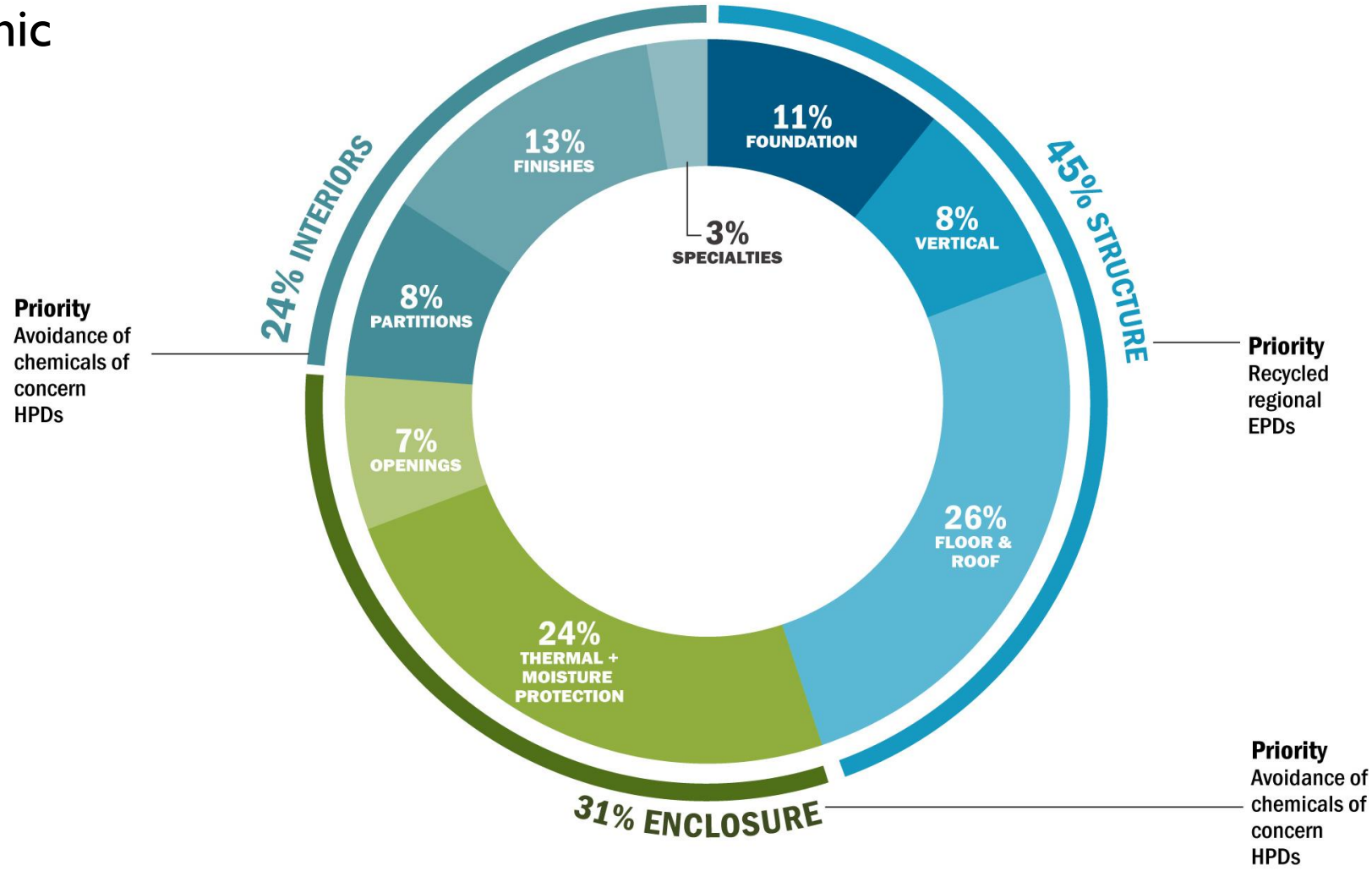
**GL-1** 1" IGU W/ LOW-E COATING ON #2 SURFACE, CLEAR VISION

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# Materials Strategy: New Academic



# Materials Exercise

PRODUCT TYPE

MRC2: EPDS

MRC3:  
SOURCING OF  
RAW MATERIAL

MRC4: MATERIAL  
INGREDIENTS  
(HPDS)

EQC2: LOW-  
EMITTING  
MATERIALS

## GOALS



**RESPONSIBLY SOURCED MATERIALS: RECYCLED AND REGIONAL CONTENT, MANUFACTURER TAKE BACK PROGRAMS**



**REDUCE EMBODIED CARBON: CARBON SMART MATERIALS, EPDS**



**RESPONSIBLY SOURCED WOOD PRODUCTS: TIMBER, WOOD FINISHES, CASEWORK, MILLWORK, COMPOSITE WOOD**



**HEALTHY BUILDING MATERIALS: LOW VOC, HPDS**

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# Materials

## Exercise:


### Interior

PRODUCT TYPE	MRC2: EPDS	MRC3: SOURCING OF RAW MATERIAL	MRC4: MATERIAL INGREDIENTS (HPDS)	EQC2: LOW-EMITTING MATERIALS
CARPET	Y		Y	Y

# Materials

## Exercise:



### Interior

PRODUCT TYPE	MRC2: EPDS	MRC3: SOURCING OF RAW MATERIAL	MRC4: MATERIAL INGREDIENTS (HPDS)	EQC2: LOW-EMITTING MATERIALS
CARPET	Y		Y	Y
CEILING				

# Materials

## Exercise:

### Interior

PRODUCT TYPE	MRC2: EPDS	MRC3: SOURCING OF RAW MATERIAL	MRC4: MATERIAL INGREDIENTS (HPDS)	EQC2: LOW-EMITTING MATERIALS
CARPET	Y		Y	Y
CEILING	Y		Y	Y

# Materials

## Exercise:




### Interior

PRODUCT TYPE	MRC2: EPDS	MRC3: SOURCING OF RAW MATERIAL	MRC4: MATERIAL INGREDIENTS (HPDS)	EQC2: LOW-EMITTING MATERIALS
CARPET	Y		Y	Y
CEILING	Y		Y	Y
GYPSUM				

# Materials

## Exercise:




### Interior

PRODUCT TYPE	MRC2: EPDS	MRC3: SOURCING OF RAW MATERIAL	MRC4: MATERIAL INGREDIENTS (HPDS)	EQC2: LOW-EMITTING MATERIALS
CARPET	Y		Y	Y
CEILING	Y		Y	Y
GYP SUM	Y			Y

# Materials

## Exercise:

### Interior

PRODUCT TYPE	MRC2: EPDS	MRC3: SOURCING OF RAW MATERIAL	MRC4: MATERIAL INGREDIENTS (HPDS)	EQC2: LOW-EMITTING MATERIALS
CARPET	Y		Y	Y
CEILING	Y		Y	Y
GYP SUM	Y			Y
MILLWORK / CASEWORK				



# Materials

## Exercise:

### Interior

PRODUCT TYPE	MRC2: EPDS	MRC3: SOURCING OF RAW MATERIAL	MRC4: MATERIAL INGREDIENTS (HPDS)	EQC2: LOW-EMITTING MATERIALS
CARPET	Y		Y	Y
CEILING	Y		Y	Y
GYPSUM	Y			Y
MILLWORK / CASEWORK	Y			Y

# Materials

## Exercise:






### Interior

PRODUCT TYPE	MRC2: EPDS	MRC3: SOURCING OF RAW MATERIAL	MRC4: MATERIAL INGREDIENTS (HPDS)	EQC2: LOW-EMITTING MATERIALS
CARPET	Y		Y	Y
CEILING	Y		Y	Y
GYP SUM	Y			Y
MILLWORK / CASEWORK	Y			Y
SOLID SURFACING				

# Materials

## Exercise:






### Interior

PRODUCT TYPE	MRC2: EPDS	MRC3: SOURCING OF RAW MATERIAL	MRC4: MATERIAL INGREDIENTS (HPDS)	EQC2: LOW-EMITTING MATERIALS
CARPET	Y		Y	Y
CEILING	Y		Y	Y
GYPSUM	Y			Y
MILLWORK / CASEWORK	Y			Y
SOLID SURFACING				Y

# Materials

## Exercise:






### Interior

PRODUCT TYPE	MRC2: EPDS	MRC3: SOURCING OF RAW MATERIAL	MRC4: MATERIAL INGREDIENTS (HPDS)	EQC2: LOW-EMITTING MATERIALS
CARPET	Y		Y	Y
CEILING	Y		Y	Y
GYP SUM	Y			Y
MILLWORK / CASEWORK	Y			Y
SOLID SURFACING				Y
RESILIENT FLOORING				

# Materials

## Exercise:







### Interior

PRODUCT TYPE	MRC2: EPDS	MRC3: SOURCING OF RAW MATERIAL	MRC4: MATERIAL INGREDIENTS (HPDS)	EQC2: LOW-EMITTING MATERIALS
CARPET	Y		Y	Y
CEILING	Y		Y	Y
GYP SUM	Y			Y
MILLWORK / CASEWORK	Y			Y
SOLID SURFACING				Y
RESILIENT FLOORING	Y		Y	Y

# Materials

## Exercise:

### Interior

PRODUCT TYPE	MRC2: EPDS	MRC3: SOURCING OF RAW MATERIAL	MRC4: MATERIAL INGREDIENTS (HPDS)	EQC2: LOW-EMITTING MATERIALS
CARPET	Y		Y	Y
CEILING	Y		Y	Y
GYP SUM	Y			Y
MILLWORK / CASEWORK	Y			Y
SOLID SURFACING				Y
RESILIENT FLOORING	Y		Y	Y
PAINT				











# Materials

## Exercise:

### Interior







PRODUCT TYPE	MRC2: EPDS	MRC3: SOURCING OF RAW MATERIAL	MRC4: MATERIAL INGREDIENTS (HPDS)	EQC2: LOW-EMITTING MATERIALS
CARPET	Y		Y	Y
CEILING	Y		Y	Y
GYPSUM	Y			Y
MILLWORK / CASEWORK	Y			Y
SOLID SURFACING				Y
RESILIENT FLOORING	Y		Y	Y
PAINT			Y	Y



# Materials

## Exercise:

### Interior

PRODUCT TYPE	MRC2: EPDS	MRC3: SOURCING OF RAW MATERIAL	MRC4: MATERIAL INGREDIENTS (HPDS)	EQC2: LOW-EMITTING MATERIALS
CARPET	Y		Y	Y
CEILING	Y		Y	Y
GYP SUM	Y			Y
MILLWORK / CASEWORK	Y			Y
SOLID SURFACING				Y
RESILIENT FLOORING	Y		Y	Y
PAINT			Y	Y
FURNITURE				

# Materials

## Exercise:

### Interior

PRODUCT TYPE	MRC2: EPDS	MRC3: SOURCING OF RAW MATERIAL	MRC4: MATERIAL INGREDIENTS (HPDS)	EQC2: LOW-EMITTING MATERIALS
CARPET	Y		Y	Y
CEILING	Y		Y	Y
GYP SUM	Y			Y
MILLWORK / CASEWORK	Y			Y
SOLID SURFACING				Y
RESILIENT FLOORING	Y		Y	Y
PAINT			Y	Y
FURNITURE	Y	 	Y	Y

# Materials

## Exercise:


### Shell

PRODUCT TYPE	MRC2: EPDS	MRC3: SOURCING OF RAW MATERIAL	MRC4: MATERIAL INGREDIENTS (HPDS)	EQC2: LOW-EMITTING MATERIALS
STRUCTURAL CONCRETE				

# Materials

## Exercise:


### Shell

PRODUCT TYPE	MRC2: EPDS	MRC3: SOURCING OF RAW MATERIAL	MRC4: MATERIAL INGREDIENTS (HPDS)	EQC2: LOW- EMITTING MATERIALS
STRUCTURAL CONCRETE	Y			

# Materials

## Exercise:

### Shell



PRODUCT TYPE	MRC2: EPDS	MRC3: SOURCING OF RAW MATERIAL	MRC4: MATERIAL INGREDIENTS (HPDS)	EQC2: LOW-EMITTING MATERIALS
STRUCTURAL CONCRETE	Y			
SITE CONCRETE				



# Materials

## Exercise:

### Shell

PRODUCT TYPE	MRC2: EPDS	MRC3: SOURCING OF RAW MATERIAL	MRC4: MATERIAL INGREDIENTS (HPDS)	EQC2: LOW- EMITTING MATERIALS
STRUCTURAL CONCRETE	Y			
SITE CONCRETE	Y			

# Materials

## Exercise:

### Shell

PRODUCT TYPE	MRC2: EPDS	MRC3: SOURCING OF RAW MATERIAL	MRC4: MATERIAL INGREDIENTS (HPDS)	EQC2: LOW-EMITTING MATERIALS
STRUCTURAL CONCRETE	Y			
SITE CONCRETE	Y			
LUMBER / TIMBER / ENGINEERED WOOD				

# Materials

## Exercise:




### Shell

PRODUCT TYPE	MRC2: EPDS	MRC3: SOURCING OF RAW MATERIAL	MRC4: MATERIAL INGREDIENTS (HPDS)	EQC2: LOW-EMITTING MATERIALS
STRUCTURAL CONCRETE	Y			
SITE CONCRETE	Y			
LUMBER / TIMBER / ENGINEERED WOOD	Y		Y	Y

# Materials

## Exercise:





### Shell

PRODUCT TYPE	MRC2: EPDS	MRC3: SOURCING OF RAW MATERIAL	MRC4: MATERIAL INGREDIENTS (HPDS)	EQC2: LOW-EMITTING MATERIALS
STRUCTURAL CONCRETE	Y			
SITE CONCRETE	Y			
LUMBER / TIMBER / ENGINEERED WOOD	Y		Y	Y
STEEL				

# Materials

## Exercise:





### Shell

PRODUCT TYPE	MRC2: EPDS	MRC3: SOURCING OF RAW MATERIAL	MRC4: MATERIAL INGREDIENTS (HPDS)	EQC2: LOW-EMITTING MATERIALS
STRUCTURAL CONCRETE	Y			
SITE CONCRETE	Y			
LUMBER / TIMBER / ENGINEERED WOOD	Y		Y	Y
STEEL	Y			

# Materials

## Exercise:

### Shell






PRODUCT TYPE	MRC2: EPDS	MRC3: SOURCING OF RAW MATERIAL	MRC4: MATERIAL INGREDIENTS (HPDS)	EQC2: LOW-EMITTING MATERIALS
STRUCTURAL CONCRETE	Y			
SITE CONCRETE	Y			
LUMBER / TIMBER / ENGINEERED WOOD	Y		Y	Y
STEEL	Y			
INSULATION				



# Materials

## Exercise:






### Shell

PRODUCT TYPE	MRC2: EPDS	MRC3: SOURCING OF RAW MATERIAL	MRC4: MATERIAL INGREDIENTS (HPDS)	EQC2: LOW-EMITTING MATERIALS
STRUCTURAL CONCRETE	Y			
SITE CONCRETE	Y			
LUMBER / TIMBER / ENGINEERED WOOD	Y		Y	Y
STEEL	Y			
INSULATION	Y		Y	Y

# Materials

## Exercise:







### Shell

PRODUCT TYPE	MRC2: EPDS	MRC3: SOURCING OF RAW MATERIAL	MRC4: MATERIAL INGREDIENTS (HPDS)	EQC2: LOW-EMITTING MATERIALS
STRUCTURAL CONCRETE	Y			
SITE CONCRETE	Y			
LUMBER / TIMBER / ENGINEERED WOOD	Y		Y	Y
STEEL	Y			
INSULATION	Y		Y	Y
CLADDING				

# Materials

## Exercise:

### Shell

PRODUCT TYPE	MRC2: EPDS	MRC3: SOURCING OF RAW MATERIAL	MRC4: MATERIAL INGREDIENTS (HPDS)	EQC2: LOW-EMITTING MATERIALS
STRUCTURAL CONCRETE	Y			
SITE CONCRETE	Y			
LUMBER / TIMBER / ENGINEERED WOOD	Y		Y	Y
STEEL	Y			
INSULATION	Y		Y	Y
CLADDING	Y		Y	







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URBAN  
FACTORY  
BRICK

# Materials

## Exercise:








### Shell

PRODUCT TYPE	MRC2: EPDS	MRC3: SOURCING OF RAW MATERIAL	MRC4: MATERIAL INGREDIENTS (HPDS)	EQC2: LOW-EMITTING MATERIALS
STRUCTURAL CONCRETE	Y			
SITE CONCRETE	Y			
LUMBER / TIMBER / ENGINEERED WOOD	Y		Y	Y
STEEL	Y			
INSULATION	Y		Y	Y
CLADDING	Y		Y	
ROOFING				

# Materials

## Exercise:


### Shell

PRODUCT TYPE	MRC2: EPDS	MRC3: SOURCING OF RAW MATERIAL	MRC4: MATERIAL INGREDIENTS (HPDS)	EQC2: LOW-EMITTING MATERIALS
STRUCTURAL CONCRETE	Y			
SITE CONCRETE	Y			
LUMBER / TIMBER / ENGINEERED WOOD	Y		Y	Y
STEEL	Y			
INSULATION	Y		Y	Y
CLADDING	Y		Y	
ROOFING	Y			

# Materials

## Exercise:

### Structure & Exterior





PRODUCT TYPE	MRC2: EPDS	MRC3: SOURCING OF RAW MATERIAL	MRC4: MATERIAL INGREDIENTS (HPDS)	EQC2: LOW-EMITTING MATERIALS
STRUCTURAL CONCRETE	Y			
SITE CONCRETE	Y			
LUMBER / TIMBER / ENGINEERED WOOD	Y		Y	Y
STEEL	Y			
INSULATION	Y		Y	Y
CLADDING	Y		Y	
ROOFING	Y			
GLAZING				



# Materials

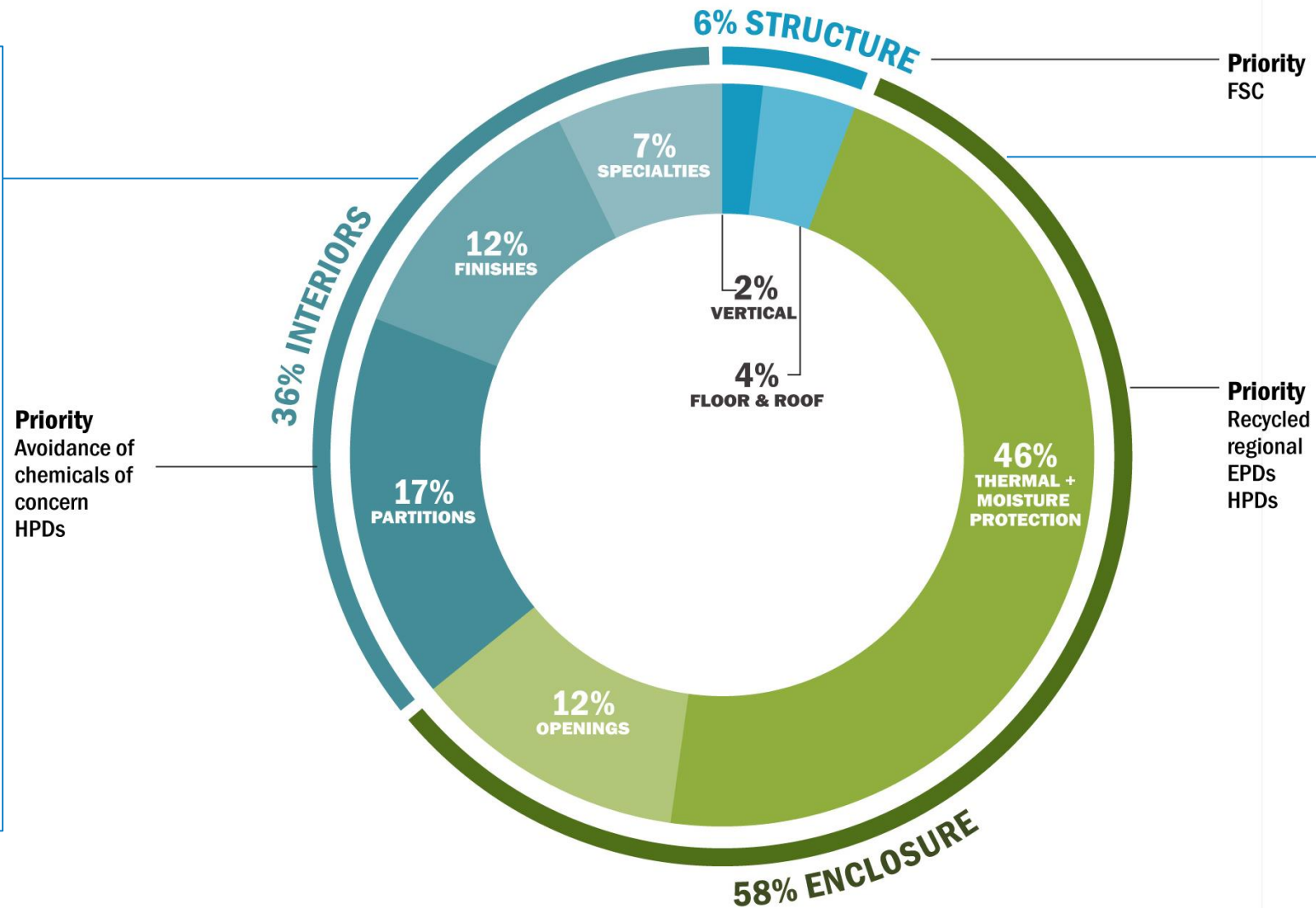
## Exercise:

### Structure & Exterior

PRODUCT TYPE	MRC2: EPDS	MRC3: SOURCING OF RAW MATERIAL	MRC4: MATERIAL INGREDIENTS (HPDS)	EQC2: LOW-EMITTING MATERIALS
STRUCTURAL CONCRETE	Y			
SITE CONCRETE	Y			
LUMBER / TIMBER / ENGINEERED WOOD	Y		Y	Y
STEEL	Y			
INSULATION	Y		Y	Y
CLADDING	Y		Y	
ROOFING	Y			
GLAZING	Y			

# Materials Strategy: Academic Renovation

- EPDs**  
Ceilings  
Carpet  
Resilient Flooring
- HPDs / Low VOC**  
Resilient Flooring  
Paints & coatings  
Adhesives and sealants  
Flooring  
Composite Wood
- Recycled Content**  
Carpet  
Metal Partition  
Framing
- FSC Certified**  
Millwork / casework

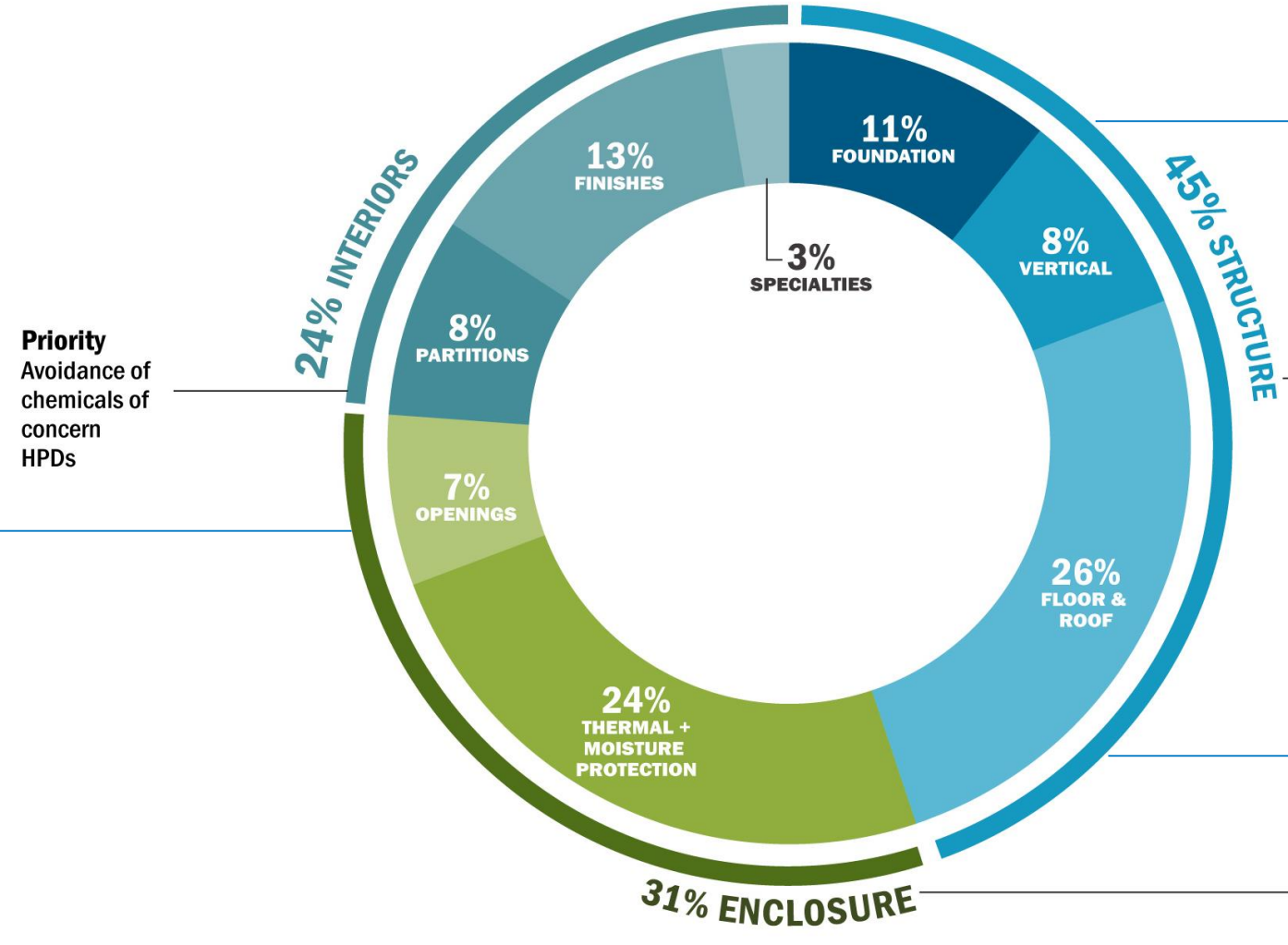


- EPDs**  
Asphalt Roofing  
Industry wide for Stucco
- HPDs / Low VOC**  
Paint
- Recycled Content**  
Stucco (?)



# Materials Strategy: Academic New Construction

- EPDs**  
Ceilings  
Carpet  
Resilient Flooring
- HPDs / Low VOC**  
Resilient Flooring  
Paints & coatings  
Adhesives and sealants  
Flooring  
Composite Wood
- Recycled Content**  
Carpet  
Metal Partition  
Framing
- FSC Certified**  
Millwork / casework



**Priority**  
Avoidance of chemicals of concern  
HPDs

**Priority**  
Recycled regional  
EPDs

**Priority**  
Avoidance of chemicals of concern  
HPDs

- EPDs**  
Concrete Mixes  
Timber
- Recycled Content**  
Reinforcing steel  
Concrete
- FSC Certified**  
Timber

- EPDs**  
Insulation  
Gypsum  
Metal Panels
- HPDs**  
Insulation
- Recycled Content**  
Metal Panels



# Utility Energy Efficiency Incentives

# UC/CSU/Utility Partnership Program

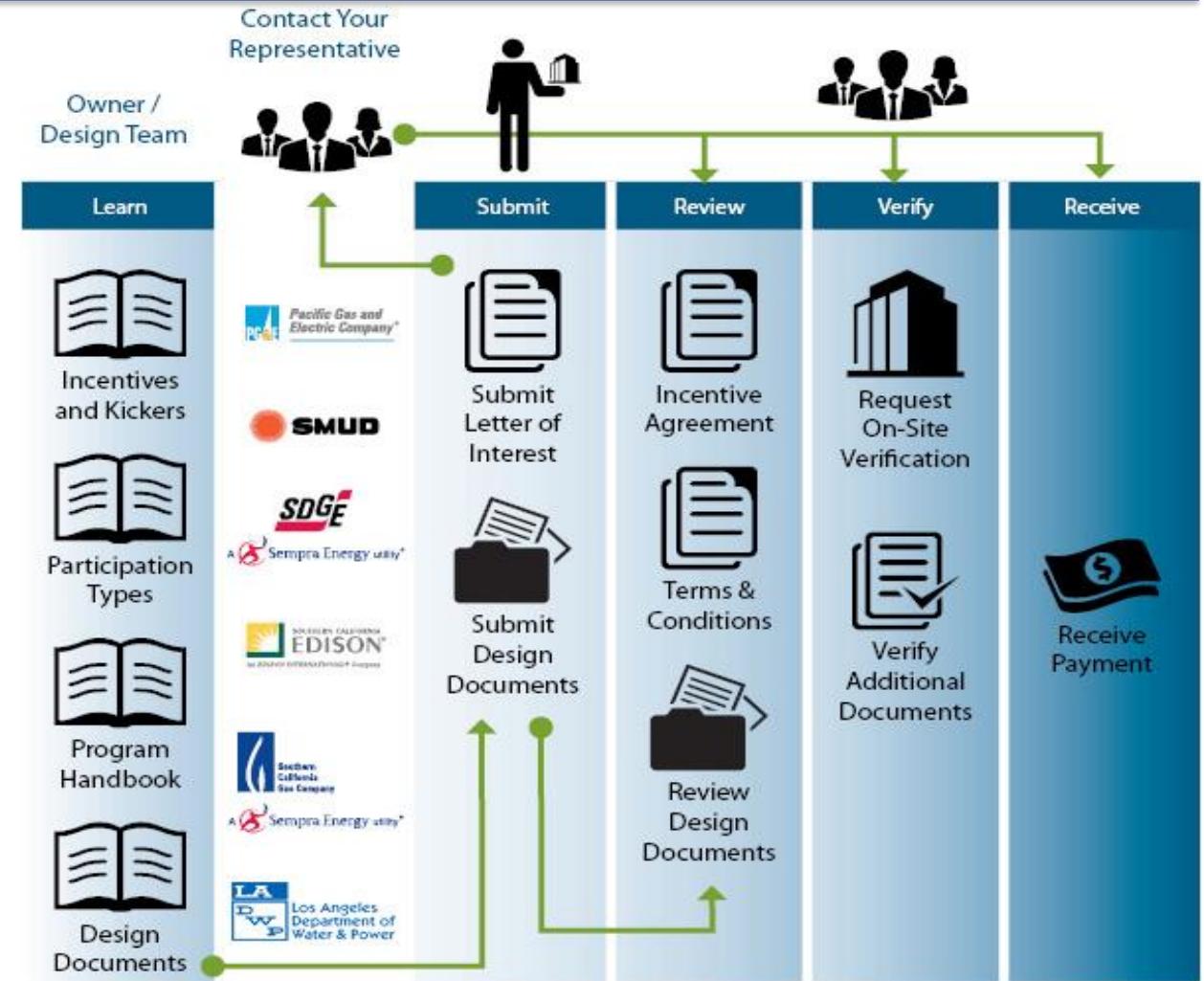


- The UC/CSU/Utility Energy Efficiency Partnership is designed to:
  - Identify energy savings opportunities at UC and CSU campuses
  - Provide funding and support for energy efficiency projects
  - Provide a framework and mechanism for the implementation of a comprehensive sustainability policy
  - Provide outreach and education to partners
- The Partnership comprises three active elements:
  1. Retrofit projects
  2. New Construction projects (Savings By Design)
  3. Training and Education

# Savings by Design

Encourages high-performance, non-residential building design and construction by providing financial incentives, design support, and detailed analysis

- Enhanced Owner and Design Team Incentives through the Partnership
- Design Assistance
- Energy Design Resources





# Partnership Incentives

Measure	Incentive Rate
Retrofit Projects	\$0.24/kWh
All Gas Measures	\$1.00/therm (\$1.50/therm, SCG 2016+)
New Construction – Whole Building Approach	\$0.10/kWh above core \$1.00/therm \$100/kW Design Team Incentive = 1/3 of Owner Incentive
New Construction – Systems Approach <ul style="list-style-type: none"> <li>• Lighting</li> <li>• HVAC and Refrigeration</li> <li>• Others and/or all</li> </ul>	\$0.15/kWh \$0.25/kWh, \$1.00/therm \$0.19/kWh, \$1.00/therm \$100/kW

# Contact Information

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**LUNCH**

# **CALGreen AND LEEDv4 COMPLIANCE**

# CALGreen & USGBC LEEDv4

## CALGreen at UC

- UC uses CALGreen Mandatory requirements and not the tiers.

## CALGreen at Cities/Counties

- Some cities and counties adopt LEED certification requirements (or equivalents) and/or other green building requirements
- Cities and counties adopt either the Mandatory, Tier 1 or 2 CALGreen requirements or a mix depending on project type and size

# CALGreen & USGBC LEEDv4

## Green Building for Non-Residential New Construction and Renovation Compliance Verification

### CALGreen Requirements

Project Condition	Requirement
<input type="checkbox"/> Tenant improvements, renovations, or alterations less than 5,000 sq. ft. with a permit value of \$200,000 or more. <sup>2,3</sup> (CBC, Part 11.301.3, PAMC 16.14.080)	<b>CALGreen Mandatory</b>
<input type="checkbox"/> Tenant improvements, renovations, or alterations of 5,000 sq. ft. or more that include replacement of at least two of the following: HVAC system, building envelope, hot water system, or lighting system. <sup>2,3</sup> (PAMC 16.14.080)	<b>CALGreen Mandatory + Tier 1</b>
<input type="checkbox"/> All new construction of any size, and addition projects 1,000 sq. ft. <sup>2</sup> or greater <sup>3</sup> (PAMC 16.14.080)	<b>CALGreen Mandatory + Tier 2</b>





# CALGreen & USGBC LEEDv4

## Documentation — T24 Energy and CALGreen vs LEED

- **Energy – Residential and Non Residential**
  - Compliance Documentation to be imprinted on plans
  - Depends on code officials whose understanding and training may vary to review and enforce regulations
- **CALGreen has no separate documentation and instead relies on design documents to demonstrate compliance**
  - Compliance is in the form of a checklist
  - Depends on code officials whose understanding and training may vary to review and enforce regulations
- **LEED had specific forms and backup documentation that's required**
  - Gives performance metrics
  - Third-party review by industry

# **CALGreen 2016**

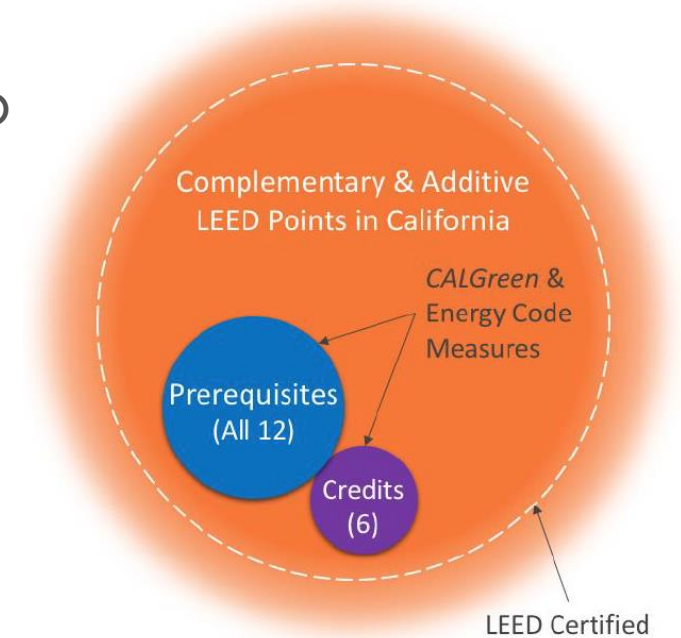
## **WHAT'S NEW?**

# Streamlined

The USGBC recently announced significant streamlining of all LEED v4 prerequisites and up to six credits when projects built to California's building codes seek LEED certification. An 50 additional points are within reach via LEED credits that exceed code minimums but are complementary to state requirements.

- › SS Prerequisite: Construction Activity Pollution Prevention
- › SS Credit: Light Pollution Reduction (1 Point, Option 1)
- › WE Prerequisite: Outdoor Water Use Reduction
- › WE Prerequisite: Indoor Water Use Reduction
- › WE Prerequisite: Building-Level Water Metering
- › WE Credit: Outdoor Water Use Reduction (1 Point, Option 2)
- › WE Credit: Indoor Water Use Reduction (1 Point)
- › EA Prerequisite: Fundamental Commissioning and Verification
- › EA Prerequisite: Minimum Energy Performance
- › EA Prerequisite: Building-Level Energy Metering
- › EA Prerequisite: Fundamental Refrigerant Management
- › EA Credit: Optimize Energy Performance (1 Point, Option 1)
- › MR Prerequisite: Storage and Collection of Recyclables
- › MR Prerequisite: Construction and Demolition Waste Management Planning
- › MR Credit: Construction and Demolition Waste Management (1 Point, Option 1)
- › EQ Prerequisite: Minimum Indoor Air Quality Performance
- › EQ Prerequisite: Environmental Tobacco Smoke Control
- › EQ Credit Construction Indoor Air Quality Management Plan (1 point)

## California's Codes Recognized in LEED



Section	Name	Changes to requirements
5.106.5.3	<b>Electric Vehicle Parking</b>	Number of spaces increased to 6% of total spaces (from 3%)
5.201.1	<b>Energy Efficiency</b>	Points to new Title 24, Part 6, 2016
5.303.3	<b>Water conserving plumbing fixtures and fittings</b>	More stringent efficiency standards
5.304	<b>Outdoor water use</b>	Points to CA Model Water Efficient Landscape Ordinance
5.408.1	<b>Construction waste management</b>	65% diversion goal (up from 50%)
5.408.2	<b>Universal Waste</b>	Divert batteries, electronic devices, mercury-containing equipment, lamps, cathode ray tubes, and aerosol cans from landfill.
5.410.1	<b>Recycling by occupants</b>	Now includes organic waste

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Section	Name	Changes to requirements
4.303	<b>Indoor water use</b>	Wall mounted urinals shall not exceed 0.125 gallons per flush, lavatory faucets 1.2 gpm
4.304.1	<b>Outdoor potable use in landscape areas</b>	Comply with MWEL0
4.408.1	<b>Construction waste management</b>	65% diversion goal (up from 50%)
4.410.2	<b>Recycling by occupants</b>	Requirement for recycling area where >5 multifamily dwelling units are constructed on a building site

# **CALGreen/LEEDv4 EXERCISE**

Code/ Rating System	Reference Number	Measure / Credit Name	Requirements	Comparison Results
CG-2016	5.303.3	Water conserving plumbing fixtures and fittings	Meet the following flow rate requirements: 1) WC: 1.28 gpf 2) urinal: 0.5 gpf 3) wall-mounted urinal: 0.125 gpf 4) showerhead: 2 gpm 5) non-residential lavatory faucet: 0.5 gpm 6) kitchen faucet: 1.8 gpm 7) wash fountain: 1.8 gpm 8) metering faucet: 0.2 gal/cycle 9) metering faucet for wash fountains: 0.2 gal/cycle	<p><b>CALGreen is more stringent than LEED v4.</b></p> <p>On April 1, 2015, Governor Jerry Brown released Executive Order B-29-15 mandating emergency regulations that would improve the efficiency of water appliances—including toilets and faucets in new and existing buildings.</p> <p>CALGreen sets maximum prescriptive flow rates for bathroom and kitchen plumbing fixtures, while LEED follows a performance approach with a water budget. CALGreen builds off the California Plumbing Code updates, with fixture flow rates now more stringent than LEED.</p>
	5.303.6	Standards for Plumbing Fixtures and Fittings	Install plumbing fixtures in accordance with the California Plumbing Code.	
LEEDv4	WEp2	Prerequisite: Indoor Water Use Reduction	Reduce water consumption by 20% from a baseline. Address fixtures & fittings, appliances, equipment, and processes.	<p>On average, California's fixture requirements are 29% lower than LEED's baseline requirements. The amount of potable water reduced against LEED's baseline would vary project to project, as it depends on the final count of fixtures throughout the building. But it is reasonable to expect a project meeting CALGreen requirements would easily achieve the LEED prerequisite for Indoor Water Use Reduction and also earn 2 points for a 30% reduction under the LEED credit.</p>
	WEc2	Indoor Water Use Reduction 25%-50%	Further reduce fixture and fitting water use from the calculated baseline in WEp2.	
CG-2016	5.304	Outdoor Water Use	Comply with the California Model Water Efficiency Landscape Ordinance (MWELo) contained within Chapter 2.7, Division 2, Title 23, California Code of Regulations	<p><b>CALGreen (MWELo) is more stringent than LEED v4 (EPA WaterSense).</b></p> <p>In response to California's drought, the state's irrigation requirements have become more stringent than LEED. Landscape irrigation must meet the Model Water Efficiency Landscape Ordinance (MWELo). This ordinance, like LEED, sets a maximum allowable water allowance for a project site based on local evapotranspiration. The method for establishing this water budget is identical between MWELo and LEED's WaterSense approach. MWELo requires a water use reduction between 45-55%, depending on site use conditions, and also requires an audit report to be filed from a certified landscape irrigation auditor.</p>
LEEDv4	WEp1	Prerequisite: Outdoor Water Use Reduction	Option 1: No irrigation required. Option 2: Reduce irrigation demand by 30% from a calculated baseline using the EPA WaterSense Water Budget tool.	<p>LEED's prerequisite requires a 30% reduction from a baseline, easily achieved by designing to the MWELo standard. Further, it's reasonable to expect a MWELo compliant project to earn at least 1 point for a 50% reduction in outdoor water use.</p>
	WEc1	Outdoor Water Use Reduction	Option 1: No irrigation required. Option 2: Reduce irrigation demand by 50% (1 point) or 100% (2 points) from a calculated baseline using the EPA WaterSense Water Budget tool.	
CG-2016	5.407.1	Weather Protection		<b>CALGreen does not have a LEED point for comparison.</b>
LEEDv4	N/A	N/A	N/A	
CG-2016	5.407.2	Moisture Control		<b>CALGreen does not have a LEED point for comparison.</b>
LEEDv4	N/A	N/A	N/A	
CG-2016	5.408.1	Construction Waste Management	Develop a Construction and Demolition Waste Management Plan and identify a 65% diversion goal. Use a waste management company to provide verifiable documentation. Or generate less than 2 lbs/sf of construction waste	<p><b>CALGreen and LEED are not aligned, but they are similar.</b></p> <p>Both CALGreen and LEED require development of a Construction and Demolition Waste Management Plan. CALGreen requires the plan to identify a 65% Diversion goal, where the LEED prerequisite only requires an estimate. CALGreen requires the use of a waste management company to provide verifiable documentation and LEED does not.</p>
	5.408.2	Universal Waste	Items like batteries, electronic devices, mercury-containing equipment, lamps, cathode ray tubes, and aerosol cans must be disposed of properly and diverted from landfill.	<p>The LEED credit has two options. For one point, a project must divert 50% of three material streams or 75% of four material streams for two points. Excavated soil, land clearing debris and alternative daily cover (ADC) must be excluded from diversion calculations for both CALGreen and LEED.</p>
LEEDv4	MRp2	Construction and Demolition Waste Management Planning	Develop a Construction and Demolition Waste Management Plan. Identify at least five materials for landfill diversion. Estimate their contribution to overall project waste. Specify diversion strategies and identify recycling facilities.	<p>Both CALGreen and the LEED credit provide an alternative waste reduction strategy that allows the project to comply by not generating more than 2 lbs or 2.5 lbs of construction waste per square foot of building's</p>



# Energy

<b>CG-2016</b>	<b>5.201.1</b>	<b>Energy Efficiency</b>	Meet or exceed the requirements of the California Building Energy Efficiency Standards (Title 24, Part 6, 2016)
<b>LEEDv4</b>	<b>EAp2</b>	<b>Minimum Energy Performance</b>	Demonstrate an energy cost reduction compared to ASHRAE 90.1-2010 (5% New Construction, 3% Major Renovations, 2% Core and Shell)
	<b>EAc1</b>	<b>Optimize Energy Performance</b>	Use whole building energy simulation to demonstrate increased energy cost reduction compared to ASHRAE 90.1-2010. something



# Indoor Water

CG-2016	5.303.3	<b>Water conserving plumbing fixtures and fittings</b>	Meet the following flow rate requirements: 1) WC: 1.28 gpf 2) urinal: 0.5 gpf 3) wall-mounted urinal: 0.125 gpf 4) showerhead: 2 gpm 5) non-residential lavatory faucet: 0.5 gpm 6) kitchen faucet: 1.8 gpm 7) wash fountain: 1.8 gpm 8) metering faucet: 0.2 gal/cycle 9) metering faucet for wash fountains: 0.2 gal/cycle
	5.303.6	<b>Standards for Plumbing Fixtures and Fittings</b>	Install plumbing fixtures in accordance with the California Plumbing Code.
LEEDv4	WEp2	<b>Prerequisite: Indoor Water Use Reduction</b>	Reduce water consumption by 20% from a baseline. Address fixtures & fittings, appliances, equipment, and processes.
	WEc2	<b>Indoor Water Use Reduction 25%-50%</b>	Further reduce fixture and fitting water use from the calculated baseline in WEp2.

# Outdoor Water

<b>CG-2016</b>	<b>5.304</b>	<b>Outdoor Water Use</b>	Comply with the California Model Water Efficiency Landscape Ordinance (MWELo) contained within Chapter 2.7, Division 2, Title 23, California Code of Regulations
<b>LEEDv4</b>	<b>WEp1</b>	<b>Prerequisite: Outdoor Water Use Reduction</b>	Option 1: No irrigation required. Option 2: Reduce irrigation demand by 30% from a calculated baseline using the EPA WaterSense Water Budget tool.
	<b>WEc1</b>	<b>Outdoor Water Use Reduction</b>	Option 1: No irrigation required. Option 2: Reduce irrigation demand by 50% (1 point) or 100% (2 points) from a calculated baseline using the EPA WaterSense Water Budget tool.



# C&D Waste

CG-2016	5.408.1	<b>Construction Waste Management</b>	Develop a Construction and Demolition Waste Management Plan and identify a 65% diversion goal. Use a waste management company to provide verifiable documentation. Or generate less than 2 lbs/sf of construction waste
	5.408.2	<b>Universal Waste</b>	Items like batteries, electronic devices, mercury-containing equipment, lamps, cathode ray tubes, and aerosol cans must be disposed of properly and diverted from landfill.
LEEDv4	MRp2	<b>Construction and Demolition Waste Management Planning</b>	Develop a Construction and Demolition Waste Management Plan. Identify at least five materials for landfill diversion. Estimate their contribution to overall project waste. Specify diversion strategies and identify recycling facilities.
	MRc5	<b>Construction and Demolition Waste Management</b>	Option 1: Divert 50% of waste and 3 material streams (1 point), or 75% of waste and 4 material streams (2 points). Option 2: Generate less than 2.5 lbs/sf of construction waste

# Materials

CG-2016	4.504.2.1	Adhesives, sealants and caulks	Adhesives, adhesive bonding primers, adhesive primers, sealants, sealant primers and caulks comply with SCAQMD Rule 1168. Aerosol adhesives comply with state VOC standards.
LEEDv4	EQc2	Low-Emitting Materials	Option 1: Achieve threshold levels of compliance with emissions and content standards for a number of product categories (up to 3 points). Adhesives and sealants must comply with CDPH Standard Method VI.1-2010 or SCAQMD Rule 1168
CG-2016	4.504.2.2	Paints and Coatings	Comply with VOC limits in the California Air Resources Board, Architectural Coatings Suggested Control Measure 2008
	4.504.2.2	Aerosol Paints and Coatings	Comply with VOC limits in the BAQMD Rule 49
LEEDv4	EQc2	Low-Emitting Materials	Option 1: Achieve threshold levels of compliance with emissions and content standards for a number of product categories (up to 3 points). Paints and coatings must comply with VOC limits in the California Air Resources Board, Architectural Coatings Suggested Control Measure 2007 and CDPH Standard Method VI.1-2010 or SCAQMD Rule 1113
CG-2016	4.504.3	Carpet systems	All interior carpet must meet one of the following 1) Carpet and Rug Institute's Green Label Plus Program 2) CDPH Standard Method VI.1-2010 3) NSF/ANSI 140 Gold or higher 4) Scientific Certification Systems Indoor Advantage Gold. Carpet cushion must meet CRI Green Label program, and carpet adhesives must meet SCAQMD Rule 1168
LEEDv4	EQc2	Low-Emitting Materials	Option 1: Achieve threshold levels of compliance with emissions and content standards for a number of product categories (up to 3 points). 100% of resilient flooring must adhere to CDPH Standard Method VI.1-2010

**LET'S TAKE A BREAK**

# **CASE STUDIES: ENERGY PERFORMANCE**



# UC Merced 2020 Campus

Merced, CA

Webcor, SOM, WRNS Studio, HOK, Mahlum, Page



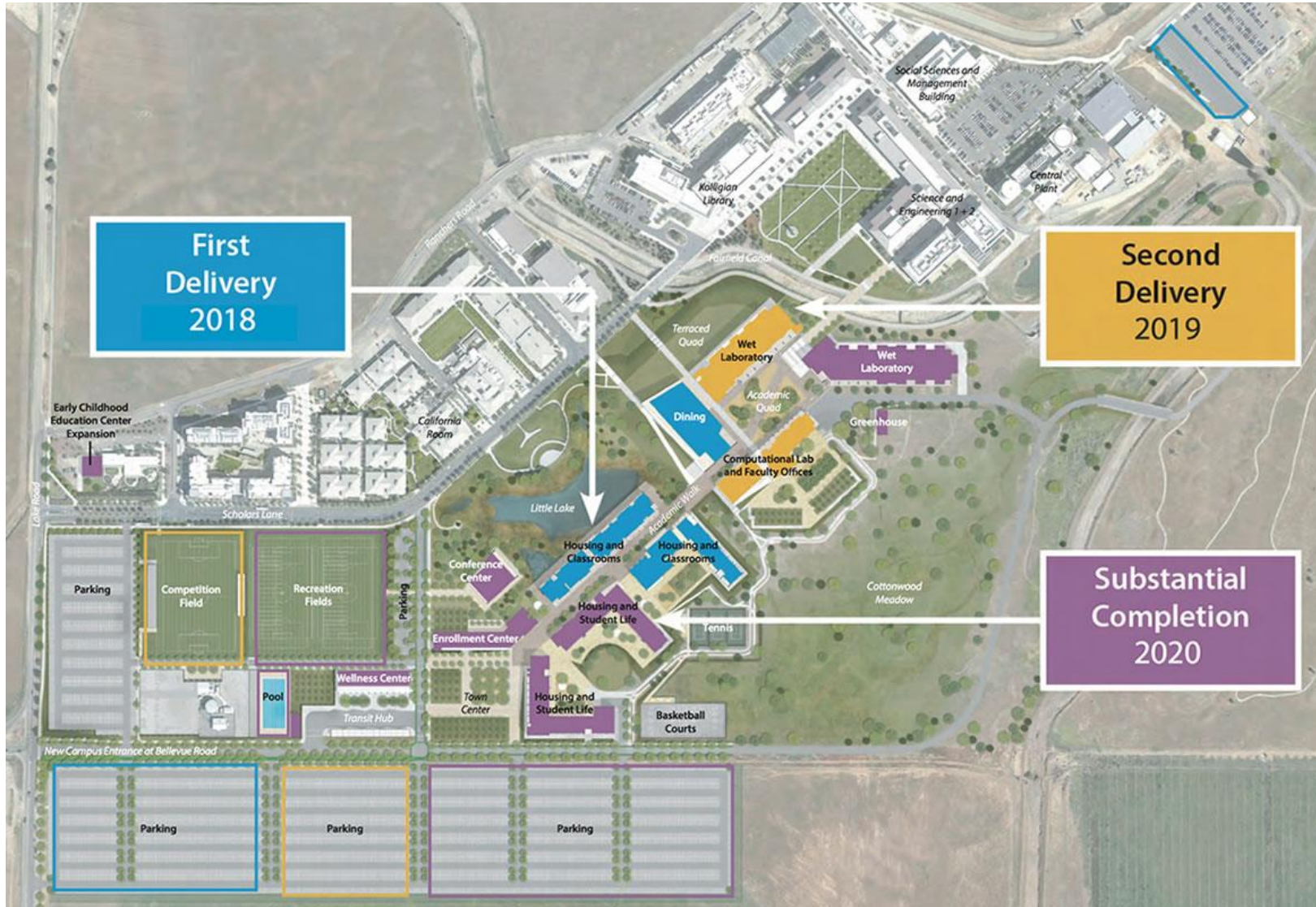
### **Zero Net Energy Campus:**

Generate from renewable sources as much energy is consumed annually. Includes campus energy use and exclude off-campus use, commuting, and air travel. (*UC Merced Climate Action Plan 2009*)

### **Zero Net Energy:**

Producing the same amount of renewable energy that is consumed. (*Long Range Development Plan 2013*)

# UC Merced 2020 Campus



## 13 buildings

In Construction – 1<sup>st</sup> & 2<sup>nd</sup> Delivery

- 1A/3B and 1B: Residence Halls
- 1D Dining Hall
- 2A Research Lab
- 2B Computational Lab
- 3A Wet Lab
- 3C and 3D Residence Halls

On the boards – 3<sup>rd</sup> Delivery

- 3F Early Childhood
- 3G Conference Center
- 3H ALO Enrollment
- 3K Competition Pool
- 3M Wellness Center

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BAN  
FA  
BRICK



# UC Merced 2020 Campus



Net Zero Energy  
Net Zero Carbon  
Net Zero Waste

~78 energy models  
3 TYPES OF MODELS x 2 PHASES x  
13 BUILDINGS

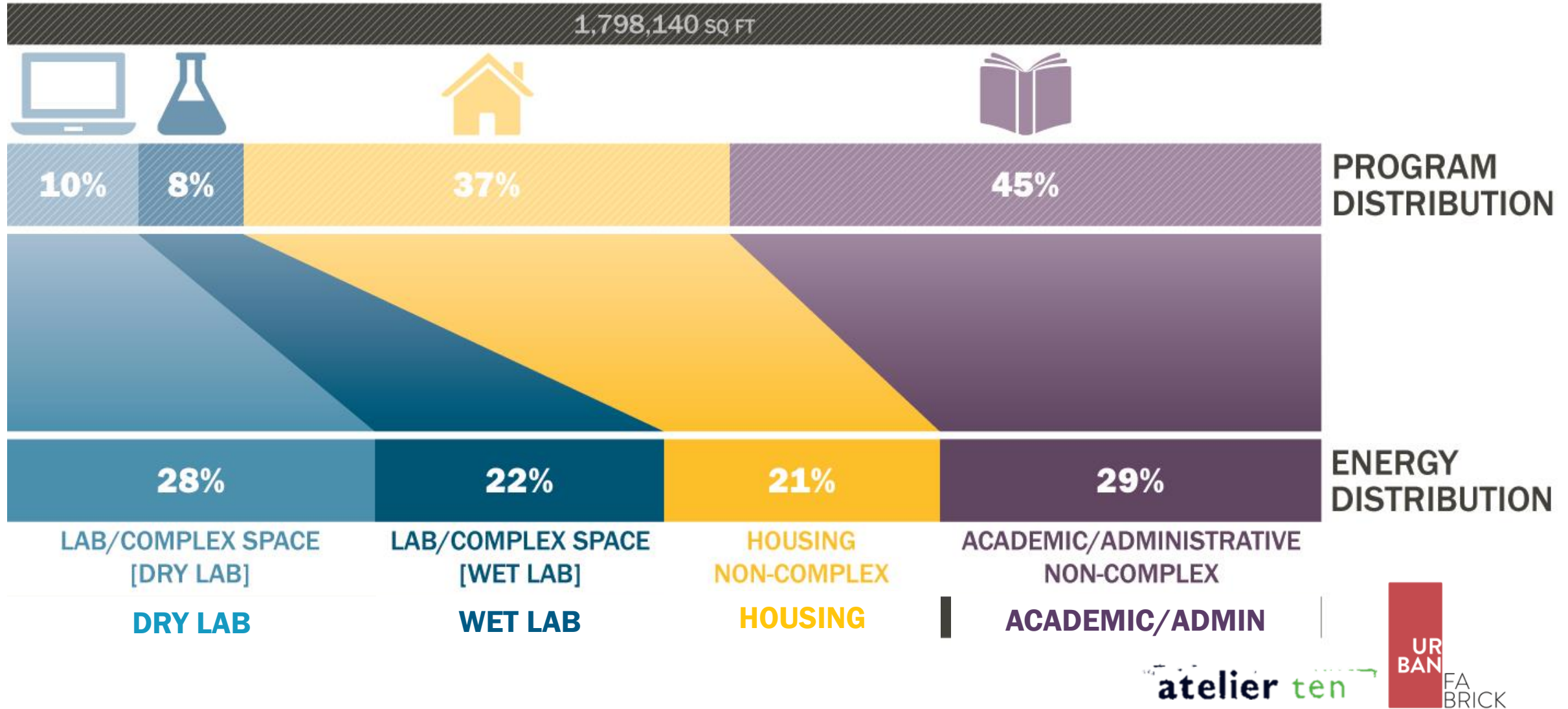
~26 sets of LEED

calculations 2x/BUILDING

- daylight calculations for  
every room on campus

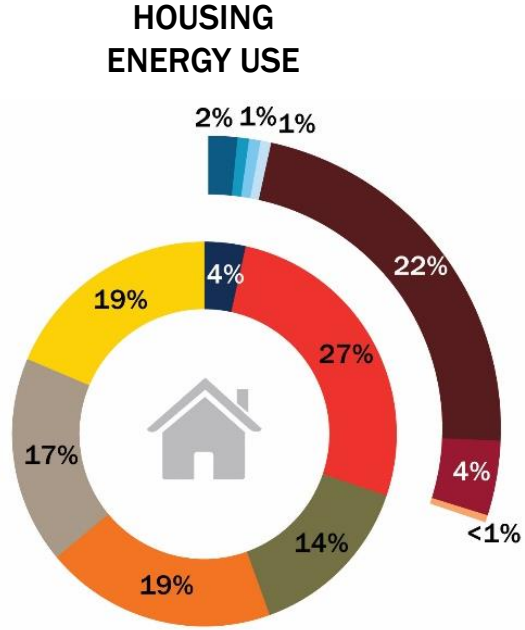
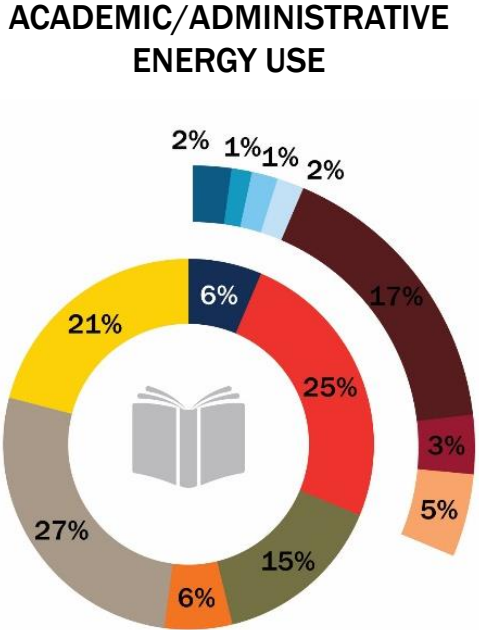
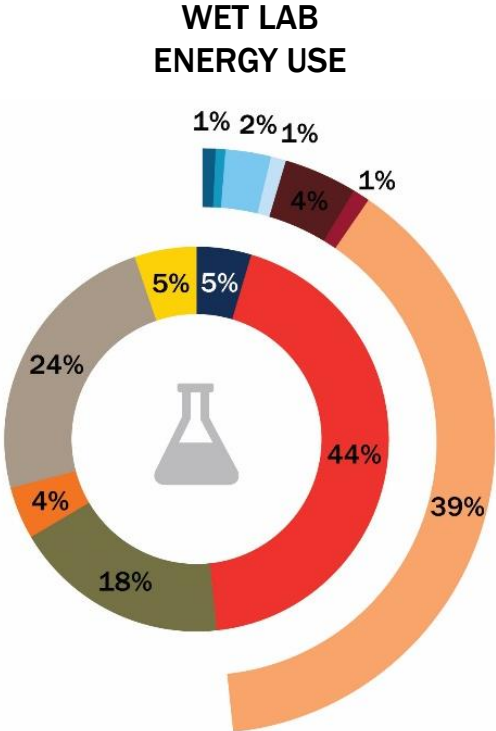
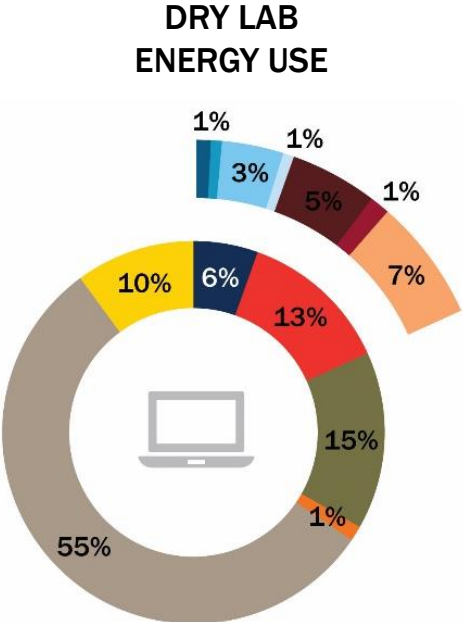


# Energy Use Distribution by Program





# Energy Use Distribution



#### ENERGY END USE

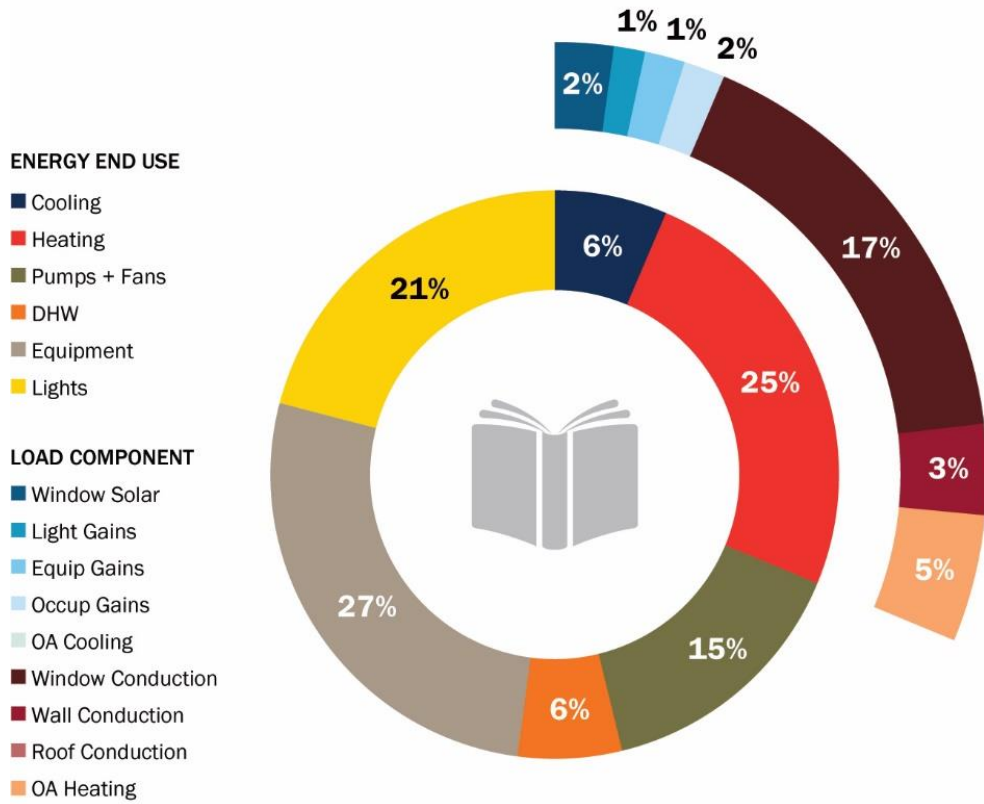
- Cooling
- Heating
- Pumps + Fans
- DHW
- Equipment
- Lights

#### LOAD COMPONENT

- Window Solar
- Light Gains
- Equip Gains
- Occup Gains
- OA Cooling
- Window Conduction
- Wall Conduction
- Roof Conduction
- OA Heating

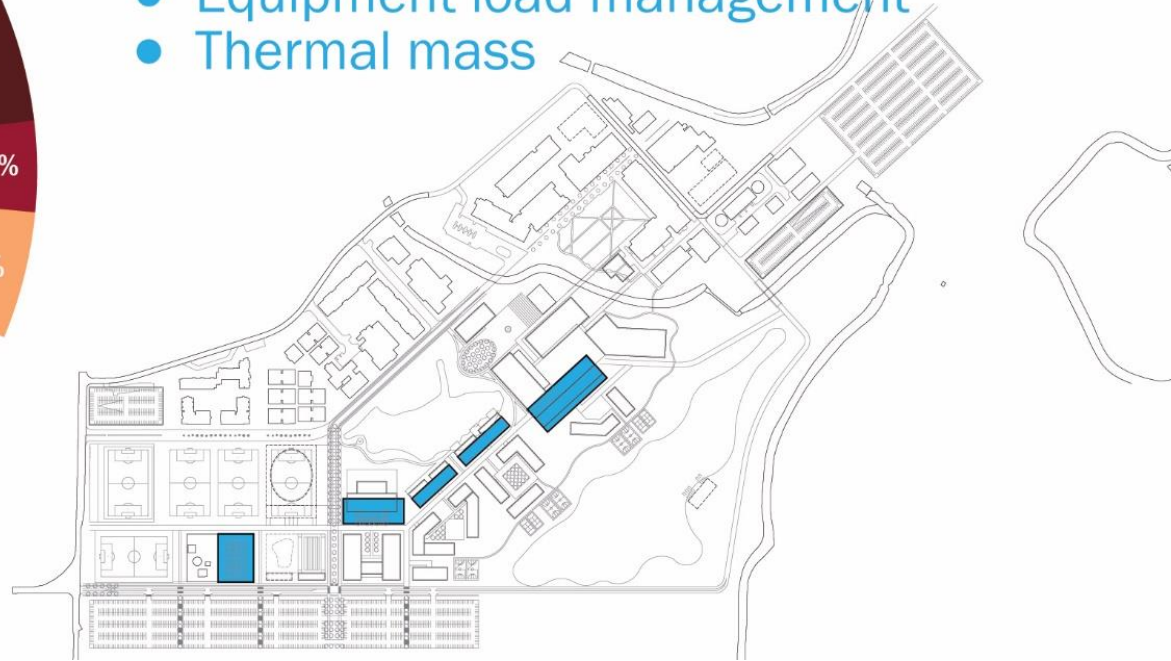


# Energy Drivers: Academic



## ACADEMIC

- Narrow massing for daylight & natural ventilation access
- High performance glazing
- Equipment load management
- Thermal mass

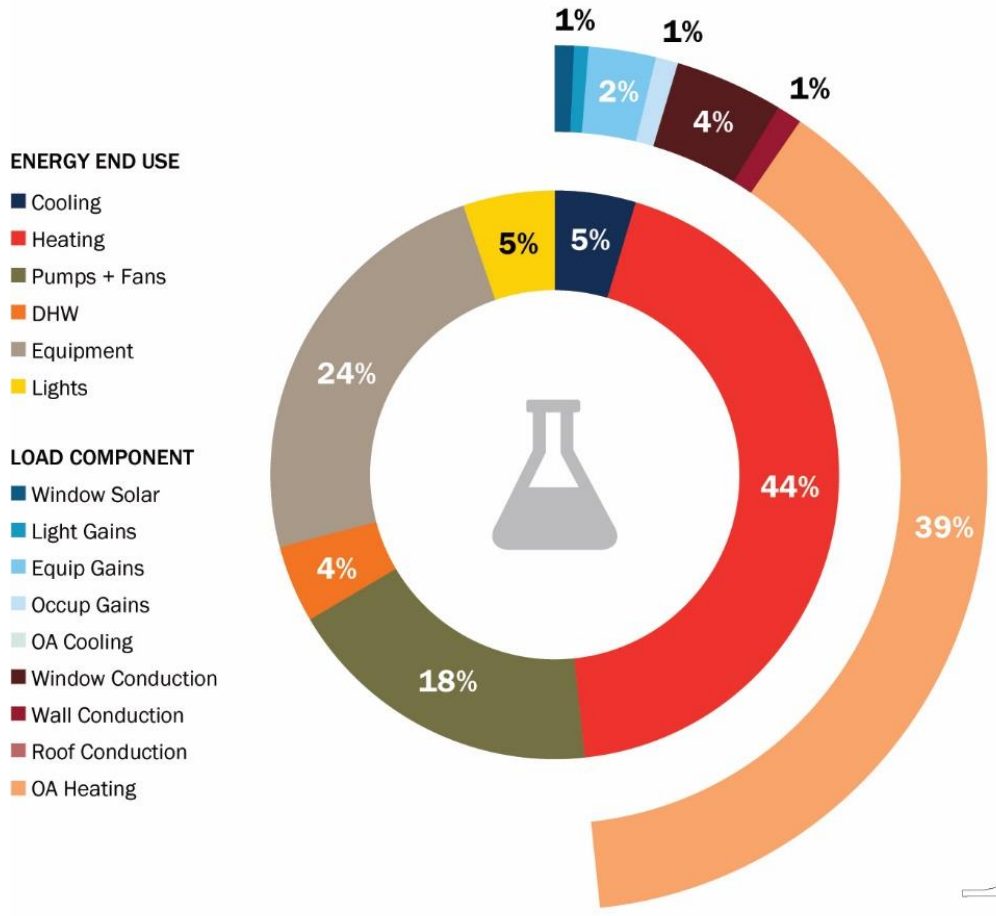


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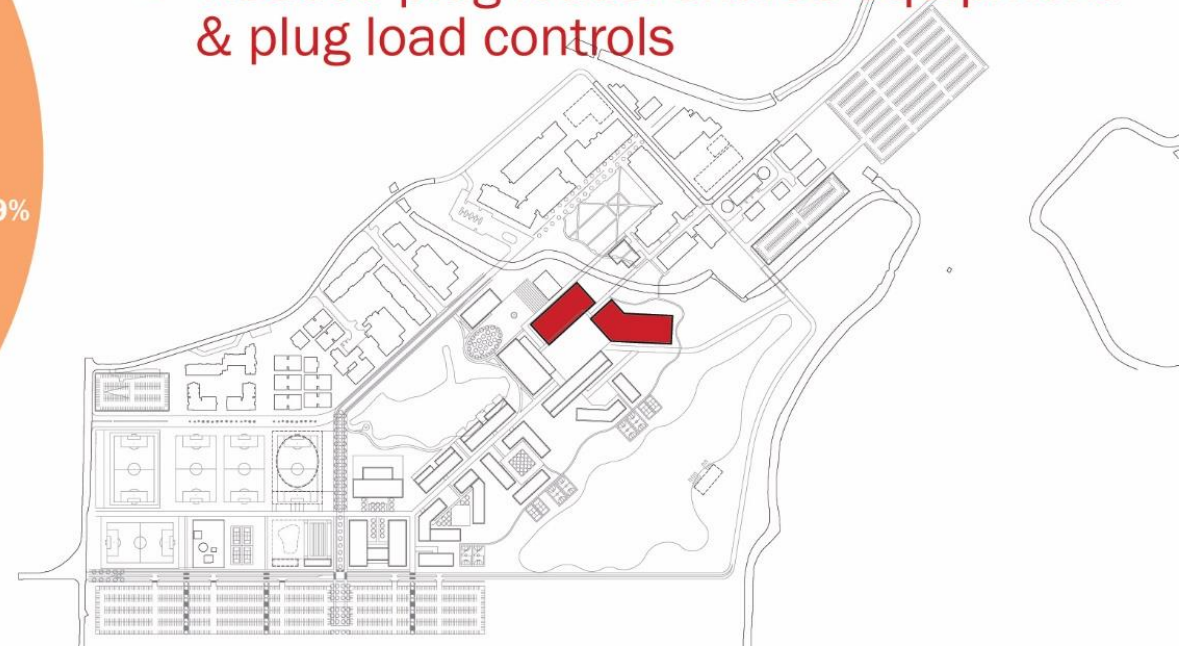


# Energy Drivers: Labs

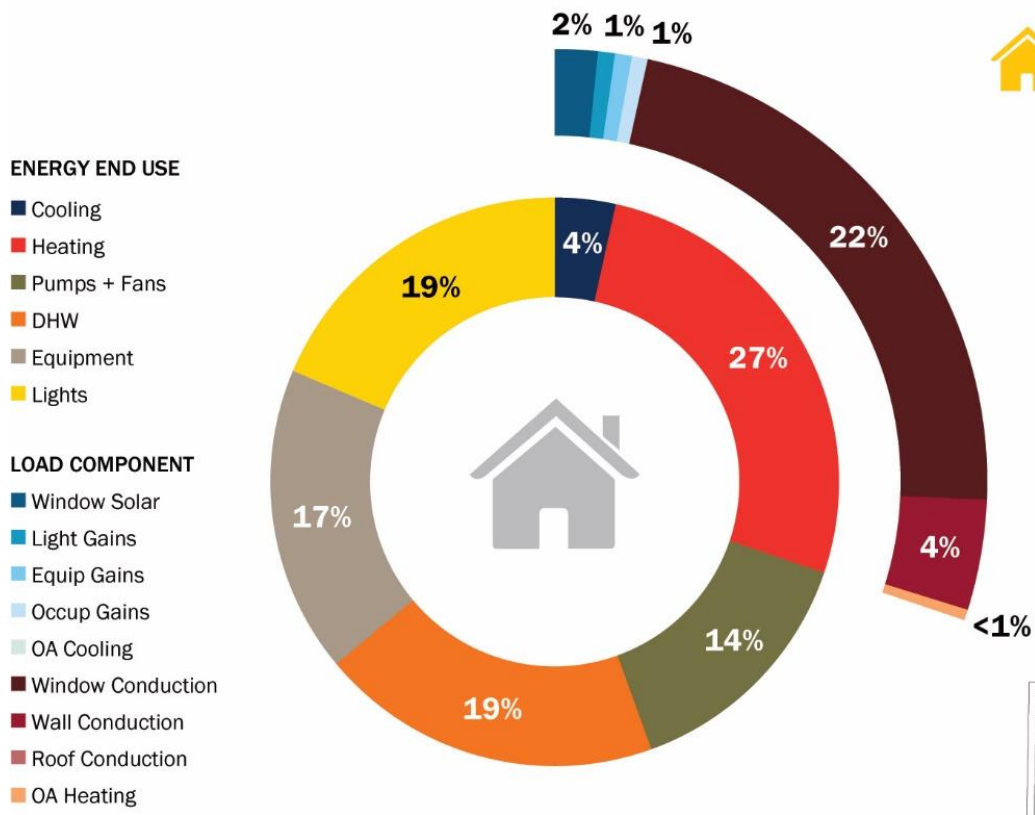


## RESEARCH/LABS

- Minimize ACH
- Cascade air
- Heat recovery
- Reduce plug loads: shared equipment & plug load controls

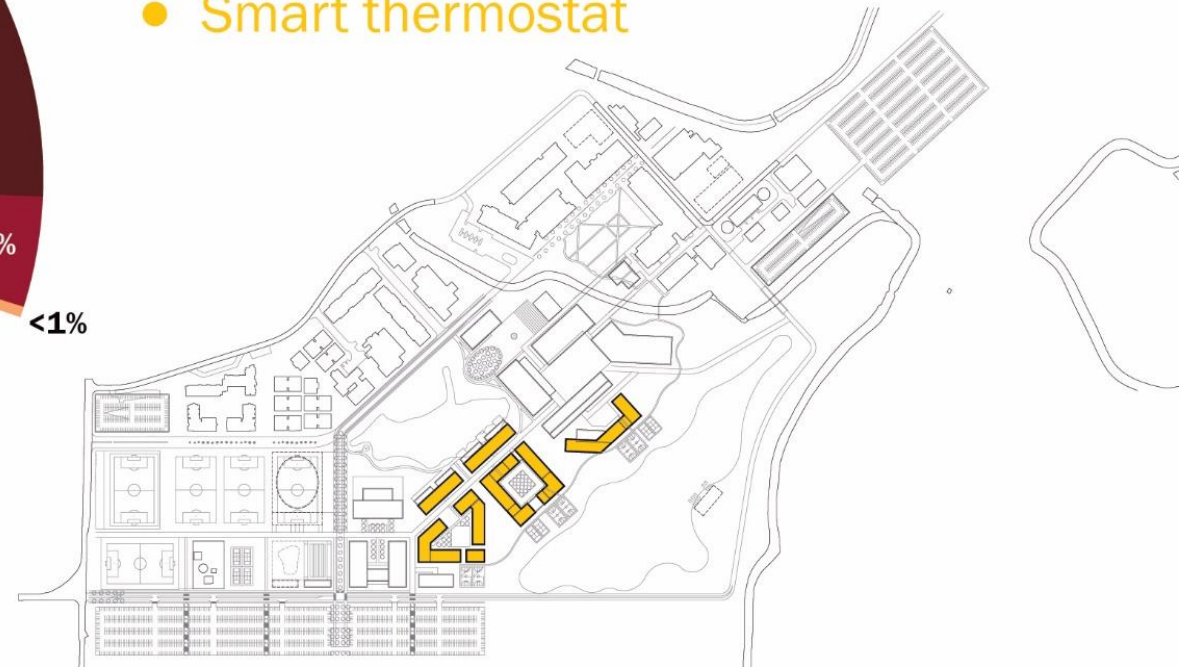


# Energy Drivers: Labs



## HOUSING

- High performance glazing
- Daylight to reduce electric lighting
- Low-flow fixtures
- Smart thermostat



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# Energy Performance Target Summary

## UCM 2020 Technical Requirements

Energy Target	Metric	Modeling Software	Reviewed by
LEED 2009 EAcl	<b>22% better than ASHRAE 90.1-2007</b>  Energy Cost Savings (\$)	eQuest or other USGBC approved software	GBCI
T24 Code Compliance 2016	<b>Pass/Fail</b>  Time Dependent Valuation (TDV) Energy	CBECC-com	Code Official
T24 Minus 20 Standard 2013	<b>20% better than T24-2013</b>  Time Dependent Valuation (TDV) Energy	eQuest or other USGBC approved software	UC Merced

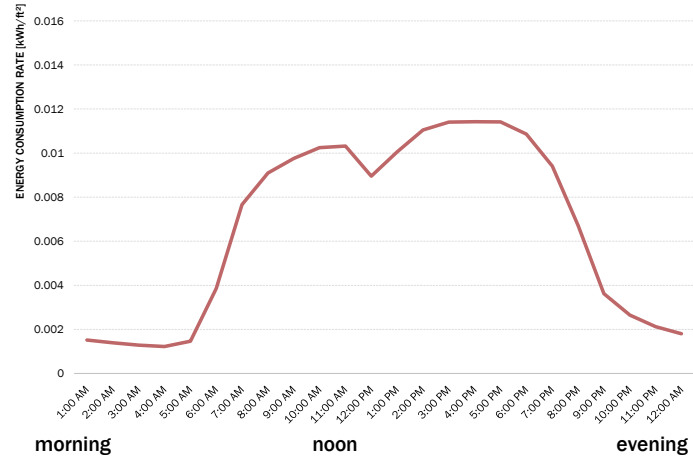
## PG&E Utility Incentive Eligibility

Savings by Design	<b>&gt;10% better than T24-2013 or T24-2016</b>  Time Dependent Valuation (TDV) Energy	eQuest or other PG&E approved software	PG&E
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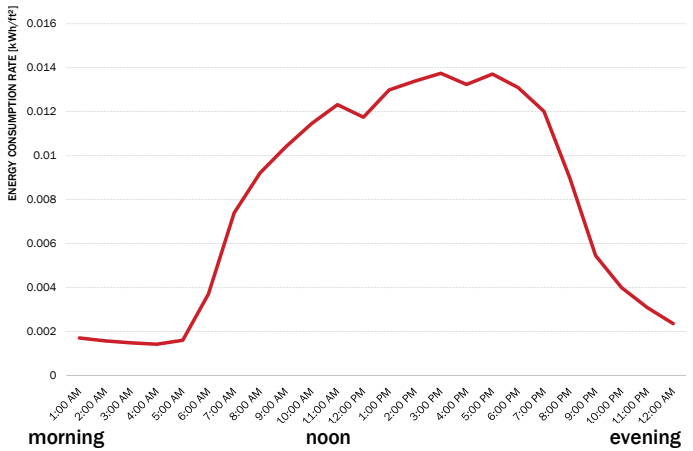
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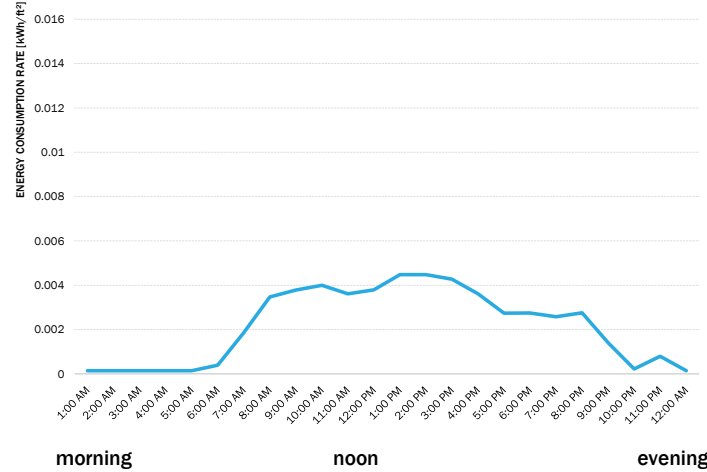
# Energy Use: Time of Day (Time Dependent Valuation (TDV) Energy)



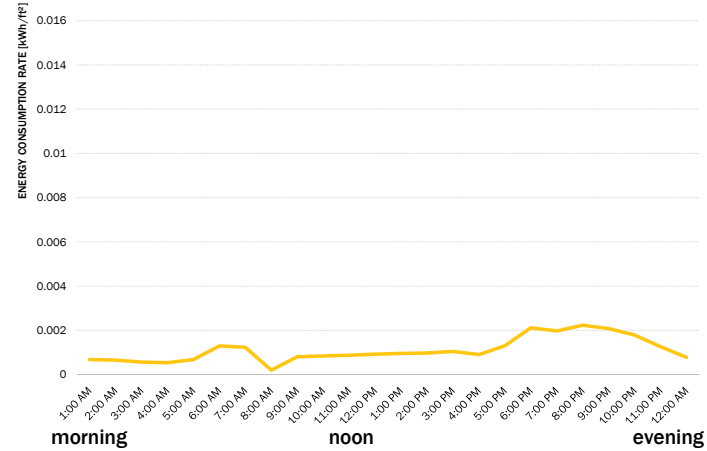
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**DRY LAB**



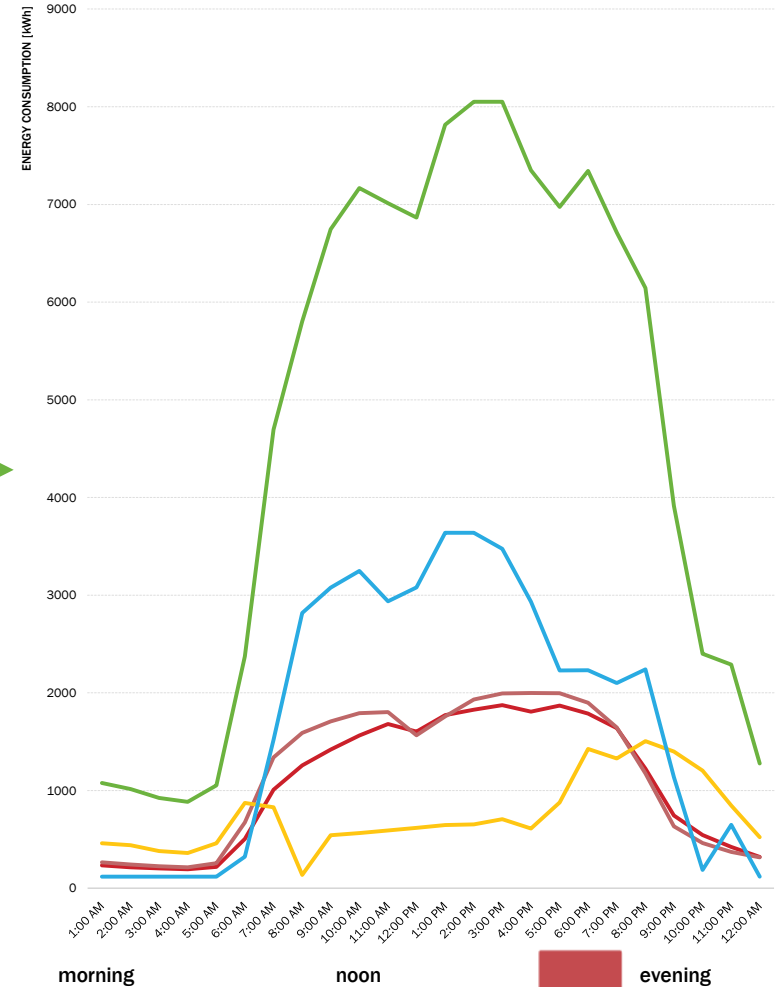
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**WET LAB**



morning  
**ACADEMIC/ADMINISTRATIVE**



morning  
**HOUSING**

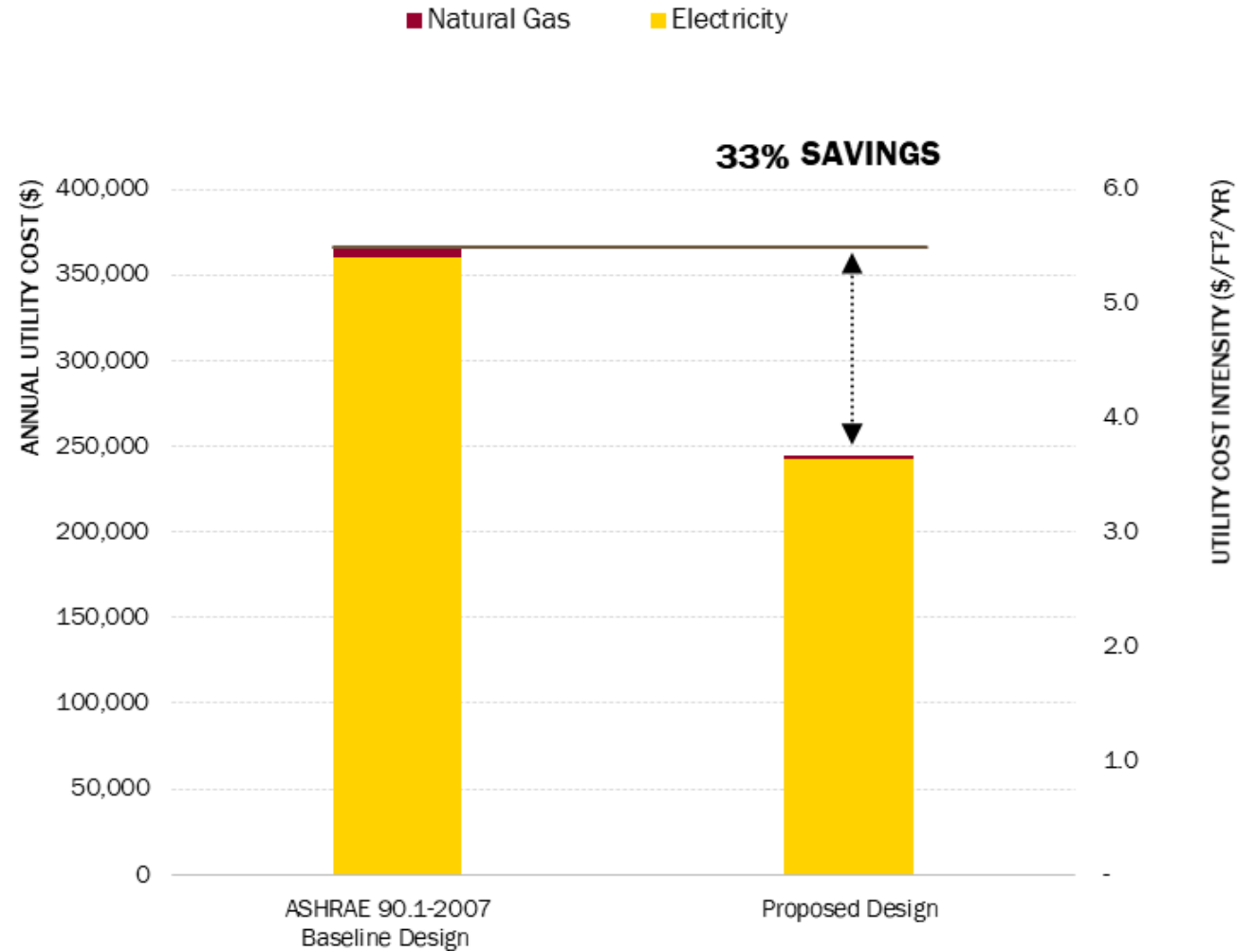


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**COMBINED**



# 3H Enrollment Building: LEED ASHRAE 90.1 Energy Cost

ANNUAL UTILITY COST  
7226 3H ALO ENROLLMENT



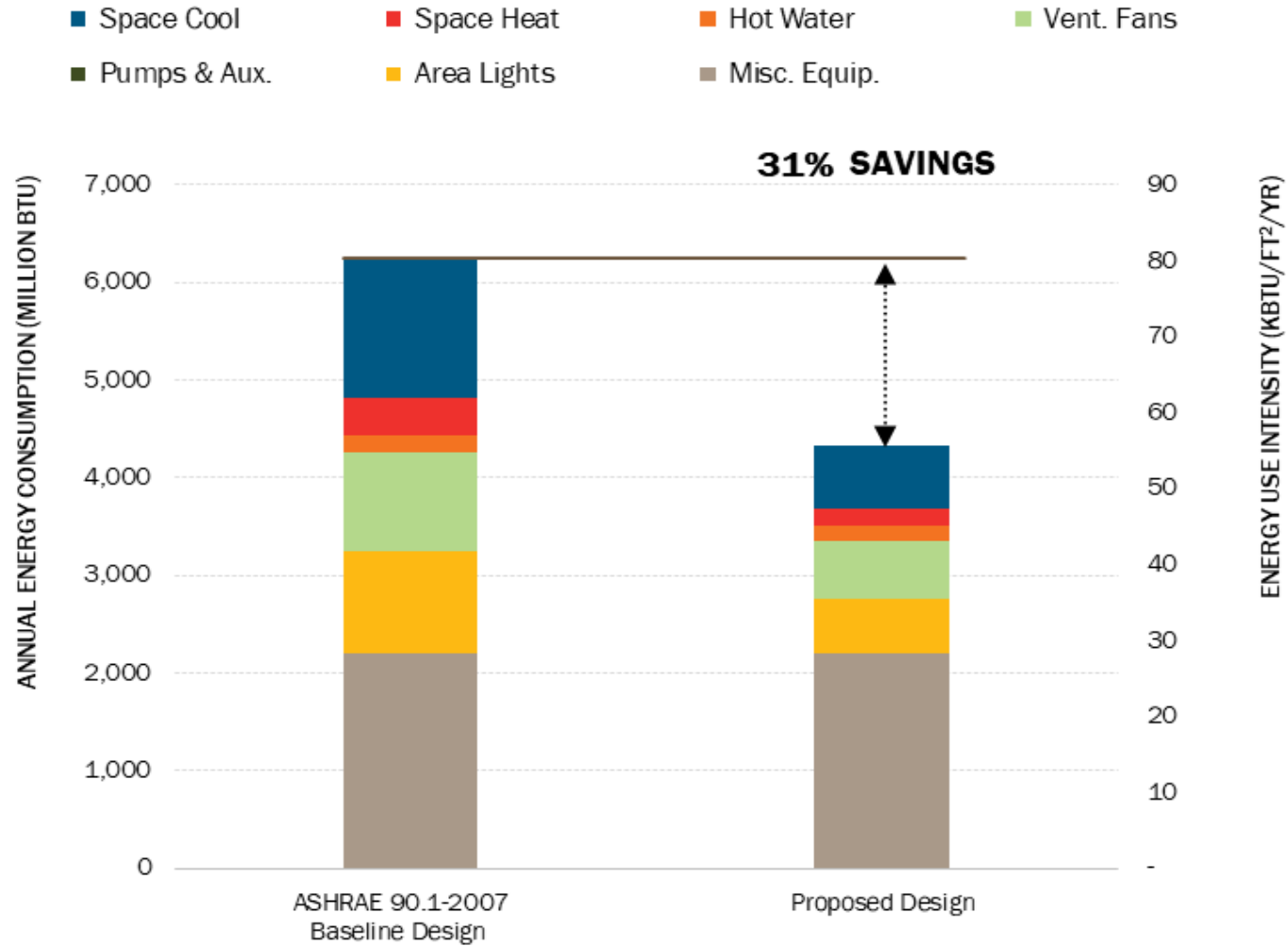
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URBAN  
FABRICK

# 3H Enrollment Building: LEED ASHRAE 90.1 Energy Consumption

## ANNUAL SITE ENERGY C7226 3H ALO ENROLLMENT

7226 3H ALO ENROLLMENT

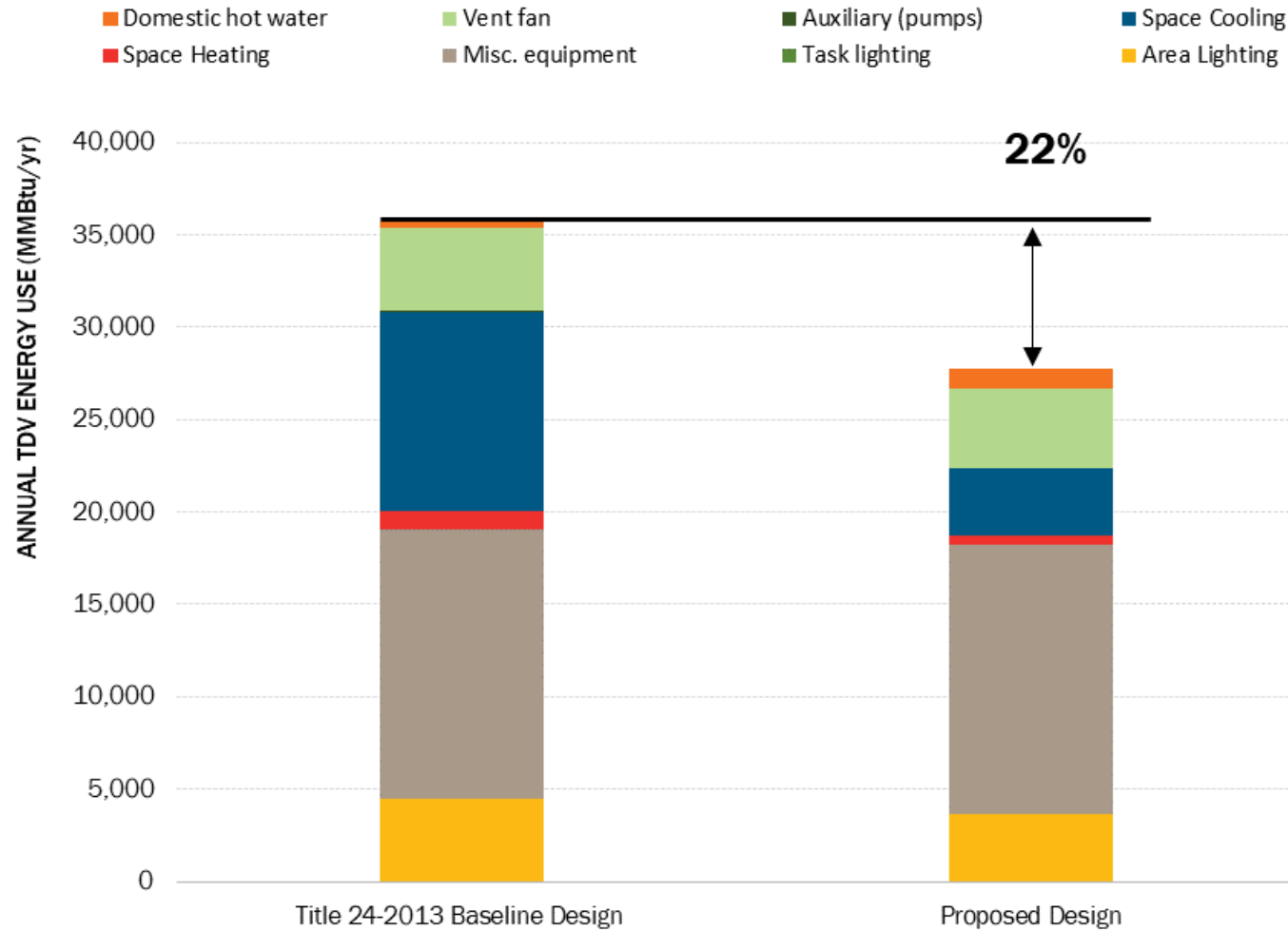




# 3H Enrollment Building: TDV Energy – Title 24 – 20%

## ANNUAL TDV ENERGY BY END-USE

7226 3H ALO ENROLLMENT



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# **CALGreen 2019**

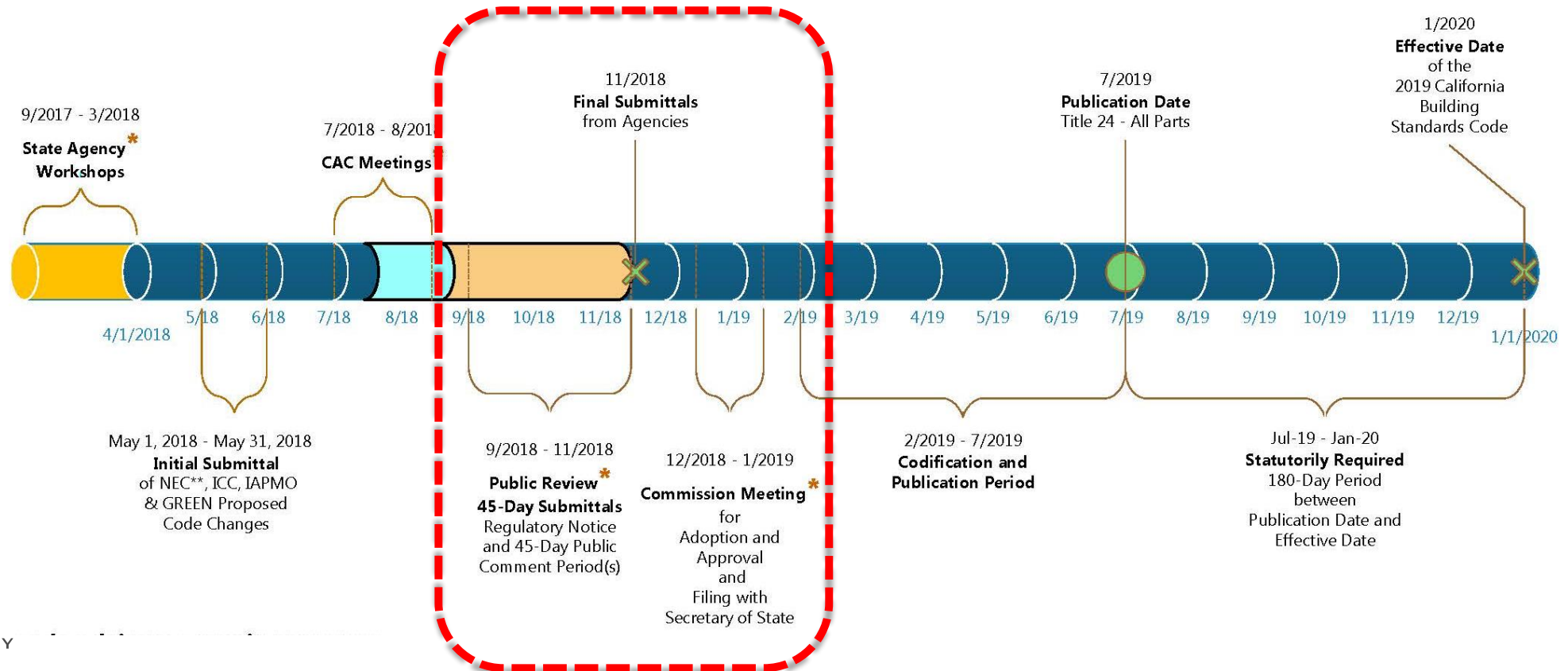
## **WHAT'S NEXT**

# Proposed Changes to 2019 CALGreen

2019 California Building Standards Code, Title 24

Effective January 1, 2020

## 2018 Triennial Code Adoption Cycle



# Proposed Changes to 2019 CALGreen

- **California Building Standards Commission (CBSC)**
  - **Update recent July 2018 amendments**  
**Benefit:** Alignment with T24 revisions
  - **Add exceptions for energy management systems Chapt. 4, Section 4.106.4.2.4**  
**Benefit:** Intent was to provide an alternative sizing for EV's.
  - **Chapter 8 to repeal DWR's Appendix D MWELO (Model Water Efficient Landscape Ordinance) references**  
**Benefit:** Deleted to avoid conflicts with Department of Water Resource (DWR) updates during its Title 23 rulemaking process, pursuant to AB 2515.
  - **<http://www.bsc.ca.gov/Rulemaking/adoptcycle/2018TriennialCodeAdoptionCycle/CodeAdvisoryCommitteeReview.aspx>**

**Buy Clean California Act  
AB – 262 and AB – 1817**

# Buy Clean California Act - Overview

**October 15, 2017 and published under Public Contract Code, section 3500-3505.**

- **Laws aims to reduce California's suppliers emissions by considering GWP and purchasing decisions**
- **Effect producers of structural steel, carbon steel rebar, flat glass, and mineral wool insulation**
- **Implementation applies to Public Works Projects and Bidding**
  - ✓ Department of General Services (Real Estate Services Division)
  - ✓ Department of Transportation (Pilot Program to include aggregate & concrete/asphalt)
  - ✓ Department of Water Resources
  - ✓ Department of Parks and Recreation
  - ✓ Department of Corrections and Rehabilitation
  - ✓ Military Department
  - ✓ California State University
  - ✓ University of California



# Buy Clean California Act - Overview

## Legislation key dates

### January 1, 2019

- DGS to establish and publish in the State Contracting Manual a maximum GWP (Global Warmer Potential) for category of eligible materials.
- AB 1817 – extends compliance to January 1, 2019 for requesting EPDs
- AB 1817 – January 1, 2020 EPDs (Environmental Product Declaration) required.
- Once it goes into effect by end of 2019, products will need to demonstrate a lower than average GWP.

### July 1, 2019

- Contracts entered on or after this date between successful bidders and the awarding authorities will be subject to the requirement of the Buy Clean California Act.

# **COURSE EVALUATIONS**

**THANK YOU!**