



**CENTER OF EXCELLENCE FOR BUILDING DECARBONIZATION (CEBD)
MEETING AGENDA**

ASHRAE Annual Conference

Sunday, June 28th, 2026, 8-10AM CDT

Location: JW Marriott Austin, 110 E. 2nd Street, Austin, TX 78701

Meeting Room: Grand Ballroom 7 (Level 4)

Virtual: [Meeting Link](#)

1. Call to Order – Blake
2. [ASHRAE Values Statement](#) – Blake

In ASHRAE meetings, we will act with honesty, fairness, courtesy, competence, inclusiveness and respect for others, which exemplify our core values of excellence, commitment, integrity, collaboration, volunteerism and diversity, and shall avoid all real or perceived conflicts of interest. Our culture is one of inclusiveness, acknowledging the inherent value and dignity of each individual. We celebrate diverse and inclusive communities, understanding that doing so fuels better, more creative and more thoughtful ideas, solutions and strategies for the Society and the communities our Society serves. We respect and welcome all.

Code of Ethics - <https://www.ashrae.org/about/governance/code-of-ethics>

Core Values - <https://www.ashrae.org/about/ashrae-s-core-values>

Diversity Statement - <https://www.ashrae.org/about/diversity-equity-and-inclusion-dei>

Artificial Intelligence Policy - <https://www.ashrae.org/about/governance>

3. Review of Agenda – Blake
4. Welcome & Meeting Attendance – Blake
5. Introductions – All
6. CEBD 2025-2026 Annual Recap – Blake
7. CEBD Led Activities
 - a. Building Code Assessment Tool (BCAT) – Parag
 - b. Residential Retrofits – Carrie
 - c. Retrocommissioning & Decarbonization – Ghina
 - d. Decarb Framework for AI Data Centers – Bing
 - e. Grocery Store Decarbonization Guide – Chuck
 - f. 2026 ASHRAE Decarb Conference in Seattle, WA – September 23-25, 2026 – Ginger
 - g. Distinguished Lecturer Presentation – Stet
8. Liaison Updates
 - a. ASHRAE Councils
 - MembC – Adeeba
 - PubEdC – Jeremy
 - TechC – Corey
 - b. MEP 2040 – Ghina
 - c. AHRI – Jaime
9. 2026-2027 CEBD Strategy Update
 - a. Strategic Planning Session & Funding Request – Carrie
 - b. Strategic Theme 1 – Leadership in WLC – Luke
 - c. Strategic Theme 2 – Charting the Path to 2050 – Mark
 - d. Strategic Theme 3 – Accelerating Market Adoption & Insight – Amanda

10. CEBD Member Recognition – Blake
11. Transfer of CEBD Chair – Blake
12. Open Session for Guest Comments
13. Adjourn



Center of Excellence for Building Decarbonization

2026 Austin Annual Meeting



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Agenda

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 - f) 2026 ASHRAE Decarbonization Conference – Ginger
8. Liaison Updates
 - a) Member's Council - Adeeba
 - b) Publication & Education Council - Jeremy
 - c) Technology Council - Corey
 1. #1977-SP Update HVAC Equipment Service Life Data
 2. #1988-SP Whole Life Carbon Gap Analysis
 3. #2025-SP Whole Building/MEP Benchmarking Data Research
 4. #2026-SP Standardizing WLC Calculations for Building Systems
 5. #2027-SP Refrigerant Emissions Management, Tracking, and Compliance
 - d) MEP 2040 – Ghina
 - e) AHRI – Jaime
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Introductions

Scan next slide or use QR code
sheets in room to register
attending

Sign-in Sheet



CEBD Update

Blake Ellis

ASHRAE's position...

*Eliminating GHG emissions from
the built environment is essential
to address climate change*



Our goals...

2030

**the global built environment
must halve its 2015 GHG
emissions**

- All new buildings must be NZE
- Widespread EE retrofits of existing assets
- New construction embodied carbon must be reduced by at least 40%

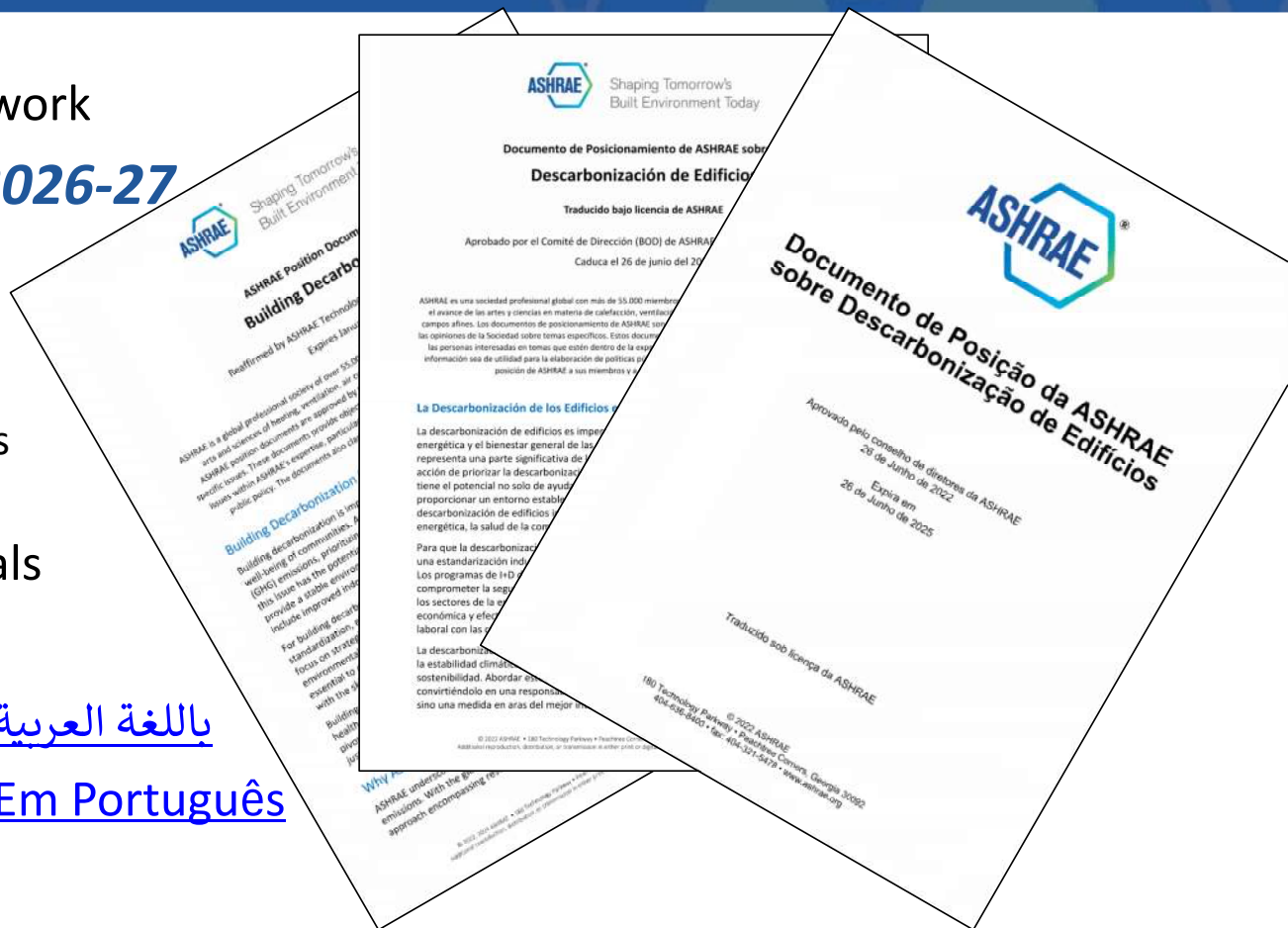
2050

**all new and existing assets
must be net zero GHG
emissions across the whole life
cycle**



ASHRAE's Position Document on Building Decarbonization

- Provides the basis for ASHRAE's work
- Created in 2022, *updating in 2026-27*
- Contains many items including:
 - ASHRAE's Position that eliminating GHG emissions from the built environment is essential to address climate change
 - ASHRAE's 2030 and 2050 Goals
- Available
 - [In English](#)
 - [باللغة العربية](#)
 - [En Español](#)
 - [Em Português](#)



CEBD Primary Responsibilities

- ***Strategy.*** Provide strategic direction for ASHRAE building decarbonization activities and work with the Planning Committee to incorporate appropriate goals into the Society strategic plan.
- ***Thought Leadership.*** Monitor future issues and trends and publicize ASHRAE's decarbonization work globally to establish ASHRAE's leadership position, in partnership with Marketing.

CEBD Primary Responsibilities

- ***Collaboration.*** Coordinate joint initiatives, events, and projects with other U.S. and international organizations whose work is complementary to ASHRAE's building decarbonization activities.
- ***Public Advocacy.*** Work with Government Affairs to provide reliable technical information on decarbonization to policymakers, media, and the public.



STANDARDS

EDUCATION

**KNOWLEDGE
RESOURCE
HUB**



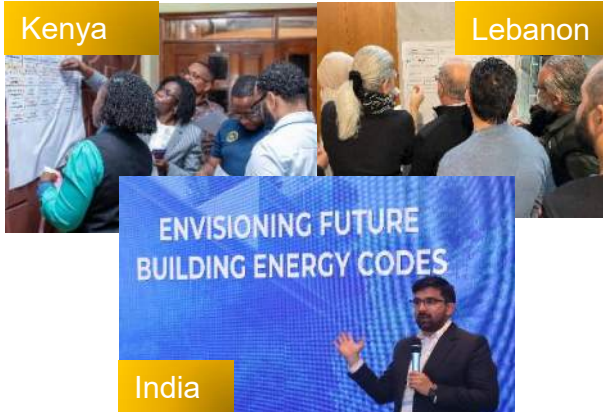
**TECHNICAL
TOOLS**

**POSITION
DOCUMENT**

Four Key Focus Areas



CEBD Strategic Planning Retreat



Building Code Workshops

Strategic Planning Retreat *(Held April 24-25, 2026 in Washington, DC)*

- ✓ Strategized Alignment with CE IEQ
- ✓ Developed Future Strategic Initiatives & Existing Enhancements

SY 2026-2027 Strategic Initiatives

- ✓ Asserting Leadership in Whole Life Carbon
- ✓ Charting the Path to 2050
- ✓ Accelerating Market Adoption & Insight

Enhancements to Existing Priorities

- ✓ Additional Building Code Assessment Tool (BCAT) Workshops
- ✓ CEBD Chapter Engagement & Ambassador Program
- ✓ Strengthen Committee-to-Committee Collaboration

Additional Activities

- ✓ Tech Council: Five (5) Research Projects Underway
- ✓ Members Council: Distinguished Lecturer Presentation on Decarbonization Retrofits
- ✓ Publication & Education Council: Two (2) Design Guides and Two (2) eLearning Courses
- ✓ Building Code Workshop held at Developing Economies Conference

Other Updates

- Coalition for Lifecycle Emissions Alignment and Reporting (CLEAR)
 - Created to align how whole life carbon emissions from buildings and infrastructure are measured and reported with the following goals:
 - Develop a globally recognized framework
 - Strengthen confidence in whole life carbon measurement and reporting practices among governments, investors and clients
 - Create a self-sustaining presence with members and affiliates contributing resources
 - Deliver technical expertise to regions managing decarbonization reporting
 - ASHRAE is a Collaborator in CLEAR
- BSR/ASME EA-202X
 - ASHRAE Commenting on overlap with ASHRAE 211-2018 (RA)
- California Energy Commission (CEC) 2028 Code Update
 - Comments due: July 10, 2026 at 5:00 PM PDT

CEBD Led Activities

Flexible International Building Code Framework

Parag Cameron-Rastogi (*Amr*)

BCAT Workshop – India

- Organized with Developing Economies Conference
 - Pro: Low cost, more attendees, higher profile with gov
 - Con: Agenda distracted by conf., BCAT --> conference seminar
- BCAT experience
 - Needs preparation!
 - Train the trainer sessions could work
- Budget and localization
 - Shared spaces and organization reduces budget ask
 - Understanding local context is critical

Residential Retrofits

Carrie Brown

Residential Retrofits

Residential retrofits are a critical component of achieving decarbonization goals.

Two new resources:

1. Intro to residential decarbonization retrofits for non-technical audiences
2. Clay Nesler's home retrofit story for technical audiences

RESIDENTIAL DECARBONIZATION RETROFITS



Residential Decarbonization Retrofits Introduction

Whether we are owners or renters, everyone depends on safe, healthy, and resilient housing. At the same time, residential buildings account for a significant share of global energy use and greenhouse gas emissions, and meaningful progress on climate goals will require substantial improvements to the performance of existing homes. These upgrades are often complex and costly, and homeowners increasingly face climate-related risks such as extreme temperatures, flooding, drought, hailstorms, wildfires, and the loss of insurance coverage.

ASHRAE offers a wide range of resources to support the design and retrofit of residential buildings that reduce carbon emissions while improving occupant health, comfort, and resilience. On this page, you'll find:

1. A concise set of priority considerations for decarbonization retrofits in single-family homes that integrates emissions reduction with occupant health and comfort and emphasizes a logical sequence of actions to maximize performance, cost-effectiveness, and long-term value.
2. A curated collection of residential decarbonization retrofit resources that emphasize occupant-focused guidance on electrification, home performance, health, comfort, and practical implementation tools.

Residential Decarbonization Retrofit Strategies

Understand your baseline and make a plan.

A comprehensive home energy audit identifies where energy is lost, which systems are most inefficient, and the optimal sequence of upgrades. This can prevent costly mistakes, such as oversizing equipment or replacing systems before addressing the building envelope. Staged or partial retrofits can also be very effective, allowing improvements to be completed over time while still capturing significant energy and carbon savings.

Focus on passive strategies first.

Reduce heating and cooling loads by sealing leaks and upgrading attic, wall, and floor insulation. Use interior shades and/or exterior deciduous vegetation to minimize solar heat gain during summer. Assess whether window replacements are cost-effective (e.g., replacing single-pane units with high-performance double- or triple-pane models). Consider using operable windows, if available, for adaptive comfort cooling. Check refrigerant line pressures regularly for leakages. These measures reduce drafts, improve comfort, and allow for smaller, less expensive HVAC systems.

Upgrade electrical panel and wiring as needed.

Where possible, avoid panel upgrades by selecting efficient appliances and using load-sharing devices. If upgrades are required to support new electric loads from heat pumps, electric vehicles, or solar, ensure the panel and wiring are properly sized for current and future needs.

Upgrade HVAC and water heating systems.

Replacing HVAC and water heating equipment with high-efficiency systems reduces carbon emissions and improves performance. Cold-climate heat pumps provide year-round comfort with lower carbon intensity, while high-efficiency water heaters—installed in conditioned or semi-conditioned spaces and paired with off-peak controls—cut energy use and further reduce emissions. Ask your contractor to recommend equipment with lower GWP (Global Warming Potential) refrigerants and ensure they recycle refrigerants at end of life.

FOUR GOOD DEEDS For Residential Building Decarbonization



Residential Building Decarbonization - Blog

Clay Nesler, ASHRAE Life Member
Founder, The Nesler Group

After 40+ years working in industry on commercial and industrial energy efficiency and decarbonization, I recently had the opportunity to apply that knowledge while renovating our 20-year-old single family residence in Fort Myers, Florida. The objective was to achieve significant increases in performance – energy, emissions, indoor environmental quality, and resilience – while achieving an attractive return on investment.

The World Resources Institute recently published [research](#) which ranked activities that individuals and households can take to reduce their greenhouse gas emissions. Sourcing renewable energy, electrical vehicle use, and energy efficiency retrofits – which were cited among the most impactful actions – were key elements of our home renovation project. These measures are also important considerations when decarbonizing commercial buildings.

In a 2020 [article](#) for the World Economic Forum, I described “four good DEEDs” for achieving zero-carbon buildings. DEEDs refers to Decarbonization, Electrification, Efficiency, and Digitalization. This article, along with a subsequent [article](#), included a number of case studies from the US, Europe, Middle East, and Asia. A key question was whether the same general approach used in decarbonizing these larger buildings and campuses could be applied in a single-family residential building.

From an [Efficiency and Electrification](#) standpoint, our home was already performing well. It was well insulated across both the living space and garage and equipped with ENERGY STAR appliances throughout. We were also fully electric, with a high-efficiency air conditioner (paired with a smart thermostat) and a heat pump pool water heater.

Using the “four good DEEDS” framework, our home retrofit project started with [Decarbonization](#) and the installation of 10.1 kW of solar PV panels.¹ This represented about two-thirds of our pre-retrofit electrical use on an annual basis. The pay-back period was estimated to be about ten years, helped by the 26% tax credit at the time and utility net-metering.

Shortly after our solar PV installation, Hurricane Ian passed directly over our house causing days of power outages. Luckily, there was no damage to our solar panels which actually fared better than our non-covered roof area. This experience taught us first-hand the importance of resilience and we prioritized battery storage as our next renewable energy improvement. We opted for a 10-kWh battery system with microgrid control serving critical circuits within the home.

The microgrid controller has built-in strategies for managing battery charging and discharging based on cost, site-level carbon emissions, or reliability. In order to minimize system-level carbon emissions, I created a fictitious real-time price tariff based on average grid emission factors for the local utility grid. This tricked the microgrid controller into “thinking” it was minimizing costs while actually minimizing carbon impact on the grid.

¹ The ASHRAE Position Document on Energy Efficiency in Buildings states that “Energy efficiency is the first priority in reducing building GHG emissions.” This case study focuses on GHG reductions in an all-electric home that has already implemented many energy efficiency measures.

Retro-Commissioning & Decarbonization

Ghina Annon

Retrocommissioning & Decarbonization

◆ Why RCx Matters

- Buildings = ~30% energy use, ~26% emissions (*IEA, 2022*)
- Existing assets are the priority (~75–80% already built) (*ASHRAE 100-2024*)
- RCx = fast, low-cost emissions reduction pathway (*LBNL, 2009*)

◆ Definition & Scope

- Systematic optimization of existing building systems (*ASHRAE Guideline 0-2019*)
- Focus on operational improvements (controls, scheduling, tuning)
- Clear boundaries vs audits, retrofits, and new commissioning

◆ Value Proposition

- 5–16% energy savings (typical) (*LBNL, 2009*)
- <2-year payback (*EPA ENERGY STAR, 2010*)
- Reduces Scope 1 & 2 emissions + improves asset performance (*Mills et al., 2004*)

◆ Implementation Approach

- Baseline → Assess → Optimize → Verify → Monitor
- Aligned with ASHRAE commissioning & M&V standards (*ASHRAE 0 & 14*)

RCx is a high-impact, low-capex lever for decarbonizing existing buildings while improving cost, performance, and compliance.

Retro-Commissioning & Decarbonization

RETROCOMMISSIONING & DECARBONIZATION



A Strategic Approach to Energy Efficiency and Emissions Reduction in Existing Buildings

1. Why This Matters

Building operations account for around 30% of global final energy consumption and 26% of global energy-related emissions (IEA, 2025). Building operations account for around 30% of global final energy consumption and 26% of global energy-related emissions (IEA, 2025).

Retro-commissioning (RCx) is among the fastest and most cost-effective operational decarbonization strategies. Large-scale studies of approximately 1,500 existing buildings show typical whole-building energy savings of 5–14%, with median simple payback periods of ~1.7 years (Crowe et al., 2020; DOE/LBNL, 2018). For building owners facing deferred maintenance, rising energy costs, and expanding regulatory requirements, RCx addresses multiple priorities by simultaneously reducing emissions, controlling expenses, extending equipment life, and ensuring long-term asset value.

2. Definition & Scope

Retro-commissioning, as defined in ASHRAE Guideline 0-2019, is the systematic process of investigating, analyzing, and optimizing the performance of existing building systems to meet current facility requirements and improve operational efficiency. Unlike new construction commissioning, RCx focuses on existing facilities that may have not been commissioned before or have drifted from their original design intent over time.

What RCx Includes:

- Comprehensive system diagnostics and functional performance testing (ASHRAE Guideline 0)
- Identification of operational deficiencies and control sequence issues
- Low-cost/no-cost optimization measures (setpoint adjustments, scheduling, controls tuning)
- Documentation of system performance and recommended improvements
- Training for operations staff on system operation and maintenance

What RCx Does Not Include:

- Major capital equipment replacement (though may identify needs)
- Building envelope upgrades or architectural modifications
- Deep energy retrofits, which typically require significant construction

Distinction from Related Approaches:

- **New Construction Commissioning:** Occurs during design and construction; RCx applies to operating buildings
- **Ongoing Commissioning:** Continuous process after initial RCx; RCx is a discrete investigation and optimization project
- **Energy Audits:** Primarily diagnostic; RCx includes implementation and verification of improvements

3. Value Proposition

ENERGY & EMISSIONS IMPACT	Typical Reduction: 5–14% whole-building energy savings in large-scale studies of existing buildings (Crowe et al., 2020); earlier studies reported savings up to ~16% (LBNL, 2009). Carbon Intensity: Direct impact on Scope 1 (on-site combustion) and Scope 2 (purchased electricity) emissions; enables transition to lower-carbon energy sources through reduced loads
FINANCIAL IMPACT	Payback Period: Typically 0.7–2 years for operational improvements (EPA ENERGY STAR, 2010); 3–5 years with minor capital measures Cost Savings: \$0.13–\$0.45/sq ft annually (Mills et al., 2004); average implementation cost \$0.27/sq ft (EPA, 2010) Asset Value: Improved ENERGY STAR scores, reduced O&M costs, extended equipment life, enhanced tenant satisfaction and marketability
RISK & PERFORMANCE	Reliability: Identifies failing components; improves comfort and reduces complaints; maintains the majority of energy savings several years post-implementation (Gunasirang et al., 2019) Regulatory Alignment: Positions buildings to meet building performance standards mandated by ASHRAE Standard 100-2024 and local regulations (e.g., NYC Local Law 97, Washington HB 1257) Energy Cost Stability: Lower baseline consumption reduces exposure to volatile energy prices

4. Implementation Framework

Following ASHRAE Guideline 0-2019 commissioning principles:

1. **Baseline & Benchmark:** Establish energy consumption baseline using 12+ months of utility data; benchmark against peer buildings using ENERGY STAR Portfolio Manager or ASHRAE Building EQ
2. **Technical Assessment:** Conduct functional performance testing per ASHRAE Guideline 0; review sequences of operation, setpoints, and schedules against current facility requirements
3. **Optimization / Retrofit Measures:** Implement low-cost operational improvements (scheduling, setpoints, economizer repair); evaluate capital measures (lighting upgrades, VFD installations) for phased implementation
4. **Electrification (if applicable):** Assess opportunities for fuel-switching (electric heat pumps, induction cooking) when equipment reaches end-of-life; evaluate electrical infrastructure capacity and alignment with decarbonization roadmap
5. **Measurement & Verification:** Follow ASHRAE Guideline 14-2023 (Measurement of Energy, Demand and Water Savings) or IPMVP protocols; compare post-implementation energy use to baseline, weather-normalized; document savings and persistence
6. **Ongoing Monitoring:** Establish continuous monitoring per ASHRAE Guideline 0; train staff on optimized system operation; develop preventive maintenance plans to sustain improvements

5. Common Barriers & Mitigation Strategies

BARRIER	MITIGATION STRATEGY
Capital Constraints	Prioritize no-cost and low-cost operational improvements; pursue energy savings performance contracts (ESPCs) or utility incentive programs; implement phased upgrades aligned with capital replacement cycles
Data Gaps	Install sub-metering on major end-uses; leverage building automation system (BAS) trend data; use ASHRAE Building EQ or ENERGY STAR Portfolio Manager to identify outliers and focus diagnostic efforts
Operational Disruption	Schedule testing and optimization during off-hours or low-occupancy periods per ASHRAE Guideline 0; implement changes incrementally with continuous monitoring; communicate plans to tenants and stakeholders
Skills Limitations	Engage certified commissioning professionals (CxP per ASHRAE/IES Standard 202); provide training for in-house staff on optimized sequences and system operation; leverage remote monitoring services for ongoing support

6. Case Study

The following represents typical RCx performance based on industry studies (Mills et al., 2004; LBNL, 2009; LBNL, 2020):

Building Profile: 200,000–250,000 sq ft Class B office building, 1980s construction, mixed-humid climate (ASHRAE Climate Zone 4A)

Typical RCx Measures: AHU scheduling and setpoint optimization, economizer repair, demand-controlled ventilation, lighting controls upgrades, chiller sequencing optimization

Expected Results: 10–16% reduction in annual energy use, improved thermal comfort, reduced maintenance calls

Implementation Cost: \$0.27–\$0.30/sq ft (\$54,000–\$75,000 total); median annual savings \$0.27/sq ft (\$54,000–\$68,000)

Typical Payback: 1.1–2.2 years simple payback

Key Success Factors: Economizer faults can represent a significant source of avoidable cooling energy waste; staff training per ASHRAE Guideline 0 principles essential for maintaining savings; continuous monitoring reveals additional optimization opportunities

7. Key References

ASHRAE Standards & Guidelines:

- **ANSI/ASHRAE/IES Standard 100-2024** – Energy and Emissions Building Performance Standard for Existing Buildings
- **ASHRAE Guideline 0-2019** – The Commissioning Process (framework for new and existing buildings)
- **ASHRAE Guideline 14-2023** – Measurement of Energy, Demand and Water Savings
- **ANSI/ASHRAE/IES Standard 202-2024** – The Commissioning Process Requirements for New Buildings and New Systems

AI Data Center Framework

Bing Liu

Launch: AI Data Center Energy Performance Framework



Framework official launch and press release at NEMA HQ on June 10, 2026.



A National Blueprint for the Future of Data Centers



National Perspective

Brought a broad national lens to define the challenges and ensure the guidance serves the full U.S. data center landscape.

Comprehensive Framework Structure

Developed a complete, practical framework—including planning, siting, efficiency, and thermal management—to guide data center projects from concept to deployment.

Ongoing Updates and Stewardship

In partnership with ASHRAE, PNNL and NEMA, we will continue updating the framework to reflect rapid advances in AI hardware, emerging technologies, and industry best practices.



One-stop Shop for AI Data Center Planning & Development



Planning
and Siting



Integrated Design
Principles



Energy and
Thermal Efficiency



Grid Interactivity and
Demand Flexibility



Resilient
Design



Commissioning and
Performance Validation



Operations and
Maintenance



Retrofit and
Modernization Strategies



Tools, Standards,
and Resources

AI Data Center Energy Performance Framework

Developed by PNNL – ASHRAE – NEMA

The online resource includes:

- Data Center Design Considerations
- Best Practices & Guidance
- ASHRAE & NEMA Standards

Available

<https://www.ashrae.org/technical-resources/ai-data-center-framework>

Engagement with Industry Partners to Assess Knowledge Gaps and Shape Framework Formulation

Industry & Professional Organizations



IT & Networking Companies, Data Center Operators, Real Estate, Financial Investment



Data Center Design, Engineering & Consulting Firms



Mechanical, Electrical & Cooling Equipment Manufacturers



Electrical Components & Power Systems



A Truly Collaborative Author Team

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kW Mission Critical Engineering

Grocery Store Decarbonization Guide

Rajan Rajendran (*Chuck*)

Project: Decarbonization Strategies for Supermarket Industry Archetypes

Summary: Supermarkets operate 24/7 and require air conditioning, heating, refrigeration, lighting, and ventilation, making them high-energy consumers. This project aims to develop decarbonization strategies tailored for supermarkets by integrating design, operations, and sustainability principles to reduce energy use and emissions while maintaining food safety and customer comfort.

Goals & Objectives

- ✓ Form a working group with industry experts, ASHRAE members, and stakeholders.
- ✓ Identify decarbonization strategies specific to supermarkets, including HVAC, refrigeration, lighting, and operations.
- ✓ Assess existing ASHRAE guidelines and determine their applicability to supermarkets.
- Develop a supermarket-focused decarbonization design guide using ASHRAE's standards and industry resources.

Key Partners

- ASHRAE TCs & CEBD Supermarket Industry Stakeholders (designers, facility managers, operations teams)
- US DOE & EPA
- AEDG for Grocery Stores & Sustainability Experts

Why ASHRAE

- This project aligns with ASHRAE's mission to support low-carbon, energy-efficient commercial spaces.

Decarbonization Impact

- Reduces HVAC and refrigeration-related emissions, which are significant contributors to supermarket carbon footprints.
- Supports corporate sustainability goals (e.g., zero-carbon roadmaps from major retailers like Walmart and Kroger).
- Helps supermarkets meet Scope 1, 2, and 3 carbon reduction targets.

In process

Project Champions:

Rajan Rajendran (CEBD)
Bruce Nelson (Tech Council)

Decarbonizing Grocery Stores

A Practical Guide to Whole Life Carbon

Project Champions

- **Vendor** for developing the guide – Effecterra
- **Working Group for guide development:** Rajan Rajendran, Bruce Nelson, Danielle Wright, Doug Scott, Jun Yang, K C Kolstad, Michael Dellecave, Mike Saunders, Nicole Colantonio, Peter Reist, Scott Martin, Denis Hagler, Tais Mitchell, Vishal Sharma, Sarp Hamamcioglu, André Patenaude, Leigh Lain Walker
- **Project Management Subcommittee:** Rajan Rajendran, Doug Scott, Bruce Nelson, Scott Martin, Vishal Sharma, Tais Mitchell



Decarbonizing Grocery Stores

A Practical Guide to Whole Life Carbon

Project Overview

Challenge / Opportunity

- The industry lacks a unified, technically credible, and widely accessible resource that provides practical, holistic, whole-building decarbonization guidance for grocery retail that can anchor decarbonization work for new and existing stores.

Project Focus

- Develop a practical, accessible guide that:
 - Integrates existing ASHRAE and industry resources into a cohesive framework
 - Defines design and operational strategies to reduce whole-life-carbon and eliminates direct/indirect emissions
 - Includes archetype-specific guidance, implementation pathways, and case studies
 - Supports consistent, scalable action across diverse grocery retail environments
 - Supports owners, design professionals, and sustainability practitioners globally

Decarbonizing Grocery Stores

A Practical Guide to Whole Life Carbon

Section 1

Introduction

Section 2

Understanding WLC, Metrics & Selling the Concept

Emphasize the importance of understanding existing building conditions, ownership structures, and operational constraints early in project planning to support stronger business case development and decision-making.

Section 3

Decarbonization Plans

Consolidate review of how to address scopes 1-3 with tactical project examples covering remodels, retrofits and new construction and ongoing performance monitoring. Includes a visual roadmap and approach matrix.

Section 4

Process & Performance

Focus on maintaining budget alignment, review,, and continuous monitoring.

Section 5

Conclusion

Final Appendices

Consolidated Resources:

- Glossary
- References
- Appendices

Guide is in five sections, addresses new as well as existing stores, and includes case studies



Project Timeline & Deliverables



Initial Timeline & Update

7-month period (Dec-Jun). Extended by 1 month in April to ensure quality for the 75% draft.

Deliverables to Date

75% draft delivered and approved with suggested edits.

Work in Progress

90% draft: technical updates and ongoing editorial support.

Collaborative Process

Requires strong engagement from PMS to support critical deliverable review cycles.

ASHRAE Decarbonization Conferences

Ginger Scoggins

- *Registration
OPEN!*
- *Early Bird Ends
July 31st!*
- *4 Tracks*
- *3 Keynote
Sessions*



2026 ASHRAE Building Decarbonization Conference

September 23-25, 2026 | Seattle, WA



Keynote Speakers



Stet Sanborn, SmithGroup

Stronger Than the Break: Lessons for Big Impact from the Recovery Room for the Decarbonization Movement



Erin McConahey, ARUP

Design for Carbon: Shifting from Metrics to Mindset/ Converting Insight to Impact

Keynote Panel: Harmonizing Policy, Reducing Burden: State Leadership in Coordinated BPS Development

- Nicole Ballinger, City of Seattle
- Supriya Goel, West Monroe
- JoAnna Saunders, California Energy Commission
- Emily Salzberg, Washington Department of Commerce
- Coleen Wisniewski, City of Chula Vista

Steering Committee & Hotel

- Ginger Scoggins, Chair
- Carrie Brown, Vice Chair
- Nancy Kohout
- Fiona Martin
- Ghina Annan
- Krishnan Gowri
- Sierra Spitulski
- Brad Lentz
- Emily Osurman
- Hashani De Silva



Hyatt Regency Lake Washington at Seattle's Southport

Distinguished Lecturer Presentation

Stet Sanborn

Distinguished Lecturer Presentation

- Available to be presented by DLs with decarbonization background in 2026-2027
- Chapters get PAOE points for having this presentation presented
- Presentation can be presented in person or virtually



Distinguished Lecturer Presentation



Center of Excellence for
Building Decarbonization

Agenda

1. Introduction
2. Moving Towards a Low Carbon Future
3. Exploring Technologies
4. Alternatives
5. Challenges
6. ASHRAE Update

- Contacts
 - CTTC Regional Vice Chairs
 - Chapter Program Chairs



Liaison Updates

Members Council Activities

Adeeba Mehboob

Members Council Activities

- General
 - Strengthen Communication Pathways between CEBD and Standing Committees. [Assignment of a CEC Liaison to attend CEBD summer and winter meetings](#)
 - Capitalize on PAOE points- raising decarb & CEBD activity awareness
- Honors & Awards
 - Discussed the Eunice Foote Decarbonization Award (criteria update & ownership)
- CEC
 - Coordination of Decarb content at topical and annual/winter conferences
- Chapter Technology Transfer
 - Added Decarbonization topic on the DL Website
 - Requested Decarbonization focused DL Speakers
 - [Tech Hour Decarb Speaker](#)
 - [SY 2025-26 : Luke Leung – “Whole Life Carbon Decarbonization Strategies for New Buildings.” RECORDED. To be released in July.](#)
 - [SY 2026-27 : Tech hour topic focusing on existing buildings and retrocommissioning](#)
 - [A sequence of Decarb topics for a minimum of one each year for the next few years. \(global audience\)](#)
 - Decarbonization Related Chapter Presentations
 - Four Decarbonization Presentations on the CEBD Website for Chapter Use
 - Building Code Strategy Game

Members Council Activities

- Government Affairs (GAC)
 - **2025-26 PPPs include Decarbonization:**
 - *Support Sustainable Building Practices including Building Decarbonization to Mitigate Climate Change*
 - *Ensure the Orderly and Safe Phasedown of High-GWP HFC Refrigerants*
 - **2026-27 PPPs will include Decarb**
 - **Approved PPIBs related to Decarb**
 - *Building Decarbonization*
 - *Building Energy Benchmarking*
 - *Climate Change and the Built Environment*
 - *Refrigerants and Their Responsible Use*
 - **GAC representative at BCAT workshops**

Members Council Activities

- Student Activities

- Decarb speaker at the Winter Mtg Student Program
- “Applied Engineering Challenge” ideas
- Add decarb credit criteria across all Student Design Competition categories
 - High School Design Competition for 26-27
- Separate decarbonization content for K–12 vs. higher education
- Investing methods to connect students with decarbonization professionals
- Student shadowing of decarbonization professionals at the decarbonization conference
- *Extended travel grant to include any ASHRAE conference to help international members of ASHRAE utilize the grant.*

- Young Engineers in ASHRAE

- Sponsor a YEA member annually to attend the Decarb conference.
- Offer YEA scholarships for Decarb courses and Decarb certification.
- Extend YEA’s informal conference shadowing program to include shadowing a CEBD member.
 - More mentors than applicants
 - Working to better advertise
- Develop beginner/YEA-focused decarb training materials and create a decarb conference track for beginners and young professionals.
- Support a YEA mentorship program pairing YEA members with decarbonization professionals



PubEd Council Activities

Jeremy Smith

Education – Training

- Training Courses (3-hour)
 - Building Decarbonization Retrofits for Commercial and Multifamily Buildings – **COMPLETE**
 - Grid Interactive Buildings for Decarbonization: Design and Operation Resource Guide - **COMPLETE**
 - Decarbonizing Hospital Buildings – **Additional review in progress.**
 - Whole Life Decarbonization Strategies in New Buildings Design (6-hours) - **RFP's received, decision on subcontractor to be made in Austin.**

PubEd Council Activities

Education – Training

- Austin Courses
 - New Decarbonization Tactics: Making Buildings Grid-Interactive
 - Starting the Path to Net Zero Buildings Using ASHRAE 90.1 - w/2025 Updates
- Decarbonization Track
 - 6 Seminars
 - 4 Panel Discussions
 - 2 Paper Sessions
 - 1 Sponsor Tech Talk



PubEd Council Activities

Certifications

- Certification Study Guide: 210 Sales + Full Member Benefit (Sept '25 – May '26)
- CDP Applicants is down 47% SY 2024-25 to SY 2025-2026
- 135 Examinees passed the CDP since inception

Study Guide Sales + Full Member Renewal Benefit

<u>YTD (IN 120)</u>		<u>YTD</u>
CDP	D-90249	210
CHD	D-90289	362
BCxP	D-90288	287
BEMP	D-90247	171

Certification Applications Processed-SY

	<u>YTD</u>	<u>LYTD</u>
BCxP:	210	218
BEAP:	30	25
BEMP:	95	132
CDP:	46	86
CHD:	145	113
HBDP:	13	26
HFDP:	<u>99</u>	<u>43</u>
Total:	637	643



Published Technical Guides



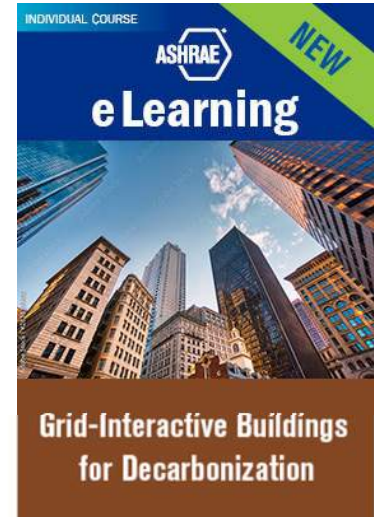
Embodied carbon in building services:
a calculation methodology for North America



<https://www.ashrae.org/about/cebd-technical-resources>

Educational Courses

- Educational Courses
 - Courses to enhance published guides (*eLearning* & *In person*)
- Chapter Programs
 - Developed four course for chapters



Tech Council Activities

Corey Metzger



CEBD/SP Project Updates

ASHRAE Center of Excellence for Building Decarbonization (CEBD)



ASHRAE 1977-SP, Expand and Update the ASHRAE Service Life

Table in the HVAC Applications Handbook

PMS – Kevin Cross (Chair), Natalie MacDonald, Lisa Ng, Josh Gemmell, James “Jim” F. Sweeney, Jr.

**Michigan State University (Contractor) - Dr. Kristen Cetin (PI), Dr. Debrudra Mitra (Co-PI),
Aanchal Gupta (Researcher), Jake Millette (Consultant – Michaels Energy)**

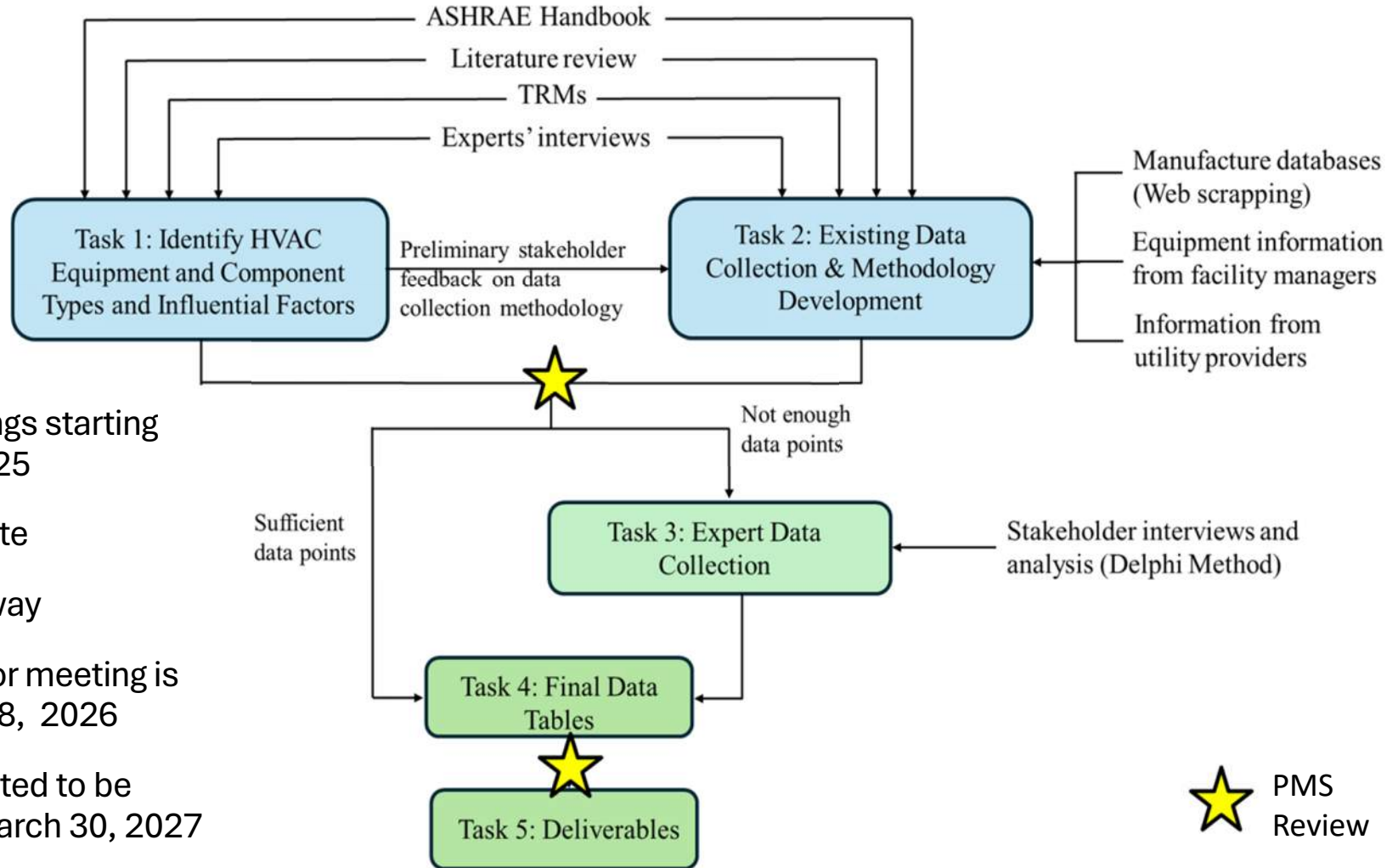
Project Summary/Objectives

This project is intended to expand and update the existing out-of-date tables and databases previously developed by ASHRAE and to ensure the inclusion of equipment relevant to building electrification such as VRF systems, air-to-water heat pumps, heat pump DHW heaters, and geothermal well field components.

Tasks

1. Determine equipment types and variations to be included in the study as well as quality of data required for each equipment type.
2. Evaluate different methods of obtaining data regarding equipment life and the associated quality of this data to determine appropriate approach for methodology of each equipment included in study.
3. Gather sufficient data to develop statistically significant estimates of life expectancy for major HVAC equipment and components (including compressors, PEX tubing, heat exchangers, coils, etc.).
4. Analyze data in a manner appropriate to the equipment type based on methodology of data collection used and develop service life expectancies of various HVAC equipment to expand and update existing available data from ASHRAE, particularly the Comparison of Service Life Estimates Table in the ASHRAE Handbook – HVAC Applications.

Tasks



- Quarterly meetings starting December 9, 2025
- Task 1 is complete
- Task 2 is underway
- Next PMS/Vendor meeting is Thursday, June 18, 2026
- Project is estimated to be completed on March 30, 2027

PROPOSED TIMELINE

Task Description	2025		2026												2027			
	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A
Task 1 Identify HVAC Equipment and Component Types and Influential Factors																		
Task 2 Existing Data Collection & Methodology Development																		
Task 3 Expert Data Collection																		
Task 4 Final Data Tables																		
Task 5 Deliverables - Final Report, Technical Papers and Project Synopsis																		

*Report, Project Synopsis,
Journal/Conference Paper*

 PMS review/feedback



ASHRAE 1988-SP, Whole-Life Carbon Gap Analysis

PMS – Lisa Ng, Ph.D. (Chair), Ghina Annan, Carrie Brown, Costas Balaras, Balkrishan Madhusudan Chodankar, Donald Colliver, Hua Ge, Rohit Jogineedi, Thomas Phoenix, Anna-Maria Sigounis, Samir Traboulsi

Evoke Building Engineering (Contractor) - (PI) Alex Janusz, P.Eng. M.A.Sc., (PM) Ali Zadeh, P.Eng. Ph.D., (Principal) Patrick Roppel, P.Eng. M.A.Sc.

Project Summary/Objectives

This project aims to identify the resources required to standardize building whole-life carbon analyses (WLCA) for practitioners, and the prospect for the development of a unified environment for building WLCA. The project shall be focused on meeting the needs of practitioners. Targeted completion is Nov 15, 2026.

Tasks

1. Identify existing authoritative WLCA resources
2. Conduct a gap analysis of authoritative resources
3. Provide specific and financially substantiated recommendations on how ASHRAE can help close the gaps.

Project Timeline

1. Identify existing authoritative WLCA resources



Complete. WLCA practitioner survey (95 respondents) and 13 SME interviews used to identify the resources forming the core toolset for practitioners. Survey and interviews also assessed which gaps practitioners considered most significant to their daily work.

2. Conduct a gap analysis of authoritative resources

In progress Targeting delivery August 15th

3. Provide specific and financially substantiated recommendations on how ASHRAE can help close the gaps.

In progress Targeting delivery October 15th



ASHRAE 2025-SP, Whole Building MEP Benchmarking Data Research

PMS – Tina Brueckner (Chair), Ghina Annan, Corey Metzger, Ginger Scoggins

PAE Consulting Engineers (Contractor) - Rachel Wrublik (PI), Claire Maxfield

Project Summary/Objectives

PURPOSE

Establish consistent, defensible whole-life carbon benchmarks for MEP systems so practitioners can compare projects and make carbon-informed design decisions.

STUDY OVERVIEW

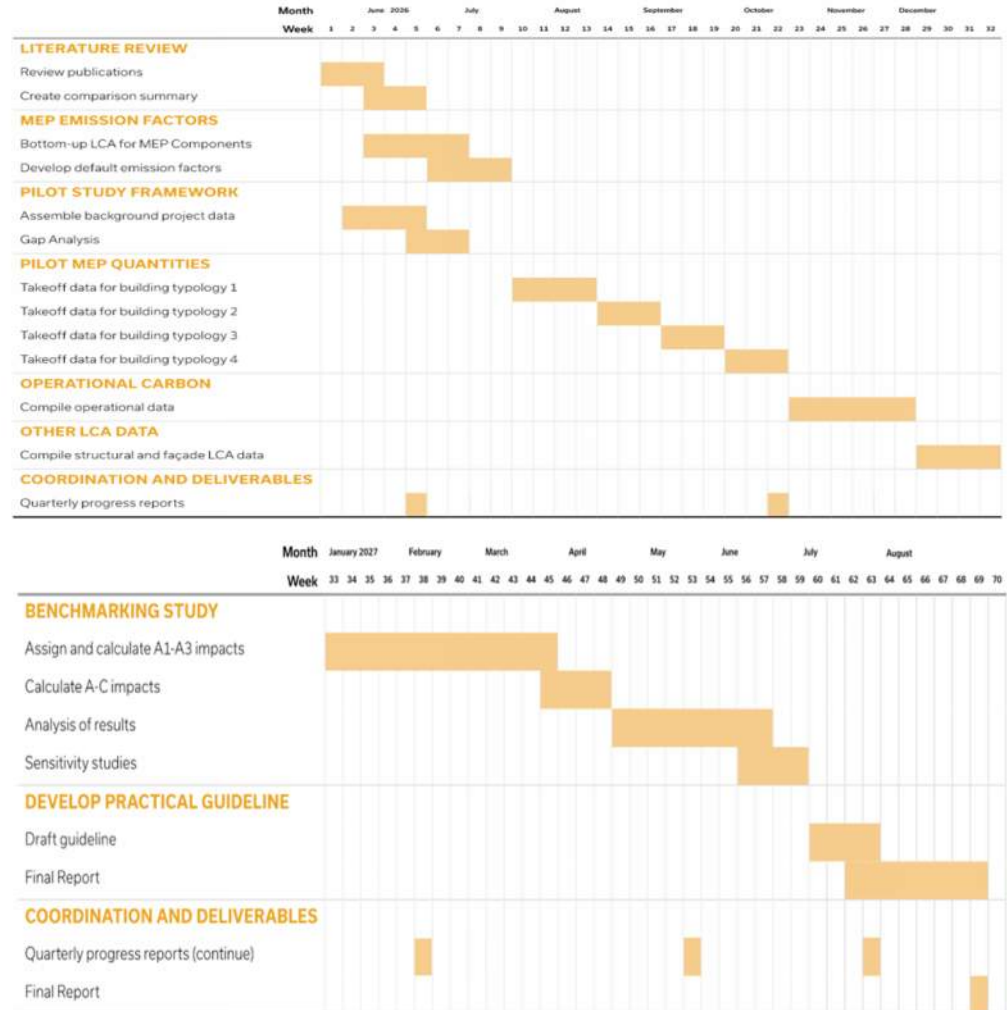
- Whole Life Carbon Benchmarking
 - 16 buildings consisting of four typologies across four ASHRAE climate zones, typologies include medium office, midrise apartment, secondary school, and one other typology
 - Utilize detailed MEP takeoffs, energy modeling data, and structural/enclosure LCA data
- Develop Practical Guideline for future pilot studies

Project Status

- Project is in the start-up phase:
 - Contract signed May 8th
 - ASHRAE kickoff May 18th
 - Confirming methods, coordination points, and pilot study inputs before the heavier data work begins
- In Progress
 - Literature review
 - 2026-SP coordination – initial meeting and review of literature research document
 - Creation of benchmark study framework

Project Timeline

- 16-month project: May 2026 – Sept 2027
- Progress reports
 - June 2026
 - October 2026
 - February 2027
 - May 2027
 - July 2027
 - September 1st, 2027 – Final Report
- Date TBD - Submission to Science and Technology for the Built Environment or ASHRAE Transactions Technical Papers





ASHRAE 2026-SP, Whole Life Carbon Calculation Guide for Building Systems

PMS – Corey Metzger (Chair), Costas Balaras, Donald Colliver, Juliana Pelligrini, Richie Mittal

**Skidmore, Owings & Merrill (SOM) – Contractor: Luke Leung (PI), Shona O’Dea (Co-PI),
Nicholas Chan, Mohammad Salamati, Marzia Sedino, James Woodal**

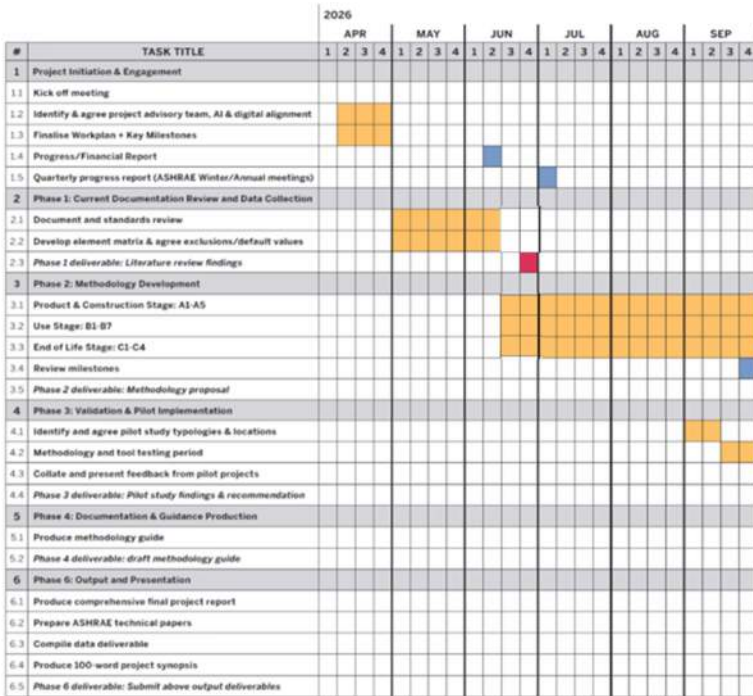
Project Summary/Objectives

This research will provide new information for various stakeholders to perform practical calculations, and be integrated as informative appendices in ASHRAE standards, guidelines, and handbook chapters. The project results along with other relevant ASHRAE research projects (e.g. “2025-SP, Whole Building MEP Benchmarking Data Research” and “1977-SP, Expand and update the ASHRAE Service Life Table in the HVAC Applications Handbook”), will help close the gap of existing knowledge on LCA of MEP systems and strengthen WLC emissions calculations.

Project Status and Deliverables

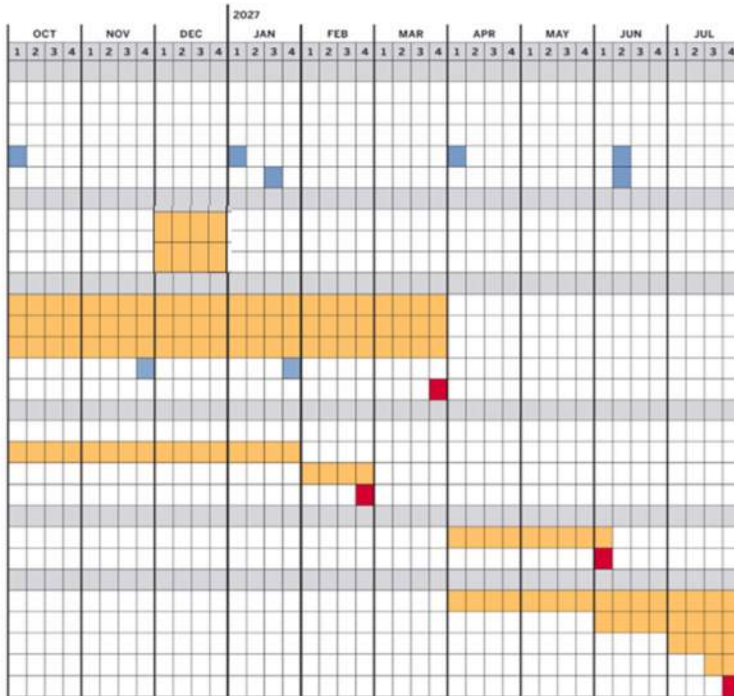
- Progress
 - SOM and the PMS have been meeting bi-weekly since their kickoff meeting on May 21, 2026.
 - SOM has sent solicitation emails to names on their advisory list.
 - The PMS agreed to SOM shortening the Phase 1 timeline by two weeks. Phase 2 of the project will begin two weeks earlier (mid-June 2026).
 - SOM and 2025-SP contractor PAE have begun coordinating on the literature review phase of their respective projects.
- Deliverables and Progress/Financial Reports
 - Literature review findings (Phase 1 deliverable) due in June.
 - First progress and financial reports were submitted on June 11, 2026
- Estimated Project Completion Date: July 31, 2027

Project Timeline



KEY

-  Key Meeting/Progress Report
-  Phase work duration
-  Phase Deliverable





ASHRAE 2027-SP, Refrigerant Leakage Rate Emissions Tracking

PMS – Stet Sanborn, Rajan Rajendran, Clay Nesler, Bruce Nelson, Ivan Rydkin

Effecterra, Inc.(Contractor) - Tristam Coffin (PI), Manny Garcia, Will Casey, Zoe Dawson (PM)

Project Summary/Objectives

Current Challenge / Opportunity

The HVAC industry relies on fragmented, outdated, and static flat-rate assumptions for refrigerant leak rates, making it highly difficult to accurately model the whole-life carbon impact of building systems.

Current Project Focus

- Help close a critical industry data gap by replacing current HVAC leakage assumptions with verified, aggregated longitudinal datasets.
- Develop a conceptual framework and simplified tracking form template to support data collection and analysis.
- Update leak-rate assumptions normalized by equipment type, age, and location.
- Evaluate if leakage rates change as equipment ages (Longitudinal Analysis).
- Develop best practice guidance report to support owner/operators with HVAC emissions mitigation.

Future Project Goal & Considerations

Shift how the HVAC industry tracks and acts on refrigerant data by establishing a framework for benchmarking leak-rates.

- Use the standardized template to support ongoing annual data reporting across the industry.
- Harmonize assumptions across global standards including ASHRAE 240P and EPA.
- Align/embed the HVAC leak framework with other regulatory reporting requirements.
- Expand future scope to include refrigeration leak rate validation by asset type, age and location.
- Create a public-facing benchmarking tool for portfolio level asset leak rate tracking

Project Timeline and Deliverables



Project Timeline & Estimated Completion Date

21-Month Project Timeline April '26 - Dec '27 split into 3 key phases:

- 1. Missing Data literature review**
Develop standardized data collection framework and methodology
- 2. Data identification**
Update HVAC equipment leak-rate assumptions & ASHRAE guidance
- 3. Root-cause analysis**
Develop best practice guidance report / recommendations

Deliverables to Date & Work in Progress

- Project PMS kick-off meeting completed in May.
- Interim report “data review and gap analysis” due July.
- Quarterly progress report due end of June.

AHRI Liaison Update

Jaime Yeh

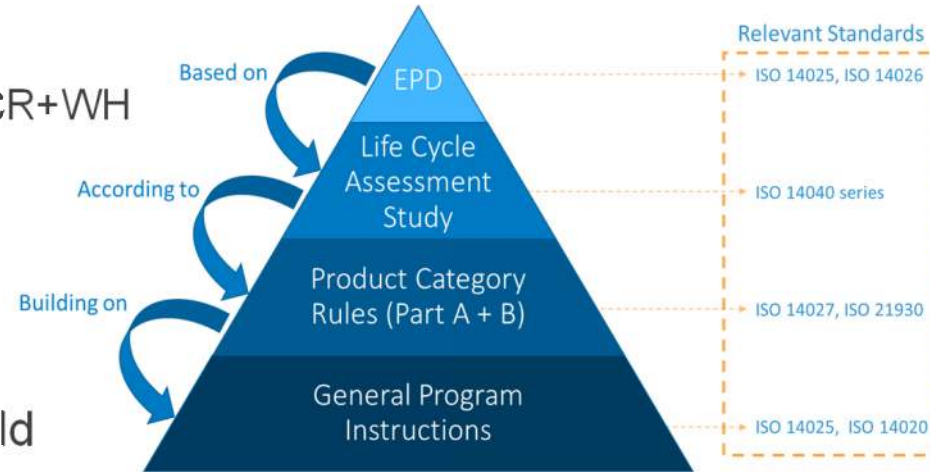
AHRI Liaison Update

AHRI Certified EPD Program (ACE)

Environmental Product Declarations program for HVACR+WH

Purpose

- Standardize EPDs for this industry
 - Development of Product Category Rules
- Ensure fair competition and level playing field
 - Expansion of AHRI Certification to EPD Verification
- Improve efficiency and scale at which EPDs can be developed and published
 - Meet industry needs while still capturing complexities of these products
- Comply with relevant standards
 - ISO 14000 series, ISO 21930, ASHRAE 244P



AHRI Liaison Update

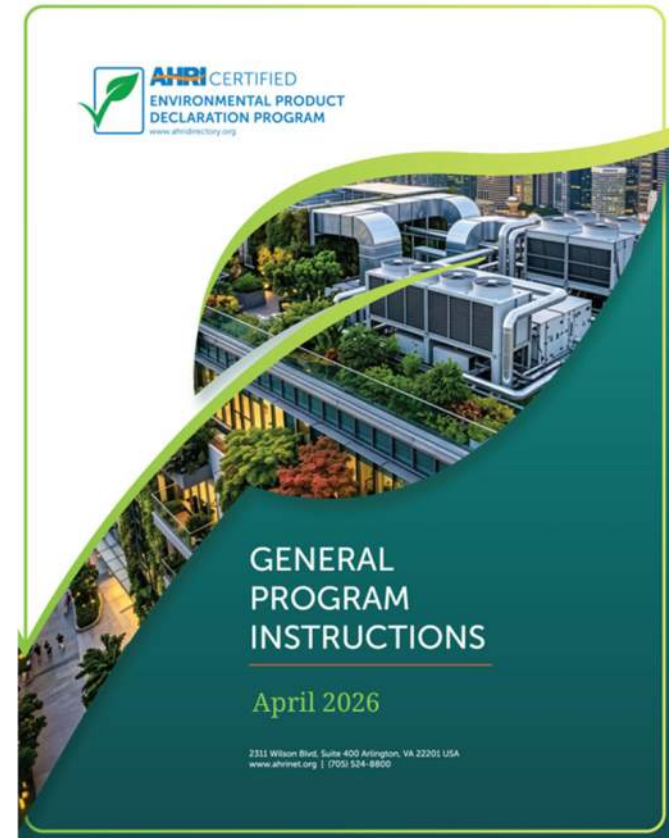


AHRI Certified EPD Program (ACE)

Environmental Product Declarations program for HVACR+WH

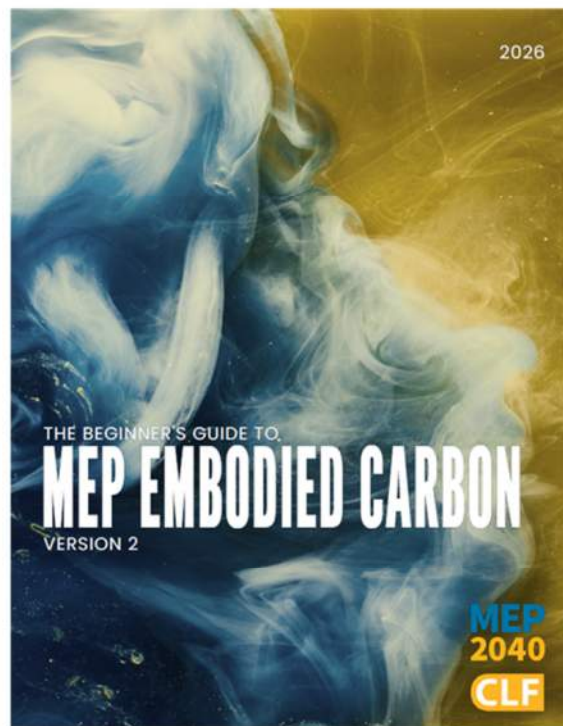
- General Program Instructions published April 6
 - Overarching rules & requirements for the program
 - Establishes AHRI as ISO 14025 EPD Program Operator
- Product Category Rules development beginning
 - Part A PCR
 - General requirements for all products in AHRI scope
 - Committee formed, first meeting in early July
 - Part B PCRs
 - Unitary AC/HP
 - Water Heaters
 - Additional product categories to follow

Learn More or Get Involved: ACE@ahrinet.org



MEP 2040
Liaison Update
Ghina Annon

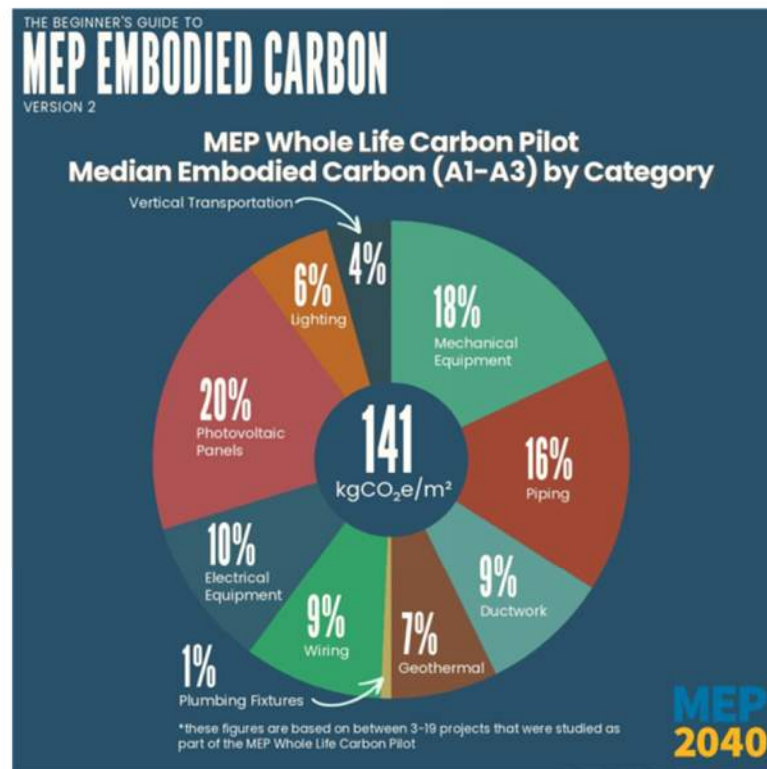
Summary of MEP 2040 Activities



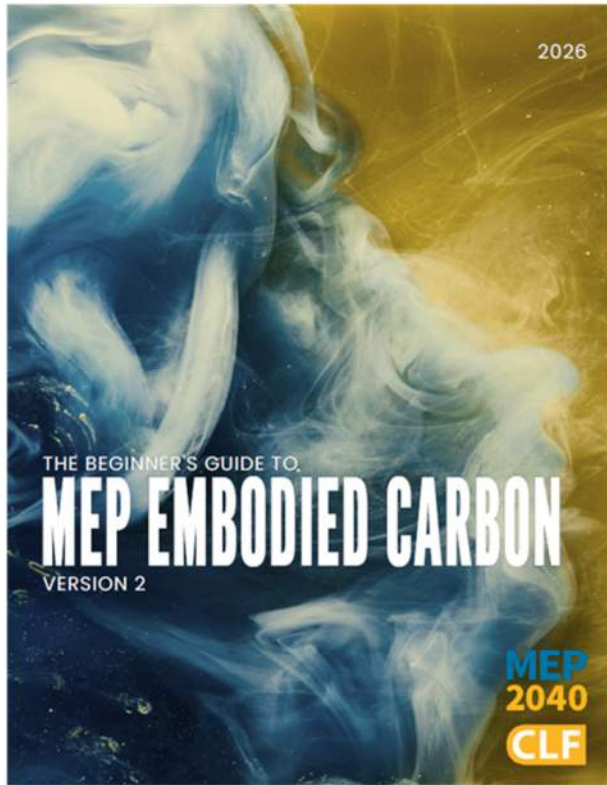
The Beginner's Guide To MEP Embodied Carbon V2

A Collaboration by
MEP 2040 & CLF

Released April 22nd, 2026



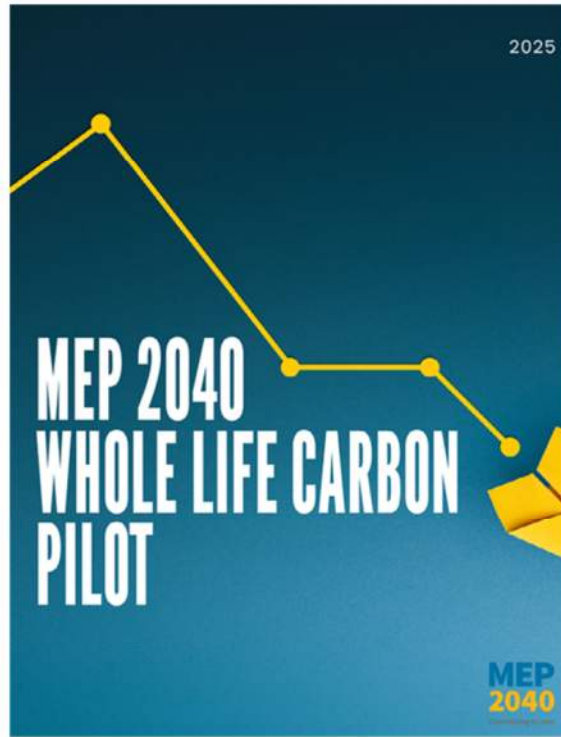
What's New in Version 2?



- Inclusion of Pilot Results (by LCA stage + category)
- Updates to Project Reporting fields
- MEP 2040 Reporting Workflow
- MEP Category Inclusion Across Standards (RICS/ASHRAE 240P)
- Metric Inclusion for Revit formulae
- Updates of A4+ per ASHRAE 240P Draft 2
- Uncertainty Guidance Update (and template)
- New FAQ Section:
- Using the Guidance Outside of the US
- Site Boundaries + Reporting
- District Energy
- Renovation



What's New in Version 2?



- Industry pilot bringing together 35 firms to assess whole life carbon of MEP systems across 40 building projects.
- Hands-on collaborative program applying methodologies from the *Beginner's Guide to MEP Embodied Carbon* through structured learning sessions.
- Comprehensive carbon scope, covering embodied carbon, fugitive emissions (e.g., refrigerants), and operational emissions from MEP systems.
- Data-driven collaboration to establish industry benchmarks, identify high-impact reduction strategies, and accelerate adoption of whole life carbon practices.
- Key step toward MEP 2040, supporting the sector's commitment to net zero carbon across mechanical, electrical, and plumbing systems.



What's New in Version 2?

Potential MEP 2040/ASHRAE Collaboration:

- ASHRAE Promotion of the Beginner's Guide to MEP Embodied Carbon and Pilot Studies
- MEP 2040 Participation in ASHRAE CEBD Strategic Projects (WLC Guidance and Benchmarking)
- Integration of new data from Strategic Projects in Guide v2: Refrigerant Emissions Tracking data, Equipment Service Life Updates
- ASHRAE sponsorship of MEP 2040

Alignment with Other Industry Efforts:

- Pilot: Coordination with ECHO Schema and CLF v2 Benchmarking Study
- Engagement with WLC Tools for MEP Integration: EC3 and Tally
- CLF Material Baselines: Future MEP integration

Guide's Alignment with 240P:

- Transport Emission Factors (A4): *Additional MEP Categories Interpolated Values*
- Refrigerant Leakage Rates (B1)
- Equipment Service Life (B4)
- Operational Energy (B6)



2026-2027 CEBD Strategy Update

Strategic Planning Session

Carrie Brown

Strategic Planning Session

- April 24–25, 2026, Washington D.C.
- 19 attendees (3 remote) + guests
- Reviewed CEBD activities and updates from the past year
- Reflected on the first two years of CEBD
- Developed and prioritized actions for 2026–27 and beyond



Strategic Planning Session

Coordination with CE IEQ

- Held back-to-back with the CE IEQ strategic planning retreat to allow a joint lunch and cross-attendance
- Closely aligned strategic intent but distinct technical focuses
- Discussion:
 - In one sentence: What is the core mission of your Center of Excellence?
 - Where do decarbonization and IEQ inherently intersect in the real world?
 - Looking at this overlap, what types of coordination do we need between the Centers?
 - What does effective coordination look like in this area?

Goal: present a single, unified ASHRAE voice that supports healthy buildings and decarbonization.



Strategic Planning Session

8 Breakout Sessions:

- A.1: Accelerating decarbonization with the BCAT
- A.2: Workforce development for building decarbonization
- A.3: A coherent baseline and benchmarking strategy for whole life carbon
- A.4: Making the financial case for decarbonization
- B.1: 2030 is less than four years away
- B.2: From guidance to market impact
- B.3: A greenhouse gas emissions standard for buildings
- B.4: The next frontiers of decarbonization



Funding Request

Carrie Brown

Funding Request

Activities with Savings	(\$309,700)
Redirected Funds	(\$110,000)
New Activities	\$666,000
Net Funding Request	\$246,300

New Activities

- New Building Code Assessment Tool (BCAT) workshops
- CEBD Chapter Engagement & Ambassador Program
- A1-A3 Foundational Embodied Carbon Quantification for MEP Systems
- Developing interactive training for ASHRAE's Decarbonizing Building Thermal Systems guide
- Whole life carbon leadership
 - Baseline stakeholder outreach
 - Form the "standard" for benchmarking WLC 240+
 - Develop a SEED document for a dedicated greenhouse gas reduction standard
- Charting the Path to 2050
 - 2050 Building Decarbonization Roadmap
 - Determine how to present and lead the narrative on 2030 goals
 - Future strategy priority session
- Accelerating Market Adoption & Insight
 - Climate Week Workshop Summit
 - Hold a forum at the Annual and Winter conferences to discuss market trends and insights.



Strategic Theme 1

Leadership in WLC

Luke Leung

Strategic Theme #1

Asserting Leadership in Whole Life Carbon

- **Key Insights**

- ASHRAE 240 has the potential to be a valuable tool on the worldwide stage.
- There are threats to ASHRAE's role in setting whole-life carbon levels for buildings.
- The UK Net Zero Carbon Buildings Standard has been published, and other organizations around the world and in the United States are looking to do the same.

- **Strategic Actions**

- Determine where ASHRAE believes its place is within the Whole Life Carbon landscape, understanding that ASHRAE is focused on the HVAC&R community, Standard 240P is focused on MEP systems and building whole life carbon includes all building components.
- Research the current levels of whole life carbon in buildings through a benchmarking study.
- Begin to develop a new standard to set building whole life carbon levels. The first step would be a gap analysis to determine what should be in the standard what could be referenced to other standards, and what other organizations need to be involved. The second step is to hire a contractor to develop a seed document for the standard outlined above.



Strategic Theme #1

Asserting Leadership in Whole Life Carbon

- **New Activities**

- Baseline stakeholder outreach

Conduct targeted stakeholder outreach to identify and prioritize organizations for engagement in the development of a North American whole life carbon assessment framework. Outreach will include representatives from building ownership, development, design, construction, manufacturing, facility operations, standards development, certification programs, policy, utilities, and digital tool providers. Activities will involve interviews, workshops, and coordination meetings to understand stakeholder roles, data needs, and opportunities for collaboration. Lessons learned from collaborative initiatives such as the UK Net Zero Carbon Buildings Standard will be evaluated to inform an inclusive engagement strategy and support the development of a coordinated, broadly supported whole life carbon benchmark.

- Form the "standard" for benchmarking WLC 240+

This project will develop a companion standard to SPC 240P that establishes whole life carbon benchmarks, targets, and performance requirements for buildings. Building on SPC 240P's methodology for quantifying life cycle greenhouse gas emissions, the standard will provide a consistent framework for developing, applying, and updating benchmark values across building types and project contexts. It will address benchmark development principles, data quality, normalization methods, reporting conventions, and performance categories. The resulting standard will support code adoption, policy alignment, design decision-making, and performance evaluation by enabling consistent comparison of building life cycle carbon performance. Estimated duration: 24 months.

- Develop a SEED document for a dedicated greenhouse gas reduction standard

Following the completion of the Whole Life Carbon (WLC) benchmarking initiative for Standard 240+, ASHRAE will advance the development of a new, dedicated greenhouse gas reduction standard. This project will issue a request for proposal (RFP) to engage a contractor to create a Standard Evaluation and Expansion Document (SEED). The SEED document will establish the foundational structure and preliminary content for this new standard, mirroring the successful format of Standard 240P. This strategic initiative will further assert ASHRAE's leadership in the whole-life carbon landscape and support global decarbonization efforts.

Strategic Theme 2

Charting the Path to 2050

Mark Lessans (*Luke*)

Strategic Theme #2

Charting the Path to 2050

- **Key Insights**

- ASHRAE's Position Document on Decarbonization is set to expire in January 2027.
- The first interim goals for 2030 are less than four years away, providing an opportunity to check progress, redefine the pathway, and make sure we don't disincentivize action.
- Coordination is needed with other organizations related to the 2030 goals.
- The industry needs more interim and concrete goals to provide the vision to determine if we are on the pathway to meeting the 2050 goals.

- **Strategic Actions**

- Create a 2050 Roadmap working group within the CEED.
- Coordinate ASHRAE's 2030 (or 2035) message with other industry organizations.
- Develop interim goals for 2040 that include tangible metrics that can be used to both measure status and provide more concrete objectives for the industry.



Strategic Theme #2

Charting the Path to 2050

- **New Activities**

- **2050 Building Decarbonization Roadmap**

The ASHRAE 2050 Building Decarbonization Roadmap is a long-term framework that sets performance indicators and milestones (2030, 2040, and 2050) to guide the global building sector toward net zero whole-life carbon by 2050. The roadmap will allow for variations in building type, location, and application and considerations will be given to countries who have beyond 2050 timelines. The roadmap will provide a structured pathway for aligning standards, policies, technologies, and practices worldwide, integrating strategies for business case, operational efficiency, electrification, low-Global Warming Potential (GWP) refrigerants, embodied carbon reduction, indoor environmental quality (IEQ), artificial intelligence (AI), resilience, equity, and circular economy principles in coordination with other major global organizations. Development will highlight the role of key resources such as 240 and 242, align with ASHRAE's broader strategic plans, and leverage relevant decarbonization frameworks from other global organizations.

- **Determine how to present and lead the narrative on 2030 goals**

While current targets call for halving 2015 emissions and advancing net-zero new building practices by 2030, evidence suggests these goals may not be fully achieved. A revision to the ASHRAE Position Document and roadmap on Building Decarbonization should balance ambition with credibility by acknowledging progress gaps, refining near-term expectations by establishing 2030 as a critical transition point, and introducing pragmatic mid-term milestones aligned with 2050 net-zero objectives. It should also recognize limitations in current measurement frameworks—particularly for embodied carbon—develop necessary tools, align current resources, and prioritize development of standardized, scalable metrics to transparently track progress across the full building life cycle.

- **Future strategy priority session**

This Future Strategy Priority Session will identify industry needs and priorities that can accelerate building decarbonization across the built environment. The project will leverage the 2026 ASHRAE Decarbonization Conference to gather marketplace input on the guidance, research, standards, tools, and resources needed to support greater adoption of decarbonization strategies. Information may be collected through attendee surveys, facilitated discussion sessions, or a combination of methods. Findings will be synthesized and presented during a forum session at the 2027 ASHRAE Winter Conference to a broader audience and validate future member and industry priorities.

Strategic Theme 3 Accelerating Market Adoption & Insight

Amanda Webb (*Stet*)

Strategic Theme #3

Accelerating Market Adoption & Insight

- **Key Insights**

- Decarbonization project drivers are required by law (code-driven), wanted (by owner or others), or required by project stakeholders (finance and insurance).
- Understanding of financing mechanisms within the building industry is not known by the typical building design engineer.
- Electricity rates are changing due to many factors, including the rate of data center adoption, and the value of decarbonized buildings is increasing.
- Green financing priorities are shifting away from traditional energy savings projects to other initiatives with better returns, such as battery storage, that are more closely aligned with building decarbonization.
- Many projects highlighted in the past are larger and much higher profile than the typical building. Refine the focus on the buildings that can have the biggest impact on CO2e reduction.

- **Strategic Actions**

- Connect with the entities that finance and insure decarbonization projects to better understand project drivers and then communicate what those drivers are to members.
- Hold a forum at the Annual and Winter conferences to discuss market trends and insights.
- Develop information on project financing options.



Strategic Theme #3

Accelerating Market Adoption & Insight

- **New Activities**

- **CEBD Chapter Engagement & Ambassador Program**

Translating decarbonization policy and technical guidance into actionable practice remains the critical gap between climate commitments and building-level outcomes. This program proposes a two-tier volunteer structure - 197 chapter ambassadors coordinated through 16 regional ambassadors and reporting to a CEBD program coordinator/CEBD liaison - to extend CEBD's reach across ASHRAE's global network. Ambassadors would disseminate CEBD publications, standards, and certifications, deliver decarbonization education through standardized workshop-in-a-box materials, provide technically informed support to members at early stages of decarbonization adoption, and surface regional intelligence, pilot opportunities, and success stories back to CEBD.

- **Climate Week Workshop Summit**

Climate Week provides a unique opportunity for ASHRAE to engage with global leaders advancing climate action and resilient infrastructure. This project would support an ASHRAE-hosted workshop or summit at a future Climate Week event, bringing together developers, insurers, owners, operators, utilities, and other stakeholders to accelerate market adoption of sustainable building solutions. Objectives include facilitating discussions, sharing ASHRAE resources and expertise, and gathering insights to inform future work. The program would align with Climate Week priorities related to buildings, infrastructure, energy efficiency, resilience, and the modernization of the built environment.

Strategic Theme #3

Accelerating Market Adoption & Insight

- **New Activities**

- Hold a forum at the Annual and Winter conferences to discuss market trends and insights.

This proposed forum establishes a recurring platform at the ASHRAE Annual and Winter conferences to examine shifting market trends, regulatory pressures, and financial drivers reshaping building decarbonization. By convening multi-disciplinary leaders, including design engineers, policymakers, owners, technology providers, and equipment manufacturers, the forum will facilitate dialogue on electrification, grid interactivity, and whole-life carbon reduction strategies. Participants will gain insights into emerging market demands, scalable design solutions, and cross-industry bottlenecks. Ultimately, these collaborative sessions will bridge the gap between technical standards and market execution, accelerating the global deployment of low-carbon, resilient building infrastructure in alignment with ASHRAE's strategic decarbonization goals.

- Developing interactive training for ASHRAE's Decarbonizing Building Thermal Systems guide

ASHRAE's Decarbonizing Building Thermal Systems Guide provides information on heat pump design for decarbonization but stops short of providing instruction. To help ASHRAE members put the information in this guide into action, a training course needs to be developed that provides a deeper dive into the calculation methodologies and decision-making processes introduced in the guide. The goal of this project is to develop and deliver an interactive course to accompany the DOE/ASHRAE Decarbonizing Building Thermal Systems guide. This course is intended to be highly interactive, and should be designed and delivered so that it can reach as wide an audience as possible.

CEBD Member Recognition

Blake Ellis



THANK YOU FOR YOUR SERVICE

ASHRAE Center of Excellence
for Building Decarbonization

- Ghina Annan, VM
- Rajan Rajendran, VM
- Stet Sanborn, VM
- Kayleigh Houde, MEP 2040 Liaison
- Adeeba Mehboob, MembC Liaison
- Corey Metzger, TechC Liaison
- Ashish Rakheja, Coord. Officer



CONTINUING MEMBERS

ASHRAE Center of Excellence
for Building Decarbonization

- Ginger Scoggins, Vice Chair
- Parag Cameron-Rastogi, VM
- Chuck Gulledge, VM
- Mark Lessans, VM
- Amanda Webb, VM
- Luke Leung, Consultant
- Jeremy Smith, PubEdC Liaison
- Jamie Yeh, AHRI Liaison
- Leigh Lain Walker, Staff Liaison



WELCOME NEW MEMBERS

ASHRAE Center of Excellence
for Building Decarbonization

- Randall Higa, VM
- Nancy Kohout, VM
- Paul Rafferty, VM
- Amr Suliman, VM
- Kevin Mercer, TechC Liaison
- Elizabeth Jedrlnic, MembC Liaison
- Ghina Annan, MEP 2040 Liaison
- Wade Conlan, CO

Transfer of CEBD Chair

Blake Ellis



WELCOME CEBD CHAIR

ASHRAE Center of Excellence
for Building Decarbonization



Dr. Carrie Brown
2026-2027 CEBD Chair



Comments to CEBD Open Session

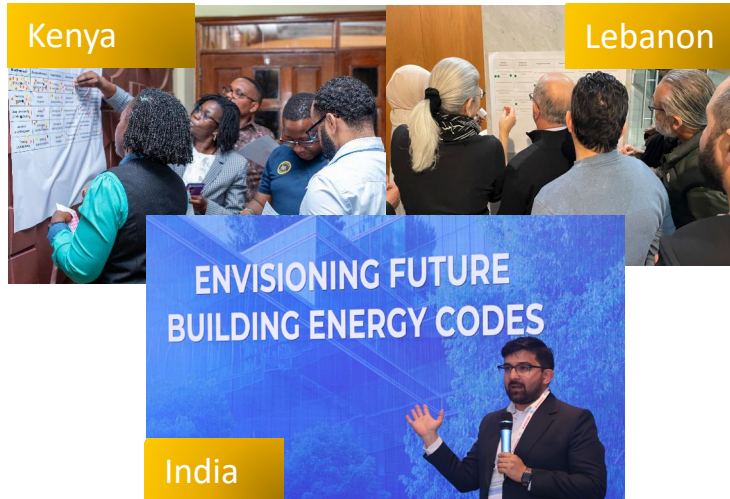


Thanks to our volunteers and staff!

Adjourn



CEBD Strategic Planning Retreat



Building Code Workshops

- **Strategic Planning Retreat** *(Held April 24-25, 2025 in Washington, DC)*
 - ✓ Strategized Alignment with CE IEQ
 - ✓ Developed Future Strategic Initiatives & Existing Enhancements
- **SY 2026-2027 Strategic Initiatives**
 - ✓ Asserting Leadership in Whole Life Carbon
 - ✓ Charting the Path to 2050
 - ✓ Accelerating Market Adoption & Insight
- **Enhancements to Existing Priorities**
 - ✓ Additional Building Code Assessment Tool (BCAT) Workshops
 - ✓ CEBD Chapter Engagement & Ambassador Program
 - ✓ Strengthen Committee-to-Committee Collaboration
- **Additional Activities**
 - ✓ Tech Council: Five (5) Research Projects Underway
 - ✓ Members Council: Distinguished Lecturer Presentation on Decarbonization Retrofits
 - ✓ Publication & Education Council: Two (2) Design Guides and Two (2) eLearning Courses
 - ✓ Building Code Workshop held at Developing Economies Conf.

AI Data Center Framework

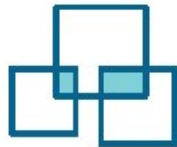


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Planning
and Siting



Integrated Design
Principles



Energy and
Thermal Efficiency



Grid Interactivity and
Demand Flexibility



Resilient
Design



Commissioning and
Performance Validation



Operations and
Maintenance



Retrofit and
Modernization Strategies



Tools, Standards,
and Resources