



Lab Futures: Meeting LEED v5's Bold New Standards



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Learning objectives

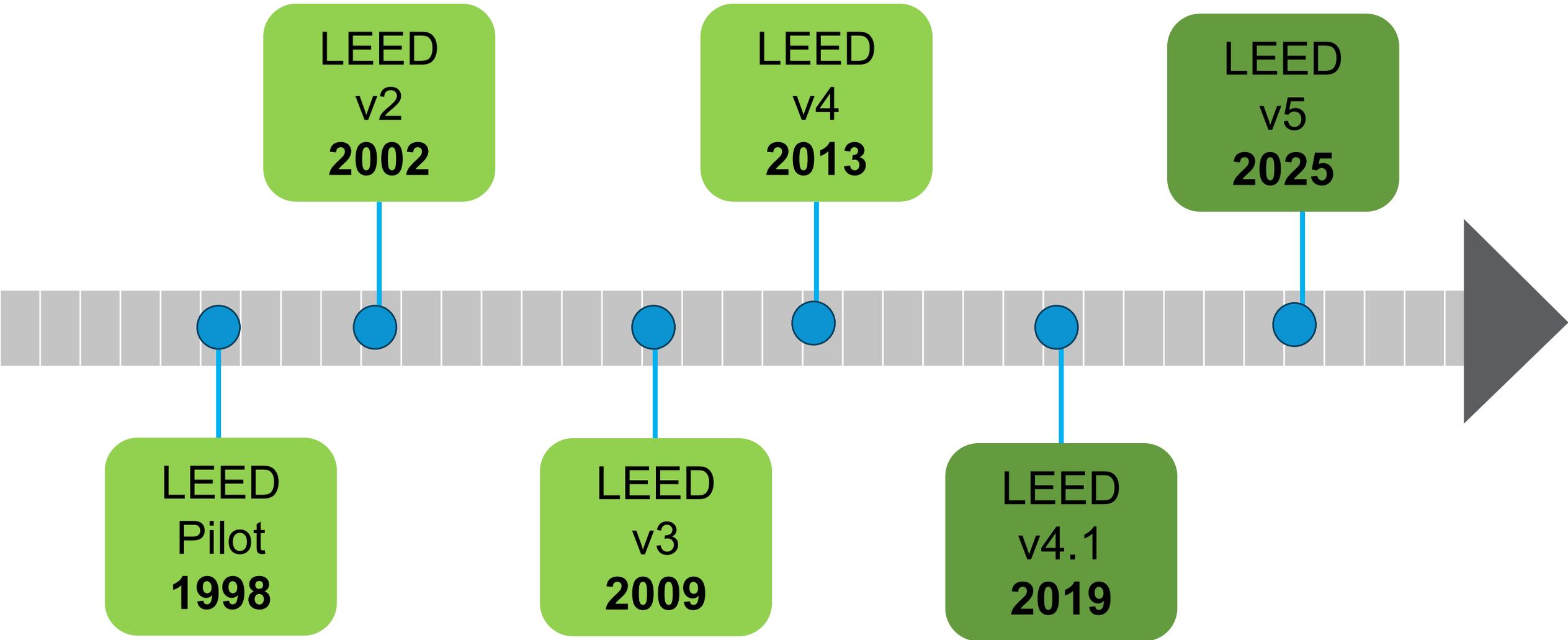
- **Identify key changes in LEED v5** that impact life science and laboratory facilities, including new prerequisites and credit requirements.
- Analyze how the updated LEED v5 framework addresses **climate resilience, decarbonization, and sustainable design** for high-performance lab buildings.
- **Evaluate strategies** for reducing operational and embodied carbon in lab environments while maintaining research integrity and performance standards.
- Apply **practical approaches** to achieving LEED v5 certification for life science facilities by integrating resilience, efficiency, and sustainability measures.

LEED v5

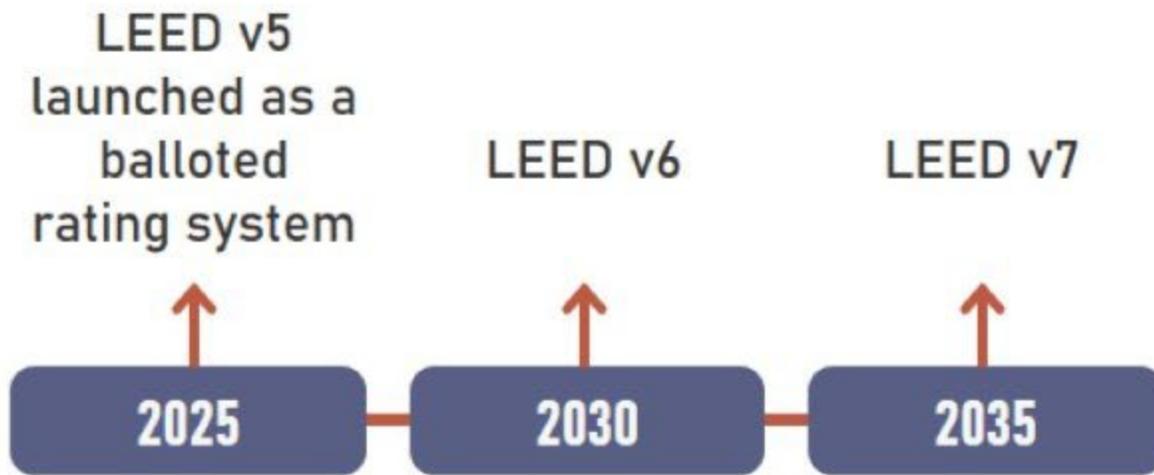
**LEED v5
is coming!**



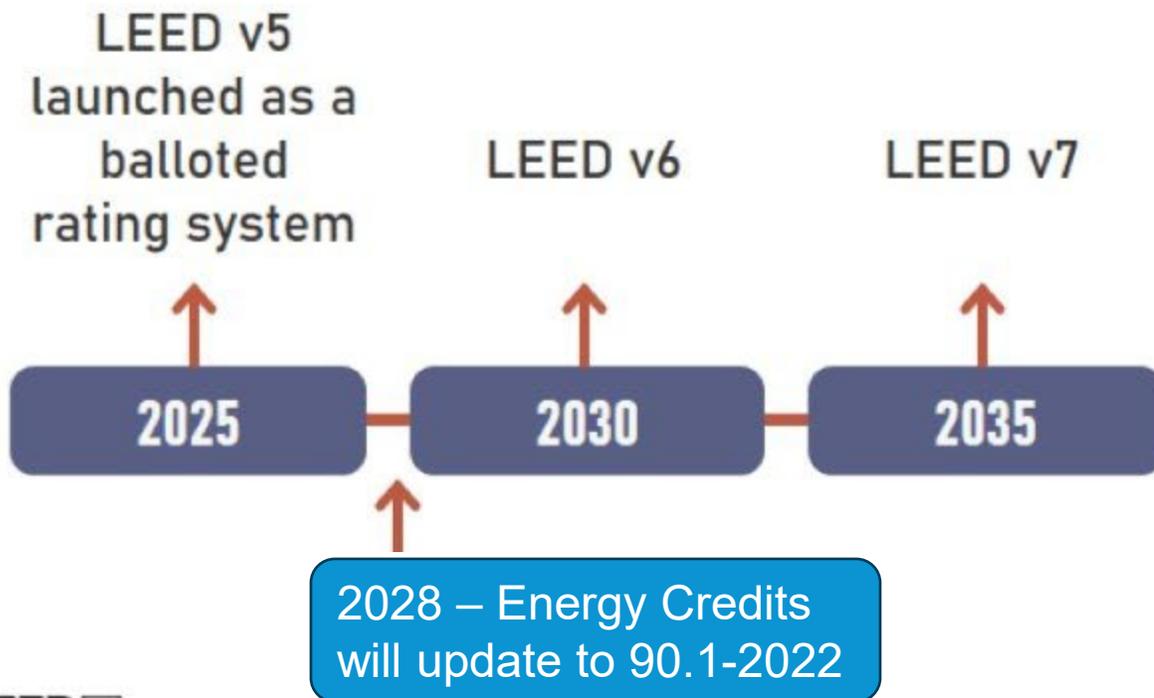
Timeline of LEED



The cycle of LEED rating system updates will now be once every 5 years



The cycle of LEED rating system updates will now be once every 5 years



LEED Maintains it's historic structure

- Integrative process
- Location and Transportation
- Sustainable Sites
- Water Efficiency
- Energy and Atmosphere
- Materials and Resources
- Indoor Environmental Quality
- Project Priorities

		New Construction	Core and Shell
	Integrative Process, Planning and Assessments (IP)	1	7
IPp1	Climate Resilience Assessment	Required	Required
IPp2	Human Impact Assessment	Required	Required
IPp3	Carbon Assessment	Required	Required
IPp4	Tenant Guidelines	-	Required
IPc1	Integrative Design Process	1	1
IPc2	Green Leases	-	6
	Location and Transportation (LT)	15	15
LTc1	Sensitive Land Protection	1	1
LTc2	Equitable Development	2	2
LTc3	Compact and Connected Development	6	6
LTc4	Transportation Demand Management	4	4
LTc5	Electric Vehicles	2	2
	Sustainable Sites (SS)	11	11
SSp1	Minimize Site Disturbance	Required	Required
SSc1	Biodiverse Habitat	2	2
SSc2	Accessible Outdoor Space	1	1
SSc3	Rainwater Management	3	3
SSc4	Enhanced Resilient Site Design	2	2
SSc5	Heat Island Reduction	2	2
SSc6	Light Pollution Reduction	1	1
	Water Efficiency (WE)	9	8
WEp1	Water Metering and Reporting	Required	Required
WEp2	Minimum Water Efficiency	Required	Required
WEc1	Water Metering and Leak Detection	1	1
WEc2	Enhanced Water Efficiency	8	7

		New Construction	Core and Shell
	Energy and Atmosphere (EA)	33	27
EAp1	Operational Carbon Projection and Decarbonization Plan	Required	Required
EAp2	Minimum Energy Efficiency	Required	Required
EAp3	Fundamental Commissioning	Required	Required
EAp4	Energy Metering and Reporting	Required	Required
EAp5	Fundamental Refrigerant Management	Required	Required
EAc1	Electrification	5	4
EAc2	Reduce Peak Thermal Loads	5	5
EAc3	Enhanced Energy Efficiency	10	7
EAc4	Renewable Energy	5	4
EAc5	Enhanced Commissioning	4	3
EAc6	Grid Interactive	2	2
EAc7	Enhanced Refrigerant Management	2	2
	Materials and Resources (MR)	18	21
MRp1	Planning for Zero Waste Operations	Required	Required
MRp2	Quantify and Assess Embodied Carbon	Required	Required
MRc1	Building and Materials Reuse	3	5
MRc2	Reduce Embodied Carbon	6	8
MRc3	Low Emitting Materials	2	1
MRc4	Building Product Selection and Procurement	5	5
MRc5	Construction and Demolition Waste Diversion	2	2
	Indoor Environmental Quality (EQ)	13	11
EQp1	Construction Management	Required	Required
EQp2	Fundamental Air Quality	Required	Required
EQp3	No Smoking or Vehicle Idling	Required	Required
EQc1	Enhanced Air Quality	1	1
EQc2	Occupant Experience	7	7
EQc3	Accessibility and Inclusion	1	1
EQc4	Resilient Spaces	2	2
EQc5	Air Quality Testing and Monitoring	2	-
	Project Priorities (PR)	10	10
PRc1	Project Priorities	9	9
PRc2	LEED AP	1	1
Total		Possible Points: 110	110

LEED v5 for Building Design and Construction



Decarbonization

	NEW CONSTRUCTION	CORE AND SHELL	
IP Prereq	Carbon Assessment	Required	Required
IP Prereq	Tenant Guidelines	-	Required
IP Credit	Integrative Design Process	1	1
IP Credit	Green Leases	-	6
LT Credit	Compact and Connected Development	6	6
LT Credit	Transportation Demand Management	4	4
LT Credit	Electric Vehicles	2	2
SS Credit	Heat Island Reduction	2	2
WE Prereq	Minimum Water Efficiency	Required	Required
WE Credit	Water Metering and Leak Detection	1	1
WE Credit	Enhanced Water Efficiency	8	7
EA Prereq	Operational Carbon Projection and Decar-	Required	Required
EA Prereq	Minimum Energy Efficiency	Required	Required
EA Prereq	Fundamental Commissioning	Required	Required
EA Prereq	Energy Metering and Reporting	Required	Required
EA Prereq	Fundamental Refrigerant Management	Required	Required
EA Credit	Electrification	5	4
EA Credit	Reduce Peak Thermal Loads	5	5
EA Credit	Enhanced Energy Efficiency	10	7
EA Credit	Renewable Energy	5	4
EA Credit	Enhanced Commissioning	4	3
EA Credit	Grid Interactive	2	2
EA Credit	Enhanced Refrigerant Management	2	2
MR Prereq	Planning for Zero Waste Operations	Required	Required
MR Prereq	Quantify and Assess Embodied Carbon	Required	Required
MR Credit	Building and Materials Reuse	3	5
MR Credit	Reduce Embodied Carbon	6	8
MR Credit	Building Product Selection and Procure-	5	5
MR Credit	Construction and Demolition Waste Diver-	2	2

Quality of Life

	NEW CONSTRUCTION	CORE AND SHELL	
IP Prereq	Climate Resilience Assessment	Required	Required
IP Prereq	Tenant Guidelines	-	Required
IP Prereq	Human Impact Assessment	Required	Required
IP Credit	Integrative Design Process	1	1
IP Credit	Green Leases	-	6
LT Credit	Equitable Development	2	2
LT Credit	Compact and Connected Development	6	6
LT Credit	Transportation Demand Management	4	4
SS Credit	Accessible Outdoor Space	1	1
SS Credit	Enhanced Resilient Site Design	2	2
SS Credit	Heat Island Reduction	2	2
WE Credit	Water Metering and Leak Detection	1	1
MR Credit	Low Emitting Materials	2	1
MR Credit	Building Product Selection and Procurement	5	5
EQ Prereq	Construction Management	Required	Required
EQ Prereq	Fundamental Air Quality	Required	Required
EQ Prereq	No Smoking or Vehicle Idling	Required	Required
EQ Credit	Enhanced Air Quality	1	1
EQ Credit	Occupant Experience	7	7
EQ Credit	Accessibility and Inclusion	1	1
EQ Credit	Resilient Spaces	2	2
EQ Credit	Air Quality Testing and Monitoring	2	-

Ecological Conservation and Restoration

	NEW CONSTRUCTION	CORE AND SHELL	
IP Prereq	Tenant Guidelines	-	Required
IP Credit	Integrative Design Process	1	1
IP Credit	Green Leases	-	6
LT Credit	Sensitive Land Protection	1	1
LT Credit	Compact and Connected Development	6	6
SS Prereq	Minimized Site Disturbance	Required	Required
SS Credit	Biodiverse Habitat	2	2
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MR Credit	Building Product Selection and Procurement	5	5
MR Credit	Construction and Demolition Waste Diversion	2	2
EQ Prereq	No Smoking or Vehicle Idling	Required	Required

LEED v5 for Building Design and Construction

Slide provided by USGBC and used with permission



DECARBONIZATION IN BD+C/ID+C

Reducing operational carbon

- Minimum Energy Efficiency
- Electrification
- Reduced Peak Thermal Loads
- Renewable Energy
- Fundamental Refrigerant Management

Reducing embodied carbon

- Quantify and Assess Embodied Carbon
- Reduce Embodied Carbon
- Building Product Selection and Procurement

Reducing transit-related carbon

- Compact and Connected Development
- Transportation Demand Management
- Electric vehicles



QUALITY OF LIFE IN BD+C/ID+C

Creating more adaptable and resilient projects.

- Climate Resilience Assessment

Emphasizing and enhancing elements of the rating system that support equity and inclusivity

- Human Impact Assessment
- Equitable Development
- Accessibility and Inclusion

Increasing the likelihood that more people will enjoy and care about the building

- Accessible Outdoor Space
- Occupant Experience



ECOLOGICAL CONSERVATION AND RESTORATION

Reducing impact on and restoring natural habitats

- Conserving natural habitats
- Restoring natural habitats

Using resources efficiently

- Reduce generation of waste and increase diversion
- Planning for zero waste operations

LEED Prerequisites

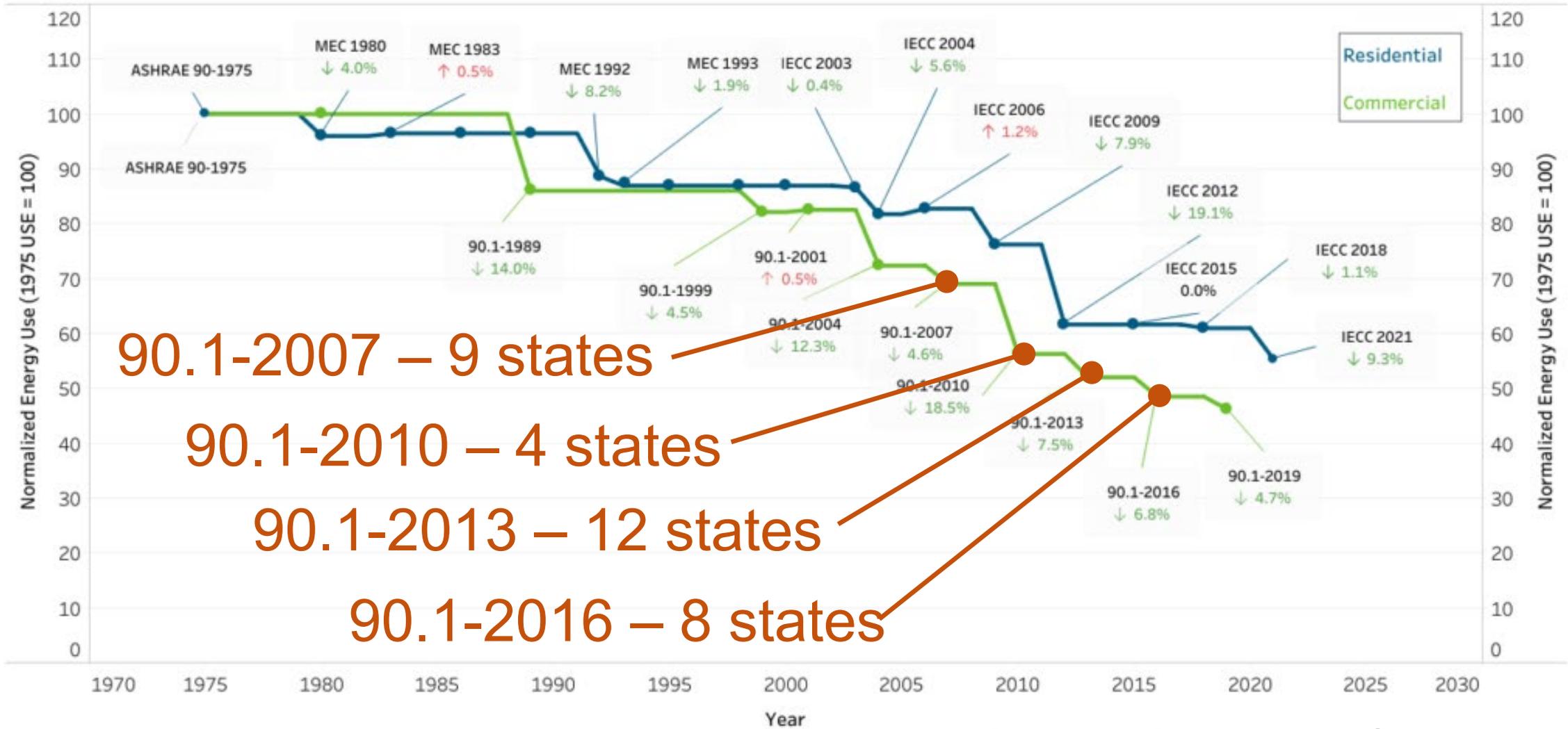
Baseline energy code ASHRAE 90.1-2019

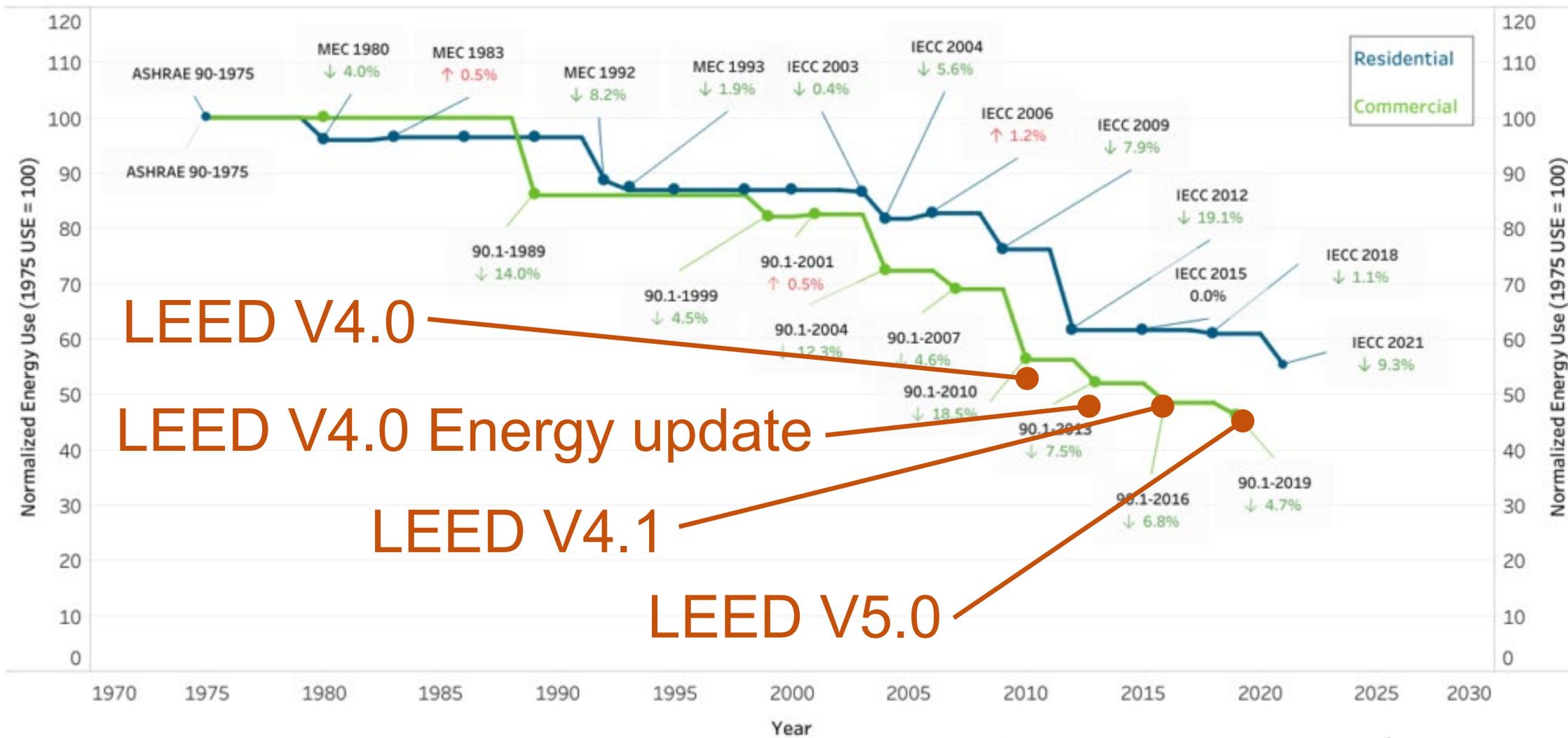


Equivalent Code
■ 90.1-2022 or 90.1-2019

Updated with data on 09/30/25

Courtesy: HUD





LEED V4.0

LEED V4.0 Energy update

LEED V4.1

LEED V5.0

FEMA National Risk Index

Explore the Map Learn More Take Action Get Help

Risk Index Expected Annual Loss

Social Vulnerability Community Resilience

County View Census Tract View Find a county or address Data Download

Legend

- Risk Index
 - Very High
 - Relatively High
 - Relatively Moderate
 - Relatively Low
 - Very Low
 - No Rating
 - Not Applicable
 - Insufficient Data
- Expected Annual Loss × Social Vulnerability ÷ Community Resilience = Risk Index

Basemaps

Dallas County Texas

Risk Index

TX's risk to each hazard type is:

Avalanche	Not Applicable
Coastal Flooding	Not Applicable
Cold Wave	Very High Score 98.1
Drought*	Relatively Low Score 58.3 <small>*Note: Risk Index is based on Agricultural (crop only) impacts</small>
Earthquake	Relatively Low Score 92.7
Hail	Very High Score 100.0
Heat Wave	Very High Score 99.9
Hurricane	Relatively Low

Create Report

New Prerequisites

- Wildfire & Wildfire Smoke
 - **Impact:**
 - Wild fires impact air quality.
 - **Design Response:**
 - ASHRAE Guideline 44.
 - Backup power systems
 - Fire-resistant landscaping
 - Defensible space



Resilience Credits



- **SS Credit: Enhanced Resilient Site Design (2 points)**
 - *Specific measures based on the hazard identified*

- **EQ Credit: Resilient Spaces (1 or 2 points)**
 - Guideline 44
 - ASHRAE 241-2023
 - Habitability without power
 - Operable windows



ASHRAE Standard 241-2023
**Control
of Infectious
Aerosols**

Approved by the ASHRAE Standards Committee on June 18, 2023

This Standard is under continuous maintenance by a Standing Standard Project Committee (SSPC) for which the Standards Committee has established a documented program for regular publication of additions or revisions, including procedures for timely dissemination, consensus action or requests for change to any part of the Standard. Instructions for how to request a

Guideline 44-2024



ASHRAE Guideline 44-2024, Protecting Building Occupants from Smoke During Wildfire and Prescribed Burn Events

Purpose

Provides comprehensive recommendations to safeguard indoor air quality (IAQ) during wildfire and prescribed burn events.

Significance

Wildland fire events have grown more frequent and intense in recent years, threatening air quality and public health. Some groups, such as pregnant women, children, older adults, and people with pre-existing conditions can be especially susceptible to the contaminants in wildfire smoke. To better protect individuals, and to equip building professionals with a comprehensive guide to help mitigate smoke intrusion and maintain healthier indoor environments, ASHRAE developed this guideline. The document outlines best practices for building design, operation and maintenance to reduce the health risks associated with prolonged exposure to wildfire and prescribed burn smoke.

Scope

Guideline 44-2024 is intended for commercial buildings, institutional facilities (including healthcare facilities and schools), multi-unit residential buildings, and designated cleaner air spaces for temporary occupancy. It offers tailored recommendations for spaces occupied by at-risk groups, such as children and the elderly, ensuring their specific needs are addressed during smoke events. The document provides considerations during the design phase for new construction as well as existing buildings. It emphasizes the importance of installing, commissioning, operating, and maintaining building envelopes, ventilation systems, and air cleaning and measurement technologies to mitigate smoke infiltration and enhance IAQ.

Highlights

New Prerequisites

- **Human Impact Assessment**
 - Demographics
 - Local infrastructure and land use
 - Human use and health impacts
 - Occupant Experience

Assumptions for LEED v5 Human Impact Assessment Database

Recommended Data Sources for U.S. Projects

Demographics		Local Infrastructure and Land Use		Human Use and Health Impacts		Occupant Experience		Working Conditions for Low-Wage On-Site Staff	
Indicator/Topic	Default Source	Indicator/Topic	Default Source	Indicator/Topic	Default Source	Indicator/Topic	Default Source	Indicator/Topic	Default Source
Race and Ethnicity	U.S. Census (2022)	Adjacent Transportation and Pedestrian Infrastructure	NHTSA (2013-2022)	Housing Affordability and Availability	CDC PLACES (2021)	Opportunity for Daylight, Views, and Operable Windows (interior)	EJScreen (2022)	Wages & Benefits	U.S. Department of Labor
Gender	U.S. Census (2022)		Walk Score (2024)		U.S. Census (2022)		SDA Tool		U.S. Bureau of Labor Statistics
Age	U.S. Census (2022)		Project Team	Availability of Social Services	CDC PLACES (2021)	Environmental Conditions of Air and Water	EJScreen (2022)		Project Team
Income	U.S. Census (2022)	Adjacent Diverse Uses	U.S. CDC (2022)	Community Safety	Local police department	Adjacent Soundscapes, Lighting, and Wind Patterns (exterior)	NEPHT	Training	U.S. Bureau of Labor Statistics
Employment Rate	U.S. Census (2022)		Project Team	Local Community Groups	Project Team		U.S. DOT (2020)		Project Team
Population Density	U.S. Census (2022)		OpenStreetMap	Supply Chain and Construction Workforce Protections	U.S. Department of Labor		UMEP		Occupational Health and Safety Administration
Education Levels	U.S. Census (2022)	Project Team	International Labour Organization		NOAA Wind Rose	ADMS-Urban	Right to Organize	U.S. Bureau of Labor Statistics	
Household Types	U.S. Census (2022)	Local/regional GHG policy	Project Team		Project Team	Project Team	Production Rates	Project Team	
Vulnerable Populations	U.S. CDC (2022)	Applicable Accessibility Code(s)	Code enforcement database						

New Prerequisites

- **Carbon Assessment**
- 25-year whole building carbon assessment



EAp1: Operational Carbon Projection and Decarbonization Plan



MRp2: Quantify and Assess Embodied Carbon



EAp5: Fundamental Refrigerant Management



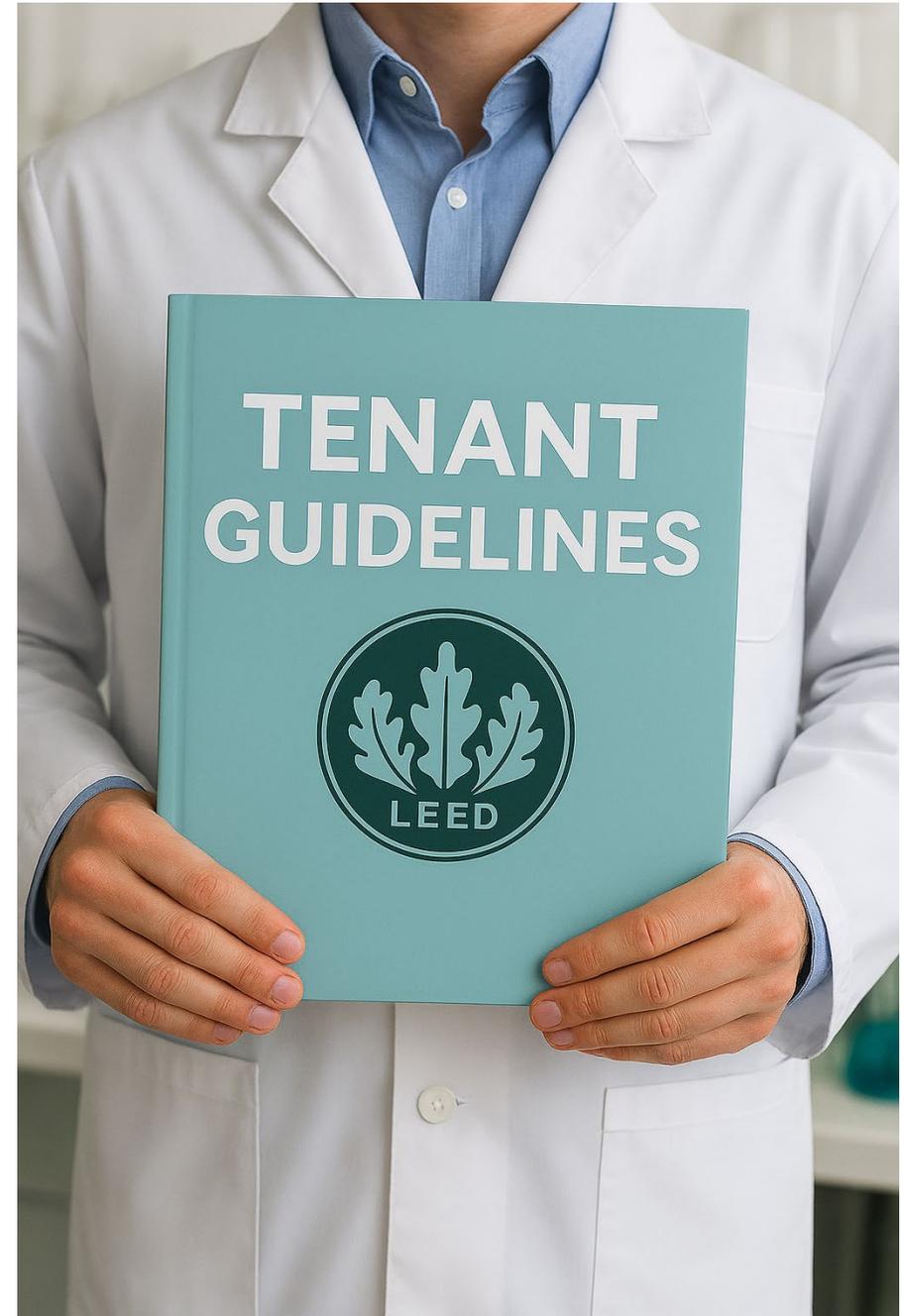
LTc4: Transportation Demand Management (optional)



New Prerequisites

For Core and Shell projects

- **Tenant Guidelines**



LEED Challenges in Laboratories

Unique Challenges of Labs

- High energy intensity
- High process loads
- Limited operable windows
- Specialized materials
- Tight interior condition requirements
- Safety and regulatory constraints



Compliance Strategies for Labs

- Electrification
- Embodied carbon
- Climate resilience
- Human impact



Differences in credits

		V5	v4
Energy and Atmosphere (EA)		33	33
EAp1	Operational Carbon Projection and Decarbonization Plan	Required	
EAp2	Minimum Energy Efficiency	Required	Required
EAp3	Fundamental Commissioning	Required	Required
EAp4	Energy Metering and Reporting	Required	Required
EAp5	Fundamental Refrigerant Management	Required	Required
EAc1	Electrification	5	
EAc2	Reduce Peak Thermal Loads	5	
EAc3	Enhanced Energy Efficiency	10	18
EAc4	Renewable Energy	5	5
EAc5	Enhanced Commissioning	4	6
EAc6	Grid Interactive	2	2
EAc7	Enhanced Refrigerant Management	2	1
	Advanced Energy Metering		1

That's in there?

- **OPERATIONAL CARBON PROJECTION AND DECARBONIZATION PLAN – EAp1**
 - Site Energy Analysis
 - Submit site energy estimate to USGBC
 - Business as Usual (BAU) case by USGBC
 - 25 year carbon fines analysis
- ***AND EITHER***
 - Be all electric
 - Provide detailed Decarb plan



That's in there?

- **Energy Metering and Reporting – EAp4**
 - Metering as required by ASHREA 90.1-2019
 - Reporting of utility use to USGBC



That's in there?

- **Fundamental Refrigerant Management Prereq- EAp5**
 - Inventory refrigerants
 - No HCFCs
 - Goal GWP>700
 - Leak checks

Refrigerant	Classification	GWP
R404A	HFC blend	3,920
R410A	HFC	2,088
R22	HCFC	1,810
R134a	HFC	1,430
R32	HFC	633
R513A	HFO	573
R600 (Butane)	HC	4

That's in there?

- **Electrification – EAc1**
5 points - **No on-site combustion**

Or for 2 points each

No combustion in **Space heating**

No combustion in **Hot water**

And/Or for one point

No combustion in **Cooking** and
other **process loads**



That's in there?

- **Enhanced Energy Efficiency – EA3**
 - Modeling path still available – more options
 - Starting Jan 1, 2028 use ASHRAE 90.1-2022
 - Future Source Energy

Table 4. Points for percentage improvement in PI below PIT

Path 1. Percentage reduction excluding on-site renewable contribution ($100\% - PI_{nre} / PI_t$)	OR	Path 2. Percentage reduction including on-site renewable contribution ($100\% - PI / PI_t$)	Points
3%		10%	1
6%		20%	2
9%		30%	3
12%		40%	4
15%		50%	5
18%		60%	6
21%		70%	7
24%		80%	8
27%		90%	9
30%		100%	10



That's in there?

- **Enhanced Energy Efficiency – EA3**
 - 1-7 points for prescriptive

Table 11.5.3-9 Energy Credits for Other Buildings

ID	Energy Credit Abbreviated Title	Section	Climate Zone																		
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
E01	Improved Envelope Performance	11.5.2.1	Determined in accordance with Section 11.5.2.1																		
H02	Heating Efficiency	11.5.2.2.2	×	×	×	×	×	×	2	×	×	5	3	4	7	5	4	9	7	9	12
H03	Cooling Efficiency	11.5.2.2.3	20	17	14	15	12	10	7	7	5	5	5	3	3	4	2	4	3	3	2
H04	Residential HVAC Controls	11.5.2.2.4	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
H05	Ground-Source Heat Pump	11.5.2.2.5	11	11	7	10	8	6	7	7	5	11	8	10	13	12	10	18	15	17	17
H06	DOAS/Fan Controls	11.5.2.2.6	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
H07	Guideline 36 Sequences	11.5.2.2.7	4	4	3	3	3	3	2	2	2	3	2	2	3	3	2	3	3	3	3
W01	SHW Preheat Recovery	11.5.2.3.1(a)	3	4	5	4	5	6	6	6	8	7	7	8	7	7	8	7	7	7	7
W02	Heat-Pump Water Heater	11.5.2.3.1(b)	4	4	4	4	5	6	7	6	8	8	7	9	8	8	9	8	9	9	9
W03	Efficient Gas Water Heater	11.5.2.3.1(c)	4	4	5	5	5	6	7	7	8	7	7	8	8	8	9	8	8	8	8

That's in there?

- **PLANNING FOR ZERO WASTE OPERATIONS – MRp1**
 - **Recycling infrastructure**
 - **Zero Waste Operations planning**
 - Design Details
 - Maintenance Manuals
 - Staff training
 - Onboarding documents
 - Other resources





LAB CORPS INDUSTRIES

Pioneering Innovation. Powering
Communities. Protecting Patients.



Lab Corps Industries

- New 1000,000 SF
- Office & Lab
- Prerequisite assessments
- Workforce Development
- Nature Focused Design



Lab Corps Industries

- Water was important
- Good envelope
- Enhanced HVAC Commissioning
- Reduced Embodied Carbon
- Construction waste was recycled



Lab Corps Industries

- Biophilic Design
- High quality lighting
- Access to windows & view
- Sustainable and low emitting Materials
- ASHRAE 44
- Air Quality testing



Lab Corps Industries

- Meets ASHRAE 90.1-2019
- Utilizes heat recovery
- 100kW roof mounted PV system
- Balance of electricity use from Tier 2 Renewables

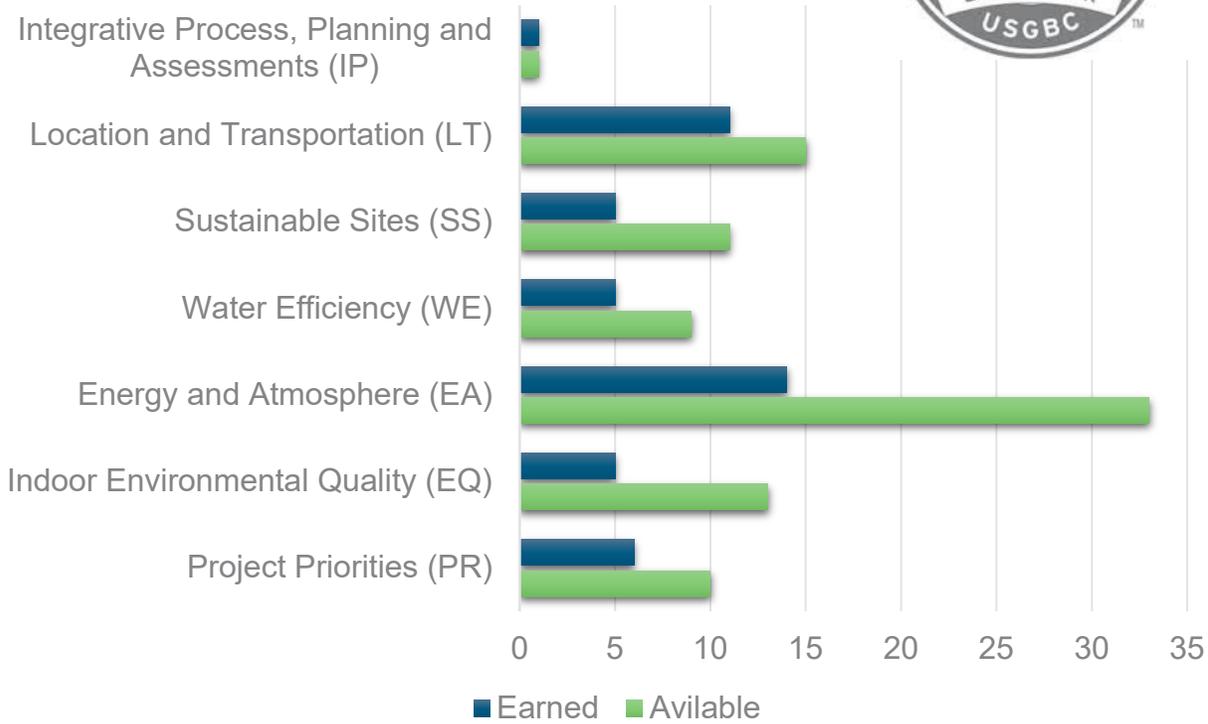


Lab Corps Industries

With onsite combustion

54 Points

LEED Points



Lab Corps Industries

- Fully electrified building with heat pumps
- Prescriptive compliance path
- Plug Load Management

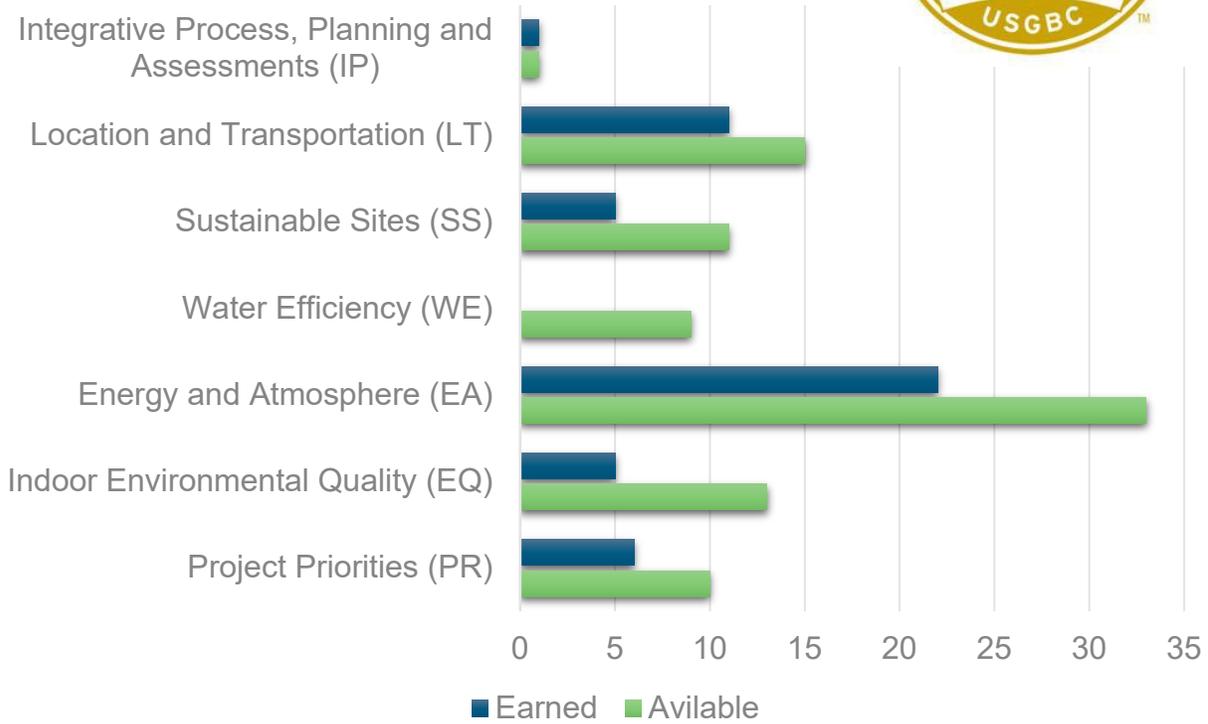


Lab Corps Industries

All Electric system

63 Points

LEED Points

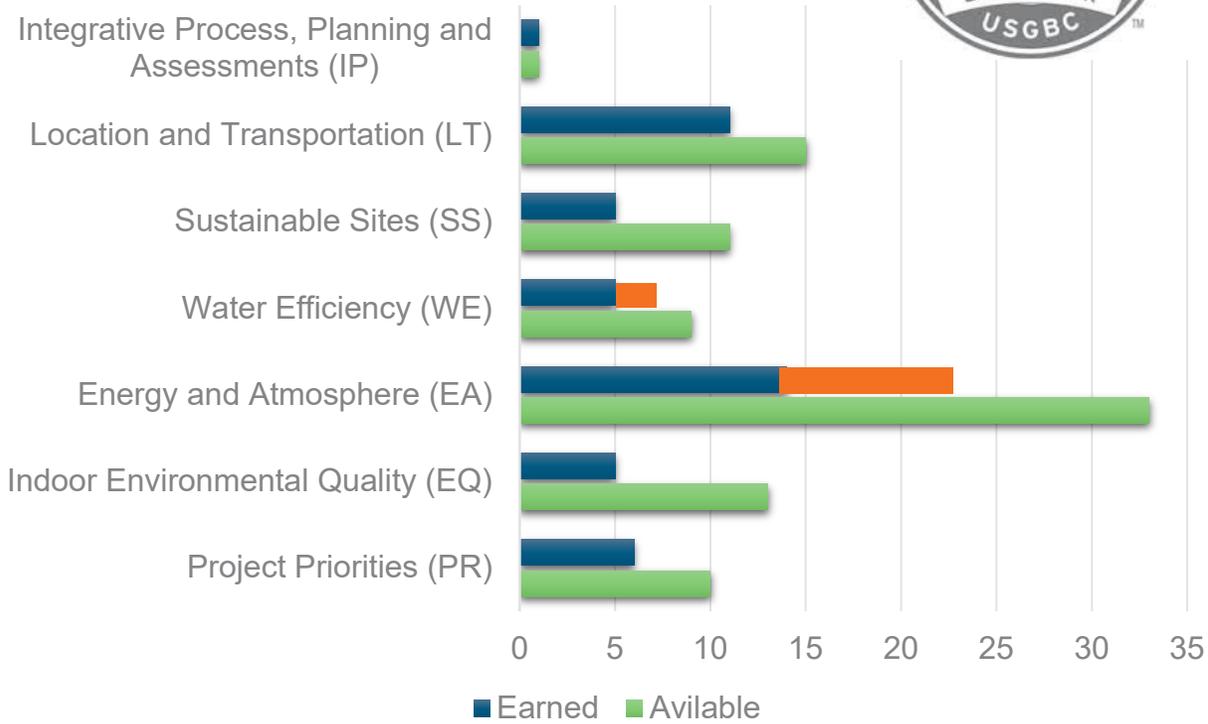


Lab Corps Industries

With onsite combustion

54 Points

LEED Points



Platinum Requirements



- **EAc1 – Electrification – ALL ELECTRIC**
 - No on-site combustion (including district)
 - COP of 1.8 for space heating and service hot water
- **EAc3 – Enhanced Energy Efficiency – 8 points required**
 - Modeling likely required
- **EAc4 – Renewable Energy – 100% of energy offset by renewables**
 - Combination of Teir 1, 2, and 3 allowed
- **MRc2 – Reduce Embodied Carbon – 20% reduction required**
 - Include structure, enclosure, and hardscape

Key Takeaways on LEED v5

- **Historic Framework remains**
- **Key Impact areas**
 - Decarbonization – 73 points
 - Quality of Life – 39 points
 - Ecosystem Conservation & Restoration – 38 points
- **Can be meet with intentional design**
- **Requires early buy in and integration**
- **Is a tool for innovation not compliance**



Questions?



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www.crbgroup.com