Building Envelope Campaign Webinar Series

Part 1: How Schools and Educational Facilities Can Benefit from DOE Technology Campaigns

February 2, 2021
3:00 – 4:00pm ET
Antonio Aldykiewicz Jr,
Oak Ridge National Lab
Building Envelope Campaign
Agenda

1. Welcome & Introduction
2. BEC
3. ILC
4. Efficient and Healthy Schools Campaign
5. Audience Q&A
Building Envelope Campaign

February 2, 2022
Thank you to our Organizers!

The American Institute of Architects

IFMA™
International Facility Management Association

IBEC
International Institute of Building Enclosure Consultants
How to assess the overall building envelope performance

…without accounting for how it is used.
The Building Envelope Performance (BEP) Metric

\[ \text{HVAC Cooling and Heating Demand} = \text{Building Envelope Energy Load} + \text{Internal Loads} \]

\[ \text{Building Envelope Energy Load} = \text{BEP (Building Envelope Performance)} \times \text{Building Envelope Area} \]

Building Envelope Performance \([k\text{Btu/ft}^2]\)
What is the Building Envelope Campaign?

- Current Better Buildings Technology Campaign
- Designed to help create more energy efficient buildings
- Introduces a new building envelope assessment metric and assessment tool: Building Envelope Performance (BEP) value
Building Envelope Campaign Goals

- **Motivate action and increase awareness** of the value of investing in high performance building envelope technologies for both new and existing commercial buildings.
- **Recognize leaders** adopting and achieving high performing building envelope systems.
- **Demonstrate and document** energy and cost savings with integrated design, construction, commissioning, and maintenance from implementation of high performing envelope systems.
How are we achieving these goals?

- **Supporters**
  - Access technical expertise regarding envelope technologies
  - Partner with the BEC technical team to spread the word about the campaign
  - Gain recognition through the BEC website

- **Participants**
  - Access campaign resources/technical expertise in evaluating envelope options
  - Stay informed on envelope technologies and resources produced through the campaign
  - Gain recognition through the BEC website, achievement of awards, and participation in case studies (pending submitting validation information and building completion)
    - Projects completed since January 2019 are eligible to submit
Recognition Tiers and Categories

Retrofit: Retro 30 or 50
Building envelope heat loss/gain reduction of 30%\(^a\)

New Construction: Novel 20 or 40
Building envelope heat loss/gain reduction of 20%\(^a\) over code\(^b\)

Technology Role Models &

Equity in Energy Role Models
An additional level of recognition may be available to those buildings which meet a campaign recognition tier and also serve as role models within the industry.

Honorable Mentions
Buildings which do not meet a campaign recognition tier but still make a noteworthy impact on the campaign (e.g., substantial square footage) may apply for an Honorable Mention.

(a) Reduction may consist of any energy retrofit measure that involve the building envelope thermal performance (R-value, Air leakage, Attachments, etc.)

(b) Most recent national energy code (ASHRAE 90.1 - 2016)
Timeline

- Launched at the 2020 Better Buildings Summit
- In our second year
- Always open for new Participants and Supporters to sign up
- Accepting and reviewing Submittals from Participants
  - All new construction and retrofits completed since January 2019 are eligible
- Spring submittal deadline is April 8, 2022
- Summer or fall recognition event

This Campaign is free and obligation-free to join. It is easy to switch from a Supporter to a Participant!
Recognized 14 buildings in Year 1!

- 16 buildings were submitted,
- 14 were eligible for recognition (3 were educational projects),
- 1.5 million square feet of conditioned floor area, and
- 9 million kBTU annual savings based on envelope technologies alone.

Buildings are a diverse group of new construction and retrofit projects from across the country representing multiple sectors: healthcare, education, commercial, and industrial.
Retrofit Projects

Retro 30
- B246 (apartment building)

Retro 50
- American Geophysical Union
- ASHRAE World Headquarters
- Prairie Trails School

Rendering of the American Geophysical Union in Washington, DC.
Used with permission.
New Construction Projects

Novel 20
- Industrial Center Building Additional (ICB-A)
- Lubber Run Community Center
- Plant Sciences Building
- Vermeer - New Plant 7

Novel 40
- Athens County EMS Station #51
- BCH Lafayette Community Medical Center MOB 2
- Boulder Valley School District Education Center
- Catalyst (Spokane)
- Credit Human Headquarters
- Vergennes Community Housing
Hannah Carter
Parkway School District, MI
Building Envelope Campaign Participant
Parkway Schools and the Building Envelope Campaign

Hannah Carter, Sustainability Coordinator
About Parkway School District

- Public school district in St. Louis, MO
- 18,000 students
- 2,000 staff
- 34 buildings
- 3.3 million square feet
- Sustainability Goals
  - 35% energy reduction by 2025
  - Direct tie to District strategic plan
    - “integrate environmentally, socially, and fiscally sustainable best practices into each department and program”
Comprehensive Approach to Energy Savings

- Sustainability and Energy board policies
- Capital replacement and building design
- ASHRAE 50% Advanced Energy Design Guidelines
- Retrofits
- Purchasing
- Behavior change - Student/staff engagement

- Monitoring and analysis
  - Building automation system
  - Fault detection software
  - Benchmarking with utility data
- Retro-commissioning

**Energy Use (kWh)**

- Target: 35% below baseline
Joining the Building Envelope Campaign

- Integrated ASHRAE 50% Advanced Energy Design Guidelines into District construction specifications
- During annual roof replacements, improving from R-8 to R-30
- Collecting data for utility rebates, used for recognition through the BEC

<table>
<thead>
<tr>
<th>Item</th>
<th>Component</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roofs</td>
<td>Insulation entirely above deck</td>
<td>R-30.0 c.f.</td>
</tr>
<tr>
<td></td>
<td>Attic and other</td>
<td>R-49.0</td>
</tr>
<tr>
<td></td>
<td>Metal building</td>
<td>R-19.0 + R-11 Lg</td>
</tr>
<tr>
<td></td>
<td>Solar Reflectance Index (SRI)</td>
<td>Comply with Standard 90.1°</td>
</tr>
</tbody>
</table>
Participation Benefits

Recognition
- Support from Administration, Board of Education, and community for Sustainability
- Sharing the benefits to schools locally and nationally
- Creating a fact sheet and video to promote and share our projects

Cost savings
- Reducing building energy use, improved IAQ, and occupant comfort
- Coupling roof and HVAC replacements may allow for downsizing equipment
- Received $16,000 in utility rebate incentives from 3 partial roof replacements
- Rebate incentives used to fund further energy efficiency projects

Support
- Easy to use tool to calculate your building envelope improvement
- Supportive team and resources for ways to further improve

Shenandoah Valley Elementary

Building Envelope Performance (BEP)
Congratulations! You meet the requirements to receive the Retro 30 award.

38% Improvement
Axel Pearson
Pacific Northwest National Lab, WA
Integrated Lighting Campaign
Integrated Lighting Campaign (ILC)

Campaign Overview
February 2, 2022
Integrated Lighting Campaign - The Focus

INTEGRATION
The lighting system can communicate with other building systems to enhance building performance.

- Space Utilization
- Advanced Sensors and Controls
- Asset Tracking
- HVAC
- Advanced Lighting Systems
- Plug Loads
- Internet of Things
ILC Website Resources

Reports / Case Studies
Utility Incentives
Webinars / Training
Videos

BECOME INVOLVED TODAY AT INTEGRATEDLIGHTINGCAMPAIGN.ENERGY.GOV
2022 Recognition Categories for Participants

- Advanced Use of Sensors and Controls for Lighting
- Integrated Controls for Plug Loads and Lighting Systems
- Integrated Controls for HVAC and Lighting Systems
- Other Integrated Systems and Lighting
- Integrated Lighting and Horticultural Controls
- Innovative Maintenance, Operation, and Financing Service Models

New in 2022! New in 2022!
Submitting for Recognition?

Program Description

Narrative:

Description of Program including start/end dates – please include pilot demonstrations if applicable, or Description of Contributions to the Integrated Lighting Campaign

Supporting Data:

(e.g., number of buildings/systems impacted, energy savings measured, Participants/projects recruited to the LLC, etc.)
Recognition Timeline and What Comes Next

Recognition Process Timeline

- **September 2, 2021**
  - Year 2 Begins
- **March 30, 2022**
  - Submission Closes
- **January 7, 2022**
  - Submission Open
- **June 30, 2022**
  - Organizations Informed of Selection/Recognition
- **August 18, 2022**
  - Recognitions Announced

Create a body of knowledge

- Case Studies
- Newsletter Articles

Images from prior campaigns
Rengie Chan
Lawrence Berkley National Lab, CA
Efficient and Healthy Schools Campaign
Ron Kramps
Charleston County School District, SC
Efficient and Healthy Schools Campaign Participant

Dennis Knight
Whole Building Systems
Efficient and Healthy Schools Campaign Supporter
Outline

- Efficient and Healthy Schools campaign
- Recognition categories
- Introduce:
Efficient and Healthy Schools Campaign

The campaign aims to engage K-12 schools to improve energy performance and indoor air quality, with a focus on practical solutions involving HVAC and other technologies to reduce energy use and carbon emissions. This campaign is led by the U.S. Department of Energy with technical support from Lawrence Berkeley National Laboratory.

Organizing partners:
Become a Participant or Supporter

■ Access technical assistance and resources on best practices, guidance, case studies, and webinars

■ Campaign prioritize schools serving low-income communities and in rural areas

■ Campaign participants can receive recognition for their exemplary efforts to improve energy efficiency and indoor air quality

■ Campaign supporters are encouraged to share and promote goals and benefits of efficient and healthy schools
Recognition: Round One (Fall 2021)

- HVAC inspection and maintenance for indoor air quality (IAQ)
- Efficient HVAC retrofits, upgrades, and/or replacements
- Ongoing monitoring and analytics for HVAC performance
- Team approach to support strategic investments in efficient and healthy schools
Charleston County School District

Ron Kramps, Executive Director, Facilities Management
Strategies For Improving Energy Efficiency and Health

Ron Kramps, PE, CEM
Associate of Facilities Management
Charleston County School District, SC
CCSD Facility Information

- 88 Schools, charters, programs
- 24 Head Start, leased, storage, admin, land, bus lots, stadiums
  - 112 Properties/Campuses
  - 10 MSF
  - ~50,000 students

Charleston belongs to “Council of the Great City Schools” - ~70 largest urban districts
CCSD EUI Tracker

1% per year Goal
1.5% per year Achieved

37% Improvement
Mindset: Facility Asset Management

- Facilities are assets, useful for producing educated students
- You must designate “Asset Managers” who are charged with understanding and owning their assets, i.e. HVAC, restrooms, playgrounds, security systems...
  - List/quantities
  - Condition
  - Maintenance requirements
  - Cost to maintain
  - Desired specs for new
  - Annual “Status of Assets” presentation to leadership

Without a clear sense of “ownership” facilities will not be properly managed!
Strategic Framework

- Biennial condition assessment
- Long Range Maintenance Plan (Capital Maintenance/Renewal Plan)
- Energy Regulations
  - Audit and “energy incentive” program
- Roof maintenance program

The big picture items that flow from the mindset and lead to success!
Important Tactical Tasks

- HVAC filter program (a good vendor helps); MERV 13+ is achievable
- Energy contract/partnership with our controls vendor
- Intentional Preventive Maintenance shop/program
- Rigorous monitoring via building automation system

Daily tasks that support energy conservation!
Custodial Support

- Weekly fogging/sanitizing via sprayer
- Hand sanitizer, masks, etc.
- Custodial checklists; wipedowns
- Integrated Pest Management

Custodial support leads to occupant health and well-being!
ESSER III: Baptist Hill High School Roof/HVAC Replacement

- **Scope:**
  - Replace modified bit with fluid applied roof
  - Replace aged RTUs with new energy efficient
  - MERV 13 filtration
- **Budget:** $2.4M
- **Status:** Awarded; planned execution by Fall 2022
- **Energy/IAQ Improvements**
  - Improve building envelope; leak free roofing
  - 20 year warranty and R-20 insulation value
  - New HVAC units; MERV 13; more outside air
ESSER III: Minnie Hughes Elem School Roof/HVAC Replacement

• Scope:
  – Replace modified bit with fluid applied roof
  – Replace aged RTUs with new energy efficient
  – MERV 13 filtration
• Budget: $3.6M
• Status: Out for bid
• Energy/IAQ Improvements:
  – Improve building envelope; leak free roofing
  – 20 year warranty and R-20 insulation value
  – New HVAC units; MERV 13; more outside air
ESSER III: Military Magnet High School HVAC Replacement

- Scope:
  - Replace existing split HVAC systems, Scholar units and RTU’s
- Budget: $7M
- Status: Design ongoing
- Energy/IAQ Improvements:
  - Replace 15 year old HVAC units
  - Better filtration system
  - Upgraded outdoor air system
Whole Building Systems

Dennis Knight, Principal and Chief Executive Officer
Whole Building Systems and Charleston County School District

- Working Together
  - 40 plus years, 12 with current firm Whole Building Systems (WBS)
  - Design guidelines to full requirements for new construction and renovation
  - Portfolio wide Energy Benchmarking
  - MEP Design for total HVAC replacement projects
  - Commissioning for new construction and HVAC replacements
  - Indoor air quality (IAQ) guidance for COVID-19 responsiveness
Whole Building Systems and Charleston County School District

- St Johns High School HVAC Upgrade Project
  - What are the approaches that can improve both energy efficiency and indoor air quality (IAQ) in schools?
  - Replace end of life equipment with super efficient units
  - Dedicated outdoor air system, demand control ventilation and energy recovery
  - Lighting upgrades and envelope improvement (roof replacement)
  - Improved IAQ conditions and 57% energy cost savings over baseline
ASHRAE Epidemic Task Force (ETF) Core Recommendations for Indoor Air Quality (IAQ)

- Follow public health advisors
- Ventilation, Filtration and Air Cleaning
- Air distribution
- Proper HVAC System Operation
- HVAC System Commissioning
Q & A
Register for Parts 2 & 3 of the Webinar Series

BUILDING ENVELOPE CAMPAIGN WEBINAR SERIES

The Building Envelope Campaign (BEC) 3-part webinar series highlights free engagement and recognition opportunities and features campaign participants sharing practical approaches to improving energy efficiency.

• Part 2: How Multifamily Buildings Can Benefit from DOE Technology Campaigns (Mar. 2, 2022: 3 - 4 PM ET)  
  Register here

• Part 3: How Historic Buildings Can Benefit from DOE Technology Campaigns (Apr. 6, 2022: 3 - 4 PM ET)  
  Register here
2021-2022 Better Buildings WEBINAR SERIES

REGISTER TODAY:
betterbuildingssolutioncenter.energy.gov/bbws
Building Envelope Campaign

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