Better Buildings Webinar Series

We'll be starting in just a few minutes….

Tell us…

What topics are you interested in for future webinars?

Please go to **slido.com** and use event code **#DOE** to submit your responses.

Save Energy and Money with the Building Envelope Campaign

December 8, 2020

3:00 – 4:00 pm EDT

Today's Presenters

Hayley McLeod
Oak Ridge National Laboratory

Dr. Simon Pallin
Oak Ridge National Laboratory

Cristine Gibney
American Geophysical Union


BUILDING
ENVELOPE
CAMPAIGN
The Building Envelope
Campaign helps building
and managers
design more energy-
efficient buildings.

Please go to www.slido.com

using your mobile device, or by opening a new window

Enter Event Code

#DOE

Polls #1 & 2

We want to learn more about you!

Please go to www.slido.com and enter code **#DOE** to respond

Agenda

1. Building Envelope Campaign (BEC) Introduction
2. Tool Walk-Thru with Technical Lead of BEC
3. Case Study – American Geophysical Union
4. Q & A

Better Buildings Alliance Tech Teams


Building Envelope


Energy Management Information Systems


Lighting & Electrical


Plug & Process Loads


Space Conditioning


Renewables Integration


Refrigeration

Envelope Technology Research Team (ETRT)

Connecting Better Buildings partners with advanced building envelope technology solutions

- ✓ Technology verification studies
- ✓ Specification documents
- ✓ Case studies and fact sheets
- ✓ Calculators and analytic tools

Envelope technologies account for approximately 30% of the primary energy consumed in commercial buildings, playing a key role in determining levels of comfort, natural lighting, ventilation, and how much energy is required to heat and cool a building.

Hayley McLeod, M.S.P.P.

Building Envelope Campaign Lead

Simon Pallin, Ph.D.

Building Envelope Technical Lead

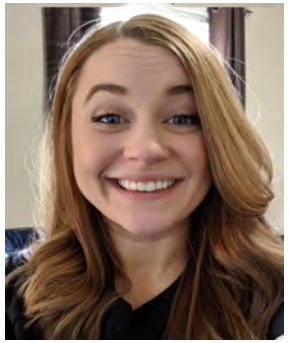
Mahabir Bhandari, Ph.D.

Building Envelope Tech Team Support

Jason DeGraw, Ph.D.

Building Envelope Tech Team Support

Kita Cranfill



Full Stack Developer

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 going to achieve the goals?

- Broad Industry Engagement
- 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 and 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

Existing Building – Envelope Retrofit

Recognition Tiers
Retro 30 Building envelope heat loss/gain reduction of 30%[a], due to implementation of building envelope improvements
Retro 50 Building envelope heat loss/gain reduction of 50%[a], due to implementation of building envelope improvements

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

Recognition Tiers and Categories

New Construction

Recognition Tiers
Novel 20 Building envelope heat loss/gain reduction of 20%[a] over code[b], due to incorporation of emerging high-performance envelope technologies
Novel 40 Building envelope heat loss/gain reduction of 40%[a] over code[b], due to incorporation of emerging high-performance envelope technologies

(a) Follow ASHRAE Advanced Energy Design Guides Reduction
(b) Most recent national energy code (ASHRAE 90.1 - 2016)

Recognition Tiers and Categories

Additional Recognition

Role Models

An additional level of recognition will be available to those buildings which meet a campaign recognition tier and *also* incorporate an additional advanced strategy or technology into their building envelopes, serving 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.

Timeline

- Currently 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
- Submittal **deadline** will be in the Spring
- Recognition event will be in the **Summer**

This Campaign is free and obligation-free to join.

It is easy to switch from a Supporter to a Participant!

Participants – 39 Registered

- eSai LLC
- LANL *
- Better Building Works LLC
- Melrose Energy Commission
- Community College of Allegheny County
- H2M architects + engineers
- Flad Architects
- Tenderloin Neighborhood Development Corporation (TNDC)
- Judicial Council of California
- Arlington County Department of Environmental Services
- GLHN Architects & Engineers, Inc.*
- Parkway School District **
- Boulder Associates
- BG3 Architecture, LLC
- Baseys Roofing & Sheet Metal
- Fair Building Technology, LLC
- Mathis Consulting
- IMPACT Industrial Services ***
- Mass General Brigham
- VHA Energy Engineer's Advisory Board (VA) ***
- Bullitt County Public Schools
- RWDI
- FGM Architects
- Building Enclosure Consultants*
- Redhorse Corporation*
- American Geophysical Union

Totals

Over 250 buildings

Over 18 million sf

* 500,000 sf
** 1 million sf
***10 million sf

Supporters – 52 Registered

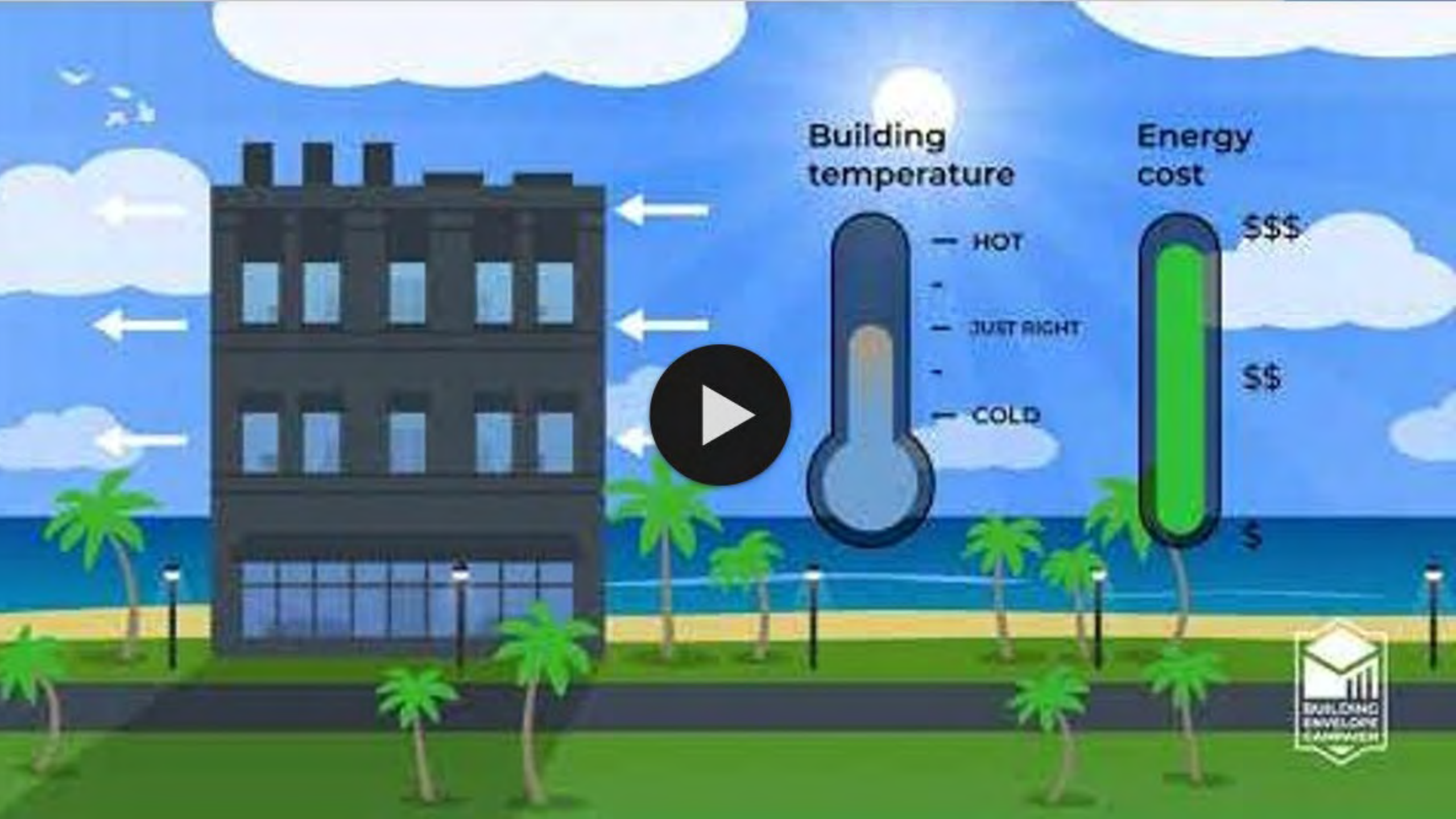
- Becker Morgan Group, Inc.
- Fabreeka International, Inc.
- ThenDesign Architecture
- Tremco Commercial Sealants & Waterproofing
- Tremco Construction Products Group
- New Buildings Institute
- BA Consult
- Brandeis University
- Spray Polyurethane Foam Alliance
- Entegrity
- Structural Insulated Panel Assn. (SIPA)
- NEXUSbec, inc.
- Judicial Council of California
- Lawrence Berkeley National Laboratory
- Walter P. Moore
- American Primitives
- Newmark Knight Frank
- Fanning Howey
- Sunshine Sustainable Design
- Central Maine Community College
- SOPREMA
- Neudorfer Engineers
- CalBarrier, LLC
- Power Shield, Inc.
- OAC Services, Inc.
- Ghafari Associates
- NRG Insulated Block
- Arc Green Consultant
- Jacobs
- ARES Consulting
- University of Maryland
- EPS Industry Alliance
- Carlisle Construction Materials
- US Greenfiber LLC
- Arkema, Unc.
- Owens Corning
- Air Barrier Association of America
- Johns Manville
- Cameron Building Envelope Specialists
- SIGA
- Transduction Technologies
- Rethinking Power Management, LLC
- Owens Corning

Thank you to our Organizers!

The American Institute of Architects

IFMA™
International Facility Management Association

IBEC
International Institute of Building Enclosure Consultants


Building temperature
HOT
JUST RIGHT
COLD
Energy cost
$$$
$$
$

Dr. Simon Pallin

Oak Ridge National Laboratory

Better Buildings®
U.S. DEPARTMENT OF ENERGY

BUILDING ENVELOPE CAMPAIGN

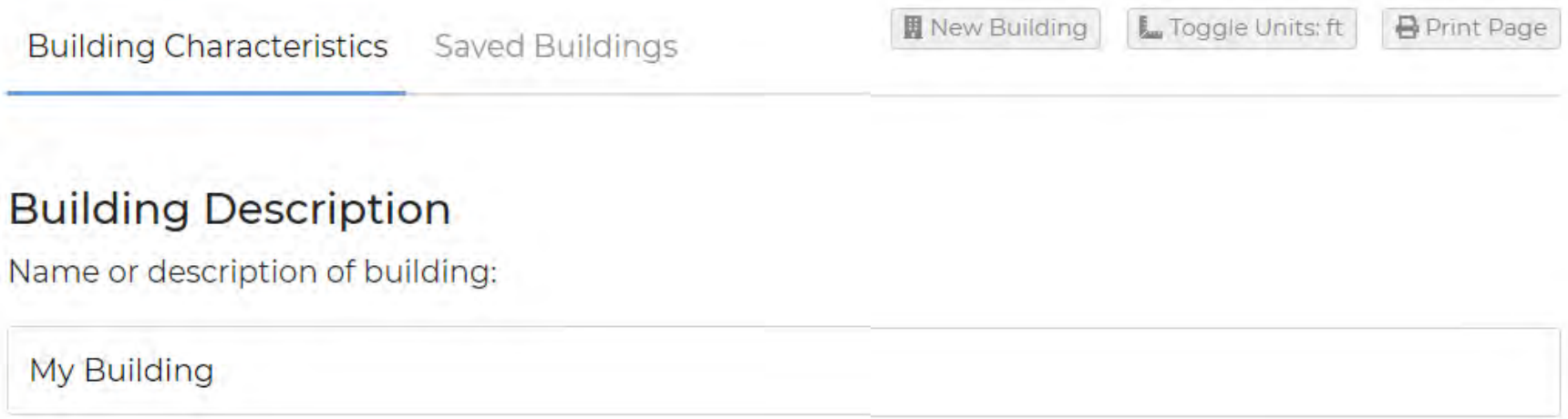
https://ec.ornl.gov

October 14, 2020

U.S. DEPARTMENT OF ENERGY

Input data for the Building Envelope Campaign tool

- **Building Description**
- Building Type
- Climate
- Geometry
- Building Components
- /Material Properties
- Advanced Options
- Review and acknowledge



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Building Type

Is this a new construction or a retrofit?

New Construction | Retrofit

Approximate year of building construction:

1990

Input data for the Building Envelope Campaign tool

- Building Description
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- **Climate**
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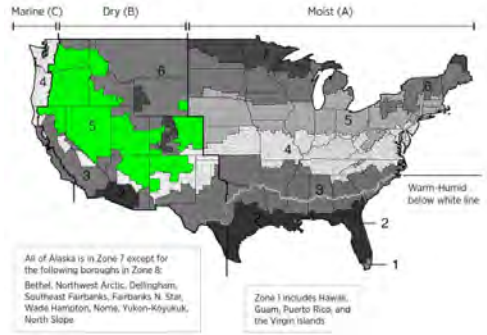

Climate

Select the climate zone where building is located

5B - Cold

Select the state where building is located

Arizona

On average, Arizona has a 4 year delay adopting new construction code.

Select the built enviroment

Suburban

Input data for the Building Envelope Campaign tool

- Building Description
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- **Geometry**
- Building Components
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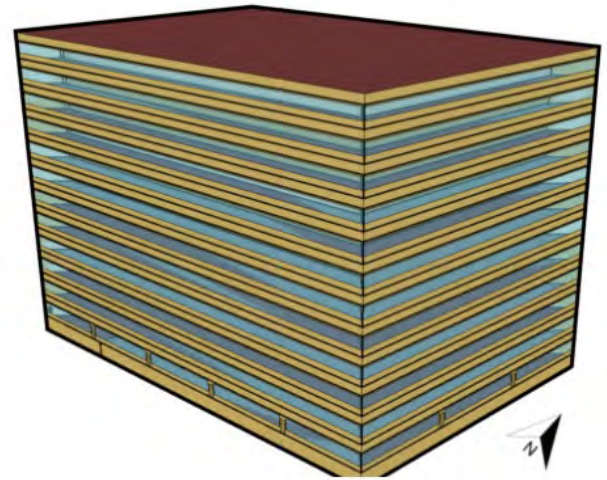
Geometry

Select the type of building. Default values represent reference building geometries, so please change as needed to match your building.

Large Office



Conditioned Floor Area: 498599 ft²

Building Height: 156 ft

Building Floors: 12

Total Surface Area of the Walls (including windows)

North	South	East	West
22464 ft²	22464 ft²	14976 ft²	14976 ft²

Window Area

North	South	East	West
14976 ft²	14976 ft²	9984 ft²	9984 ft²

Input data for the Building Envelope Campaign tool

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- **Geometry**
- Building Components
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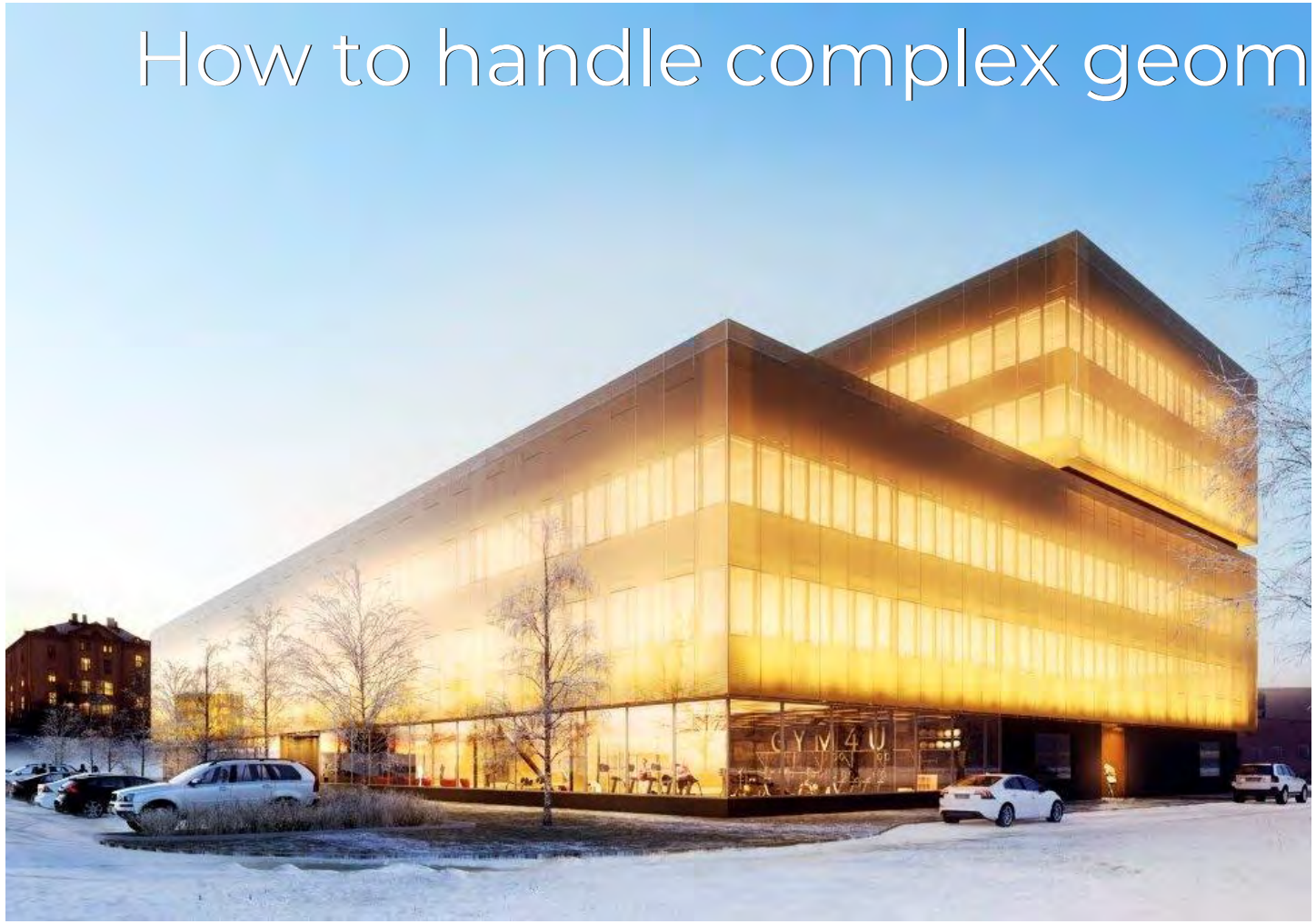
How to handle complex geometries?



Input data for the Building Envelope Campaign tool

- Building Description
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- **Geometry**
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- /Material Properties
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To calculate the total window and wall area for each orientation when the building is not a square or rectangle. Simply sum the area of the window and wall faces for a given orientation.

South Wall Façades

West Wall Façades

Input data for the Building Envelope Campaign tool

- Building Description
- Building Type
- Climate
- Geometry
- **Building Components /Material Properties**
- Advanced Options
- Review and acknowledge

Building Components/Material Properties

Default values for "Existing Building" are based on estimate code at time of construction. Please change as found necessary.

Existing Building

Wall *R*-value

6.3

Click here to access R-value calculator

Predominant Wall Facade Material

Painted Surface – Light

Roof *R*-value

18.8

Click here to access R-value calculator

Roof Surface Material

Black Membrane

Window U-factor

0.59

Need Help? Click here

Window SHGC

0.39

Input data for the Building Envelope Campaign tool

- Building Description
- Building Type
- Climate
- Geometry
- **Building Components /Material Properties**
- Advanced Options
- Review and acknowledge

Build Your Wall Assembly

The capacity of an insulating material to resist heat flow. The higher the R-value, the greater the insulating power.

1. What type of **Cladding**? Help

Painted Surface – Light	0.1	in

2. What type of **Intermediate Material**? + Add Material — Remove Material Help

Concrete blocks	8	in
Sprayed Polyurethane Foam: Closed Cell	3	in

3. What type of **Interior Cladding**? Help

Gypsum Board	0.6	in

Submit Cancel

Input data for the Building Envelope Campaign tool

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- Geometry
- **Building Components /Material Properties**
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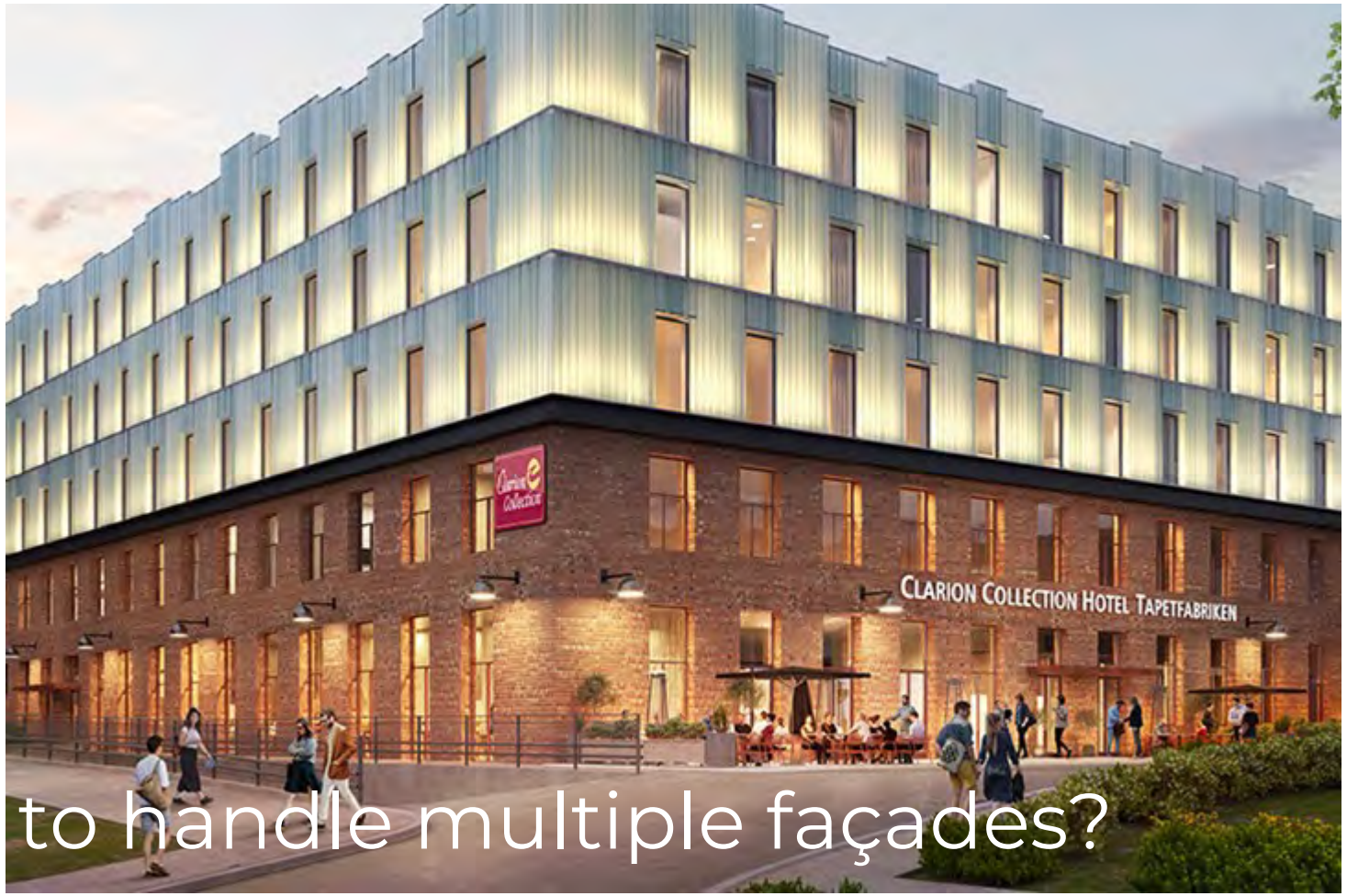


How to handle multiple façades?

Input data for the Building Envelope Campaign tool

- Building Description
- Building Type
- Climate
- Geometry
- **Building Components /Material Properties**
- Advanced Options
- Review and acknowledge

$$R_{tot} = \left(\frac{A_1}{A_{tot}} \frac{1}{R_1} + \frac{A_2}{A_{tot}} \frac{1}{R_2} + \ldots + \frac{A_n}{A_{tot}} \frac{1}{R_n} \right)^{-1}$$

Area façade (1) = A_1

R-value wall (1) = R_1

Area façade (2) = A_2

R-value wall (2) = R_2

Input data for the Building Envelope Campaign tool

- Building Description
- Building Type
- Climate
- Geometry
- **Building Components /Material Properties**
- Advanced Options
- Review and acknowledge

Yes | No — Have you conducted a blower door test?

Building Airtightness Value

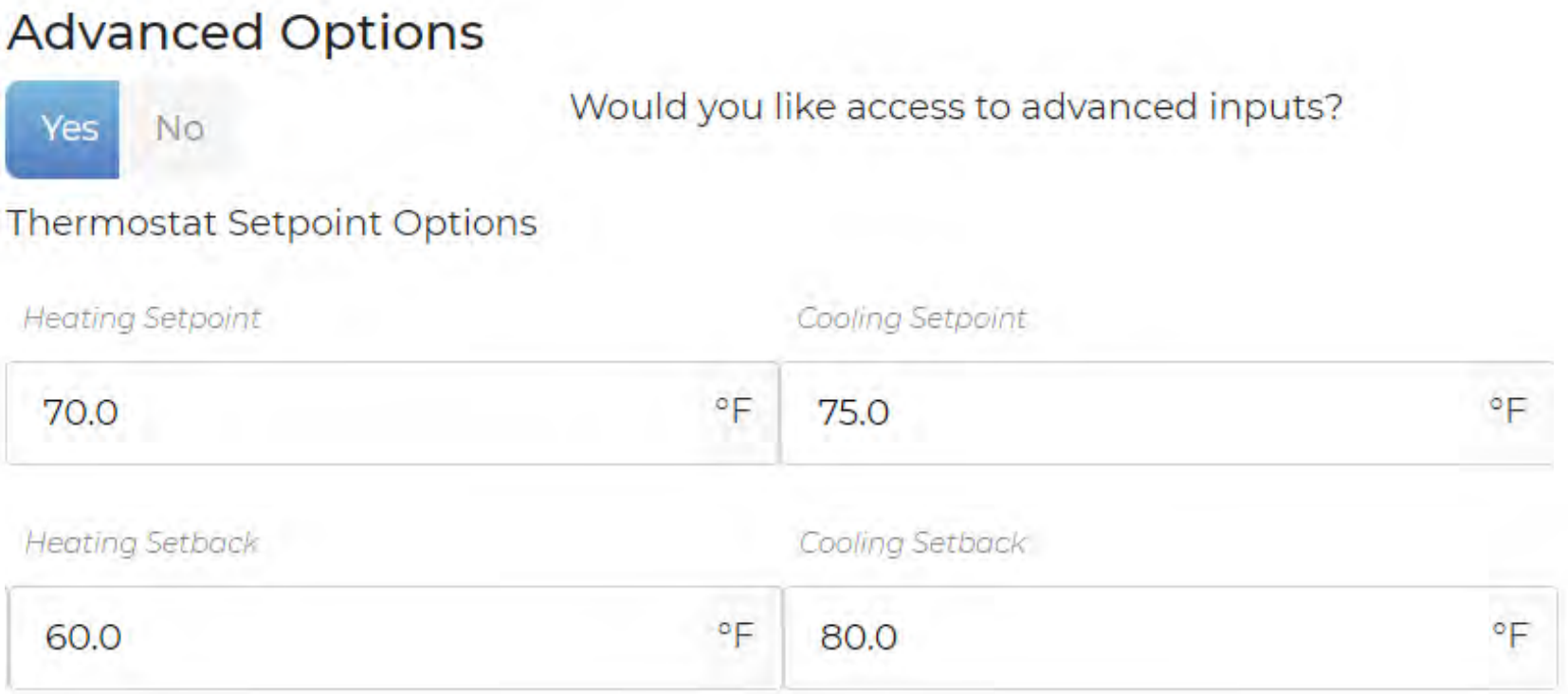
1.07 cfm/ft²

Yes | No — Have you taken any additional steps to improve the airtightness of your building?

A 10% improvement in airtightness has been assumed.

Input data for the Building Envelope Campaign tool

- Building Description
- Building Type
- Climate
- Geometry
- Building Components
- /Material Properties
- **Advanced Options**
- Review and acknowledge



Input data for the Building Envelope Campaign tool

- Building Description
- Building Type
- Climate
- Geometry
- Building Components
- /Material Properties
- Advanced Options
- **Review and acknowledge**

Review and acknowledge

Yes | No

Click 'Yes' here to indicate that you have reviewed the Security & Privacy Notice.

Yes | No

The information collected over the course of the campaign will be accessible only by the campaign team, and will only be published without identifying information and/or in aggregate (with the exception of case studies developed in partnership with the building owner/manager). Click 'Yes' to indicate that you agree to share your data.

Check Results | Save Building

Building Envelope Performance Summary

Building Characteristics | Summary | Saved Buildings

New Building | Print Page

My Building

Building Envelope Performance (BEP)

Congratulations! you meet the requirements to receive the Retro 30 award.

41% Improvement

	Existing Building *Baseline*	Retrofit *Improvements*
BEP *kBtu/ft²*	**46.9**	**27.9**
Wall *R*-Value	**6.3**	**20**
Wall Facade Material	**Light Painted Surface**	**Light Painted Surface**
Roof *R*-Value	**18.8**	**30**
Roof Surface Material	**Black Membrane**	**Black Membrane**
Window U-Factor	**0.59**	**0.3**
Window SHGC	**0.39**	**0.39**
Air Leakage Rate *scfm/ft²*	**1.07**	**0.96**

Update Inputs

Better Buildings U.S. DEPARTMENT OF ENERGY

U.S. DEPARTMENT OF ENERGY

Building Envelope Performance Summary

Energy Performance Breakdown

Charts below indicate improvement potentials for various building characteristics. Improvements are displayed using the BEP-value together with award criteria.

Building Type: largeOffice
Climate Zone: 5B

Wall Performance

Calculated

Building Type: largeOffice
Climate Zone: 5B

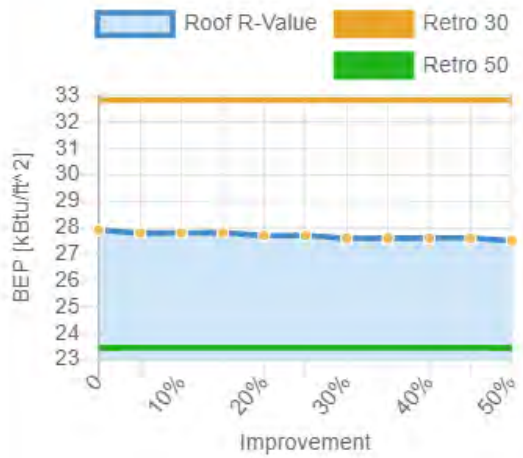
Window Performance

Calculated

Building Type: largeOffice
Climate Zone: 5B

Roof Performance

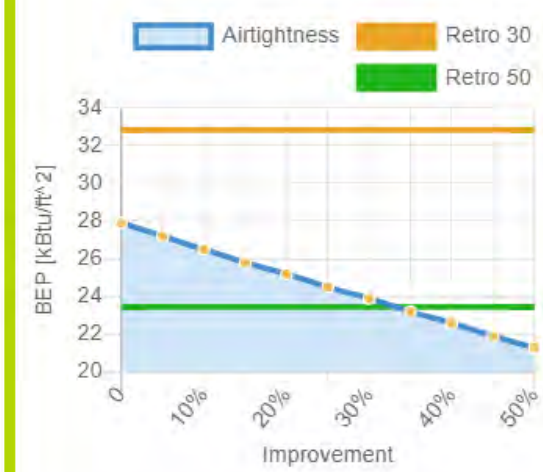
Calculated



Building Type: largeOffice
Climate Zone: 5B

Airtightness

Calculated



Cristine Gibney

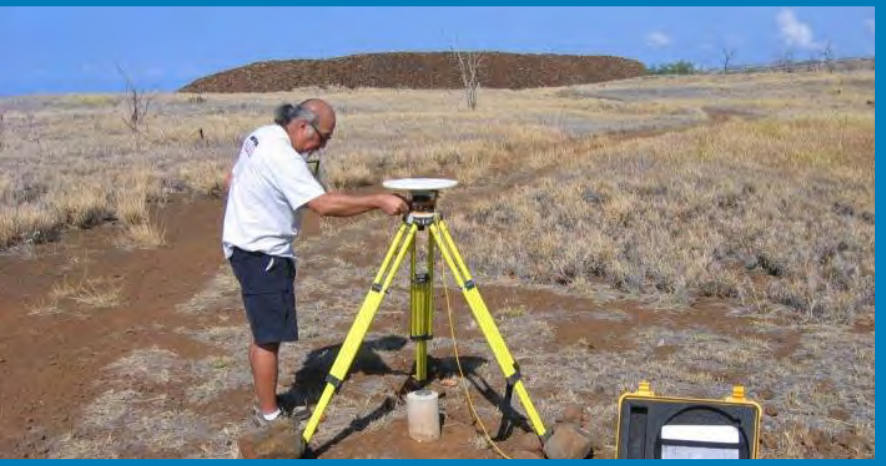
American Geophysical Union

AGU --Building Envelope Campaign

ABOUT AGU

To support and inspire a global community of individuals and organizations interested in advancing discovery in Earth and space sciences and its benefit for humanity and the environment.

AGU's headquarters serves as a beacon for progress in achieving sustainability and embracing learning and collaboration

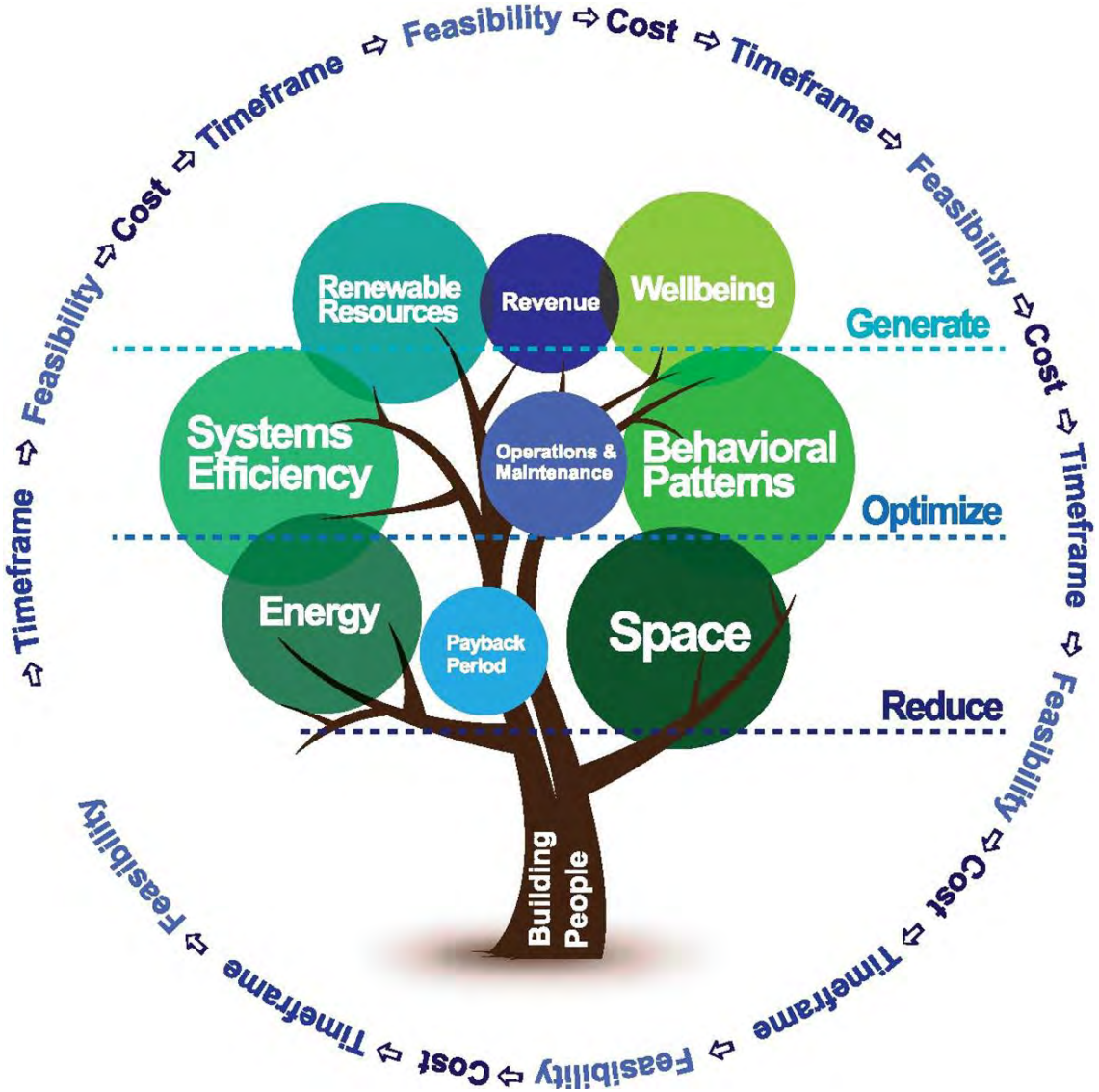


AGU is a global organization supporting 130,000 Earth and space science enthusiasts and experts.


610 Committee, Task Force, and Advisory Group Members
61 Council Members
650 Editors & Associate Editors
34,821+ Reviews
37,900+ Authors
20,000+ Volunteers
15,900+ Reviewers
16 Members of the Board of Directors
29,200+ Meeting Attendees
277,000+ AGU Social Media Followers
300,000+ Members of the Worldwide Earth & Space Science Community

AGU Building PROJECT GOALS

- Showcase our members' work and demonstrate how Earth and space science is contributing to solving the pressing problems facing society.
- Promote collaboration by creating a state-of-the-art meeting and conference space that will serve as a vital resource for our members and community
- Develop a 21st C. workplace that utilizes technologies and flexible design
- Lead by example and strive to become the first-ever "net zero energy" renovation of an existing building in the District
- Raise the visibility of AGU, our members and our science




AGU
2000 Florida Ave NW
Dupont Circle
Meridian Hill Park
Kalorama Park
The Embassy of Islamic Republic of Afghanistan
Royal Thai Embassy (Consular Office)
Universal Centre
American Geophysical Union
Mitchell Park
Spanish Steps
Embassy of Haiti
Stead Park

The Site and “OLD” AGU Building

LOOKING WEST ON FLORIDA AVENUE

CORNER OF 20TH STREET AND FLORIDA AVENUE

LOOKING NORTH UP 20TH STREET

LOOKING EAST ON FLORIDA AVENUE

The NEW AGU Building

AGU Headquarters

2000 Florida Avenue NW

Renovation of a 1994 building

- Conditioned Floor Area 71,786 ft^2
- 81 ft height
- ASHRAE Climate Zone 4A
- 5 above-ground floors, 2 floors below grade & rooftop (amazing view!)
- On boundary of historic district

Owner occupied

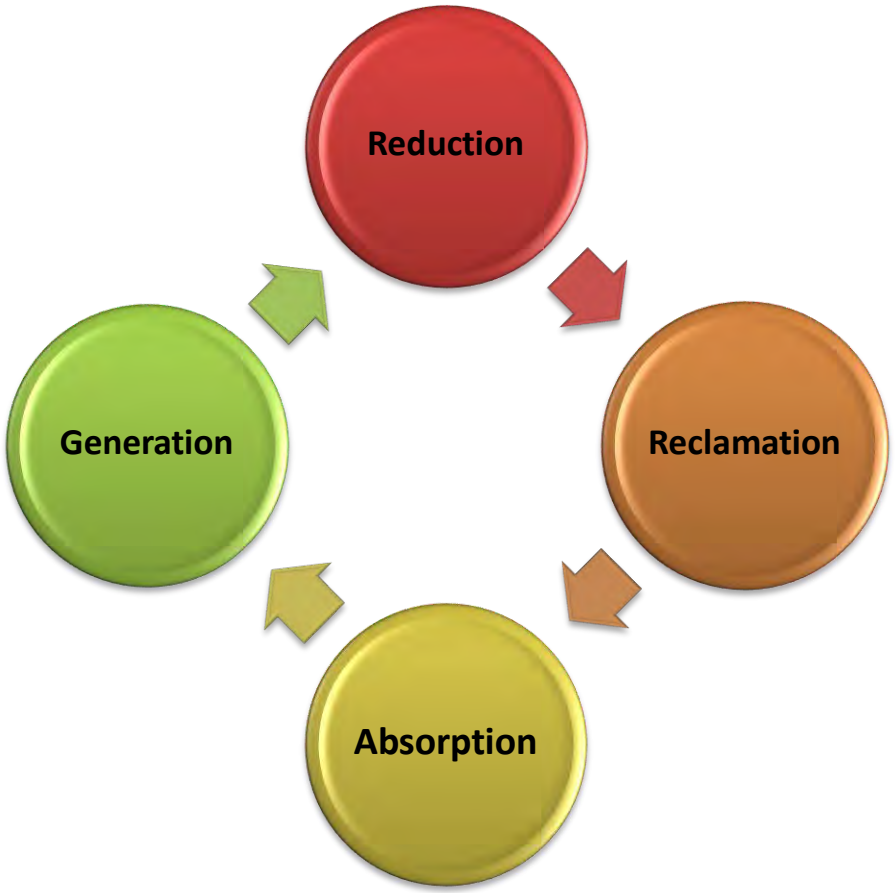
- Conference facilities
- Member lounge/meeting space
- Inviting to the general public

Unique features

- Sewer line under Florida Avenue
- Southern façade backs to adjacent building

HIGH-PERFORMANCE DESIGN

Sustainable Strategies



Reduction

- Radiant Ceiling Cooling System
- Daylight Responsive Controls (DRC)
- DC Powered Workspace
- **Enhanced Envelope Insulation**
- High Efficient LED Lighting
- **Triple-Pane Glazing**
- **Dynamic Glass Shading**
- Variable Frequency Drives
- Dynamic Toilet Room Exhausting
- Occupancy Sensors & Controls
- Low-Flow Plumbing Fixtures
- Access Control – Power Management
- Energy Usage Display Monitors

Reclamation

- Hydroponic Phytoremediation (Hy-Phy)
- Dedicated Outside Air System (DOAS)
- Exhaust Air Heat Recovery
- Heat Recovery Water Chiller
- Condensate Water Collection & Reuse
- Free Cooling Condenser Operation
- Recycled Water Flushing

Absorption

- Sewer Heat Transfer System
- Storm Water Collection & Reuse

Generation

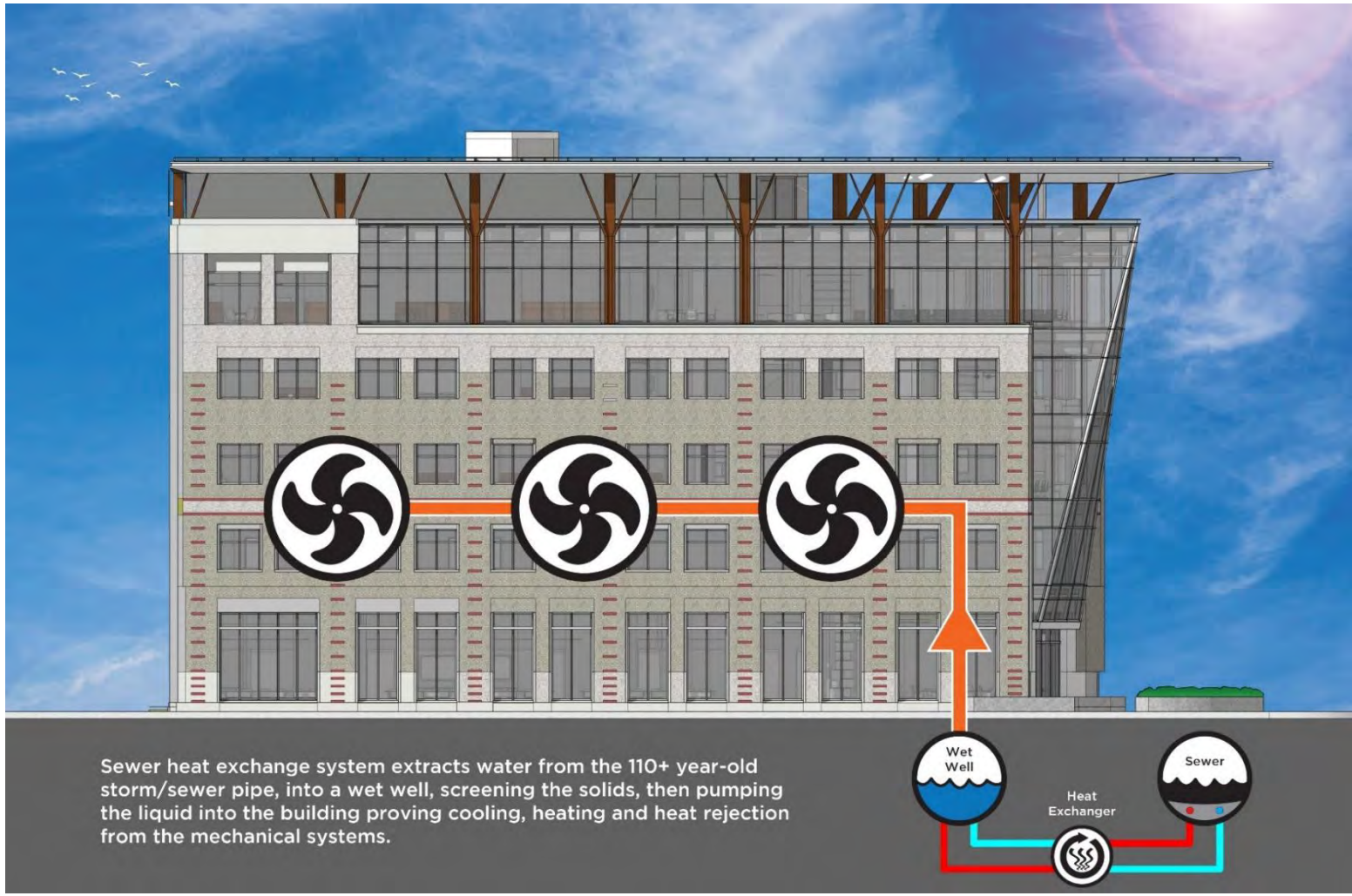
- Solar Photovoltaics (PV)

MUNICIPAL HEAT EXCHANGE

Absorption

8’ X 8’ – 150 Year Old Sewer

Huber Sewer Heat Exchange



Dynamic Glass Shading - *Sage Glass*

Reduction

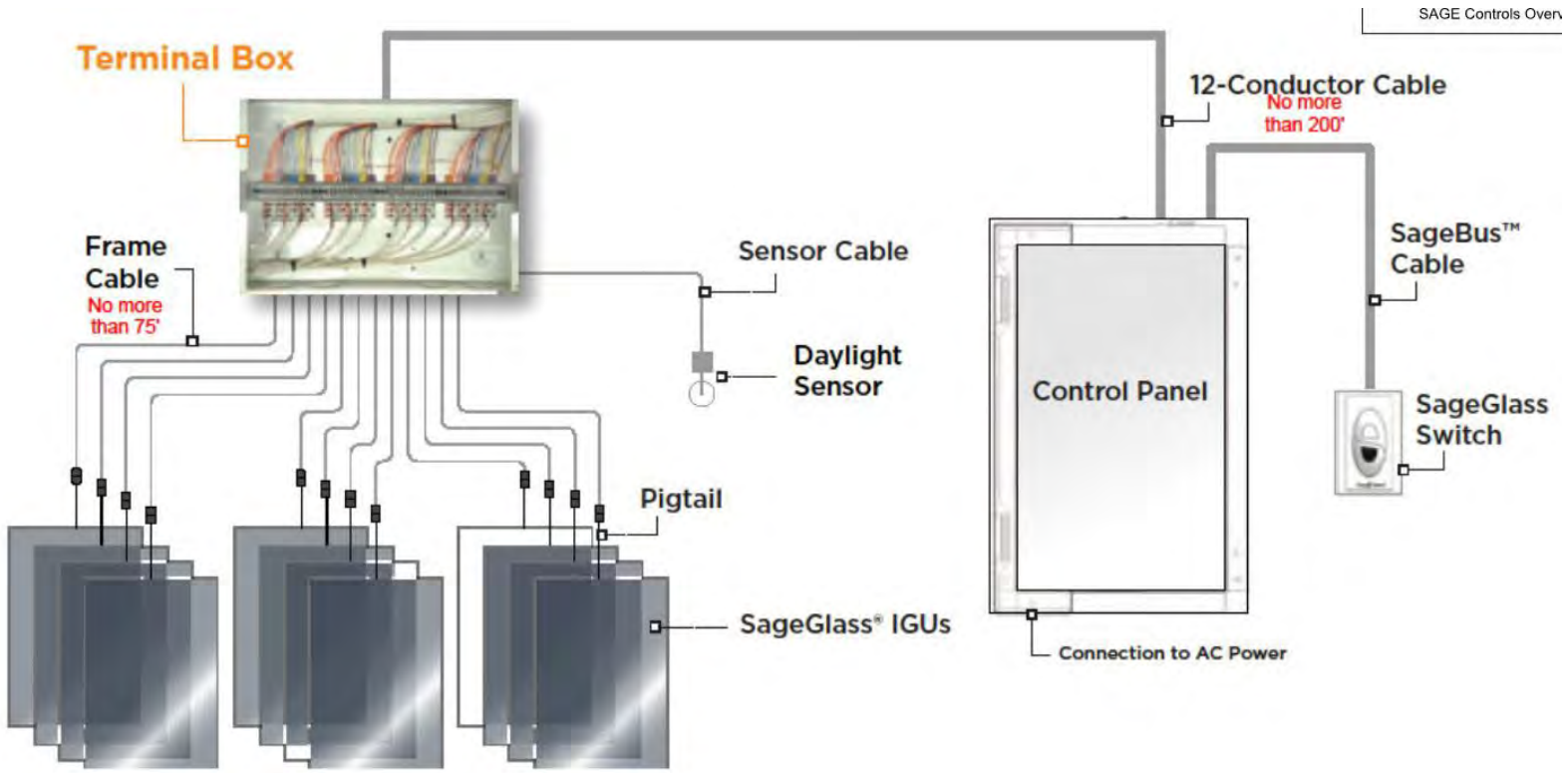
IGU Configuration

IGU Component	IGU Build-Up
SageGlass Outboard Lite	6mm Clear HS w/SR2.0 0.89mm SentryGlas® 2.2mm SageGlass AN, EC2.0
Cavity*	11.2mm Air Filled
Inboard Lite	6mm HS
Cavity*	11.2mm Air Filled
Inboard Lite	6mm HS

Level of Tint	% Tvis	%Rf Ext.	%Rb Int.	SHGC	U-Factor	%TuV	%Tdw-K
Clear State	54	19	20	0.37	0.24	<1.0	12.9
Intermediate State 1	16	11	16	0.14	0.24	<1.0	4.7
Intermediate State 2	5	11	15	0.09	0.24	<1.0	2.1
Tinted	1	11	15	0.08	0.24	<1.0	<1.0

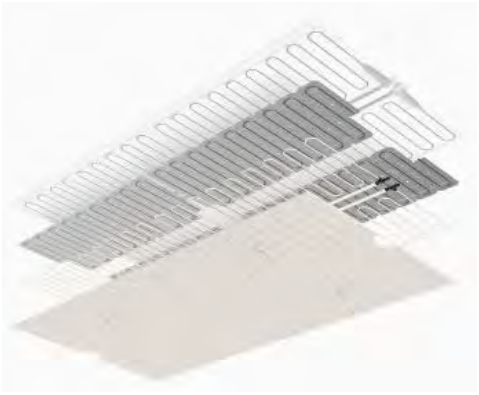
ELECTROCHROMIC GLAZING

Reduction

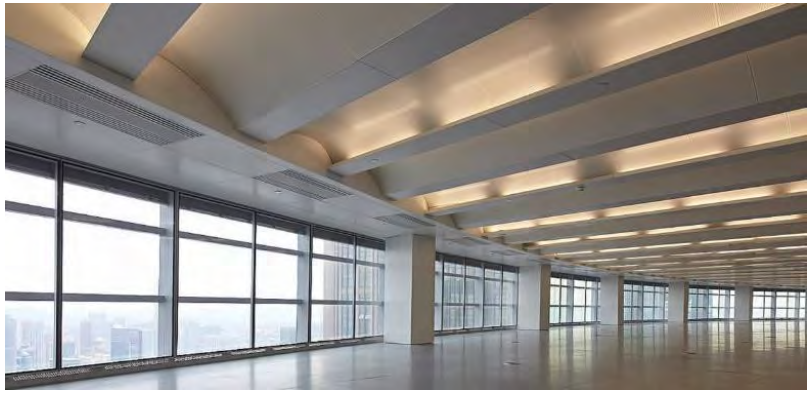


RADIANT CEILING SYSTEM

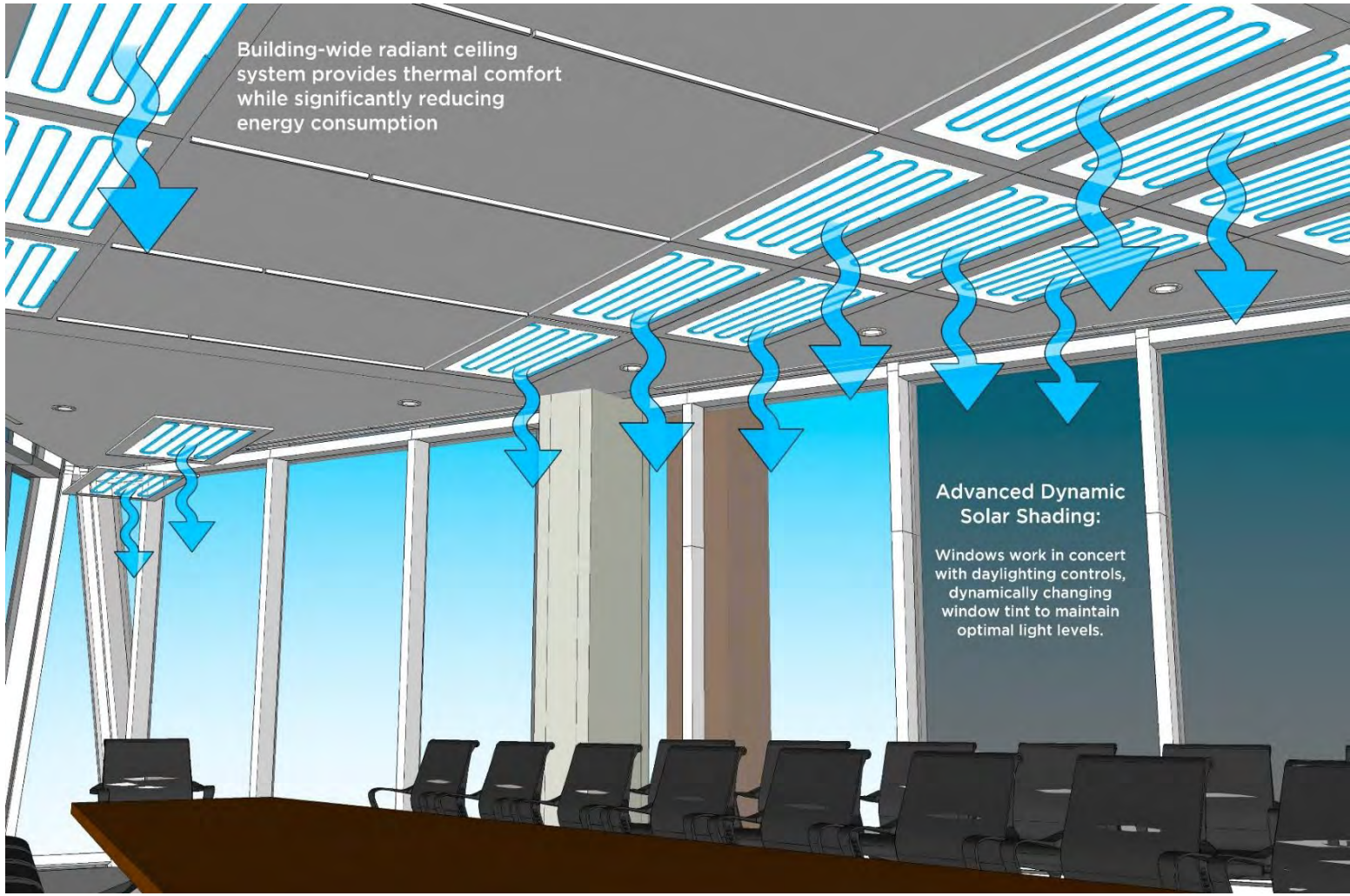
Reduction



Radiant Ceiling Cooling Panel



Radiant Ceiling



THE NEW AGU WORKPLACE

"The Prow" Boardroom

THE NEW AGU WORKPLACE

Showcasing Member Sciences

THE NEW AGU WORKPLACE

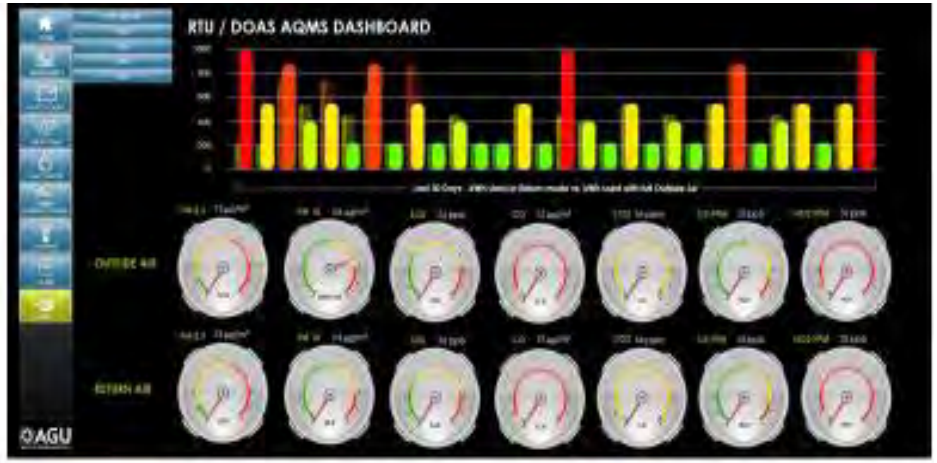
Open Office

THE NEW AGU WORKPLACE

Staff Engagement | Staff Lounge

DATA AND MEASURING SUCCESS

Real Change in Real Time



MAKING HISTORY

Mayor Bowser Signs Clean Energy DC Omnibus Act

MAKING HISTORY

AGU Wins First Ever DOEE Clean Energy DC Award

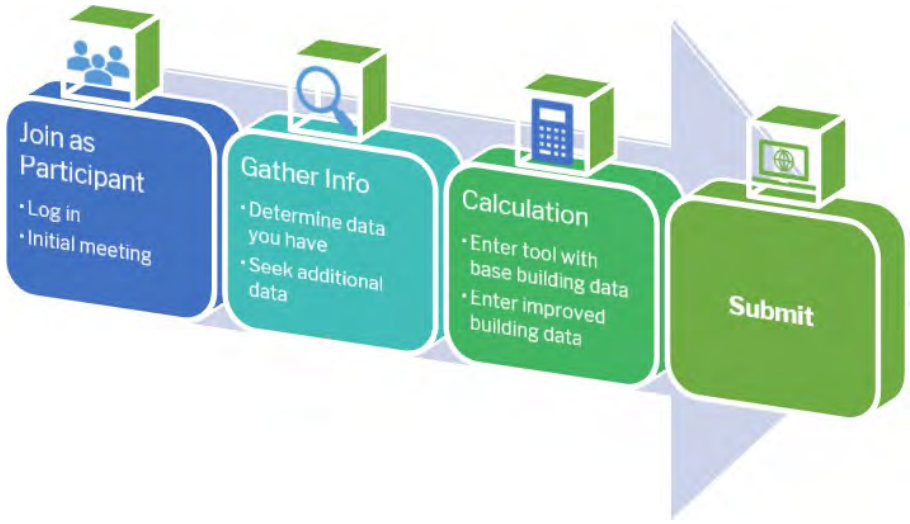
DISTRICT SUSTAINABILITY AWARDS 2019

CALL TO ACTION

Every Voice Matters

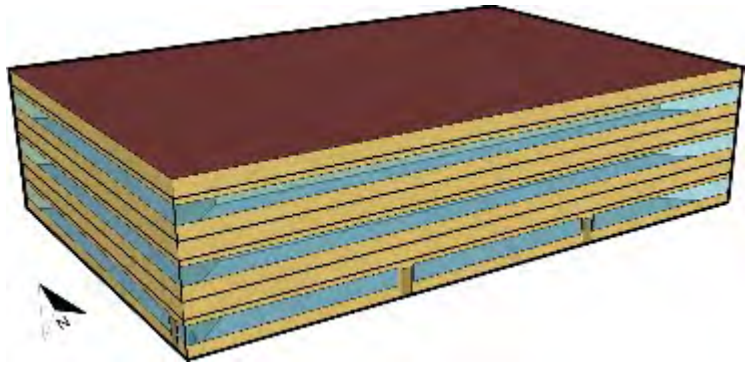
We know the younger generation in the workforce is interested in working in an environment that supports their values. Consider for your own organization (or talk to leadership about it). There is a business reason, even if you are not an Earth and space science organization, to do more toward net zero and sustainability, including being an attractive place to work.

Participant view of Building Envelope Campaign



Join as Participant

1. Create an account and log in
2. Phone call with Oak Ridge National Lab Team



Gather Info

AGU Entries and Assumptions
Building Envelope Campaign

Envelope Performance

Category	Value	Authoritative Doc	Assumption
Building Type	Retrofit	OPR	
Building Construction Date	1994	Original Drawings	

Category	Value	Authoritative Doc	Assumption
Climate Zone	4A	ASHRAE Standard 169-2013	
Location	Washington DC	Address	
Built Environment	Dense Urban	Address	

AGU Entries and Assumptions
Building Envelope Campaign

Category	Value	Authoritative Doc	Assumption
Conditioned Floor Area	71,486 ft²	Hickok Cole BOMA calculations	IGA values less parking area Aggregate 84865 ft² Less Parking 13379 ft²
Building Height	81'	Building CD	A201 lists height as 193' 3 5/8" /starts at 112' 4"...
Building Floors	7	Building CD	Included Parking Area
Total Surface Area			**Include** Windows
North	10706 ft²	HCA	Prow faces NE, added ½ surface to north calc
South	7432 ft²	HCA	
East	11594 ft²	HCA	Prow faces NE, added ½ surface to east calc
West	5645 ft²	HCA	
Wall Surface Area			**Exclude** Windows
North	5937 ft²	HCA	Prow faces NE, added ½ surface to north calc
South	7432 ft²	HCA	
East	7159 ft²	HCA	Prow faces NE, added ½ surface to east calc
West	4361 ft²	HCA	

AGU Entries and Assumptions
Building Envelope Campaign

Building Components/Material Properties

Existing Building (prior to renovation)

Category	Value	Authoritative Doc	Assumption
Wall R-value	6.0	Energy Model, Jan 2020	See page 4
Predom Façade	Brick	Energy Model, Jan 2020	
Roof R-Value	9.4	Energy Model, Jan 2020	See page 5
Roof Surface	Black Membrane	Built Roof	Verified by FM
Window U-Factor	.6250	Energy Model, Jan 2020	Page 5, Assembly U I-P
SHGC	.4	Energy Model, Jan 2020	See page 5
Blower Door Test	No		
Building Air Tightness Value			1.07 default by program if no blower test
Any additional airtightness			

AGU Entries and Assumptions
Building Envelope Campaign

Planned Retrofit (renovated building)

	Value	Authoritative Doc	Assumption
Wall R-value	15.7	Energy Model, Jan 2020	
Predominant Façade			See page 4
Roof R-Value	9.4	Energy Model, Jan 2020	See page 5
Roof Surface	Green Roof	Built Roof	PV not on drop down
Window U-Factor	.236	Energy Model, Jan 2020	Triple Pane Low-e Electrochromic
**SHGC	.37		Electrochromic Glazing (not scoped in the envelope modeling tool) ** Model 1 Uses least solar resistance factor in energy model (SHGC .37) a second version will apply the .08 high resistance value)
Building Air Tightness Value			Program assumes 10% improvement

** Electrochromic windows, used most transparent value in this version. Will build additional models for each level of tint. The simulation tool is not designed for different tinting (electrochromic/SAGE) but multiple models will be able to demonstrate the impact of different SHGC.

Advanced Options

Category	Value	Authoritative Doc	Assumption
Thermostat			
Heating Set Pt	70	LEED Documentation	
Cooling Set Pt	78	LEED Documentation	
Heating Set Back			Used program defaults
Cooling Set Back			Used program defaults


Join as Participant
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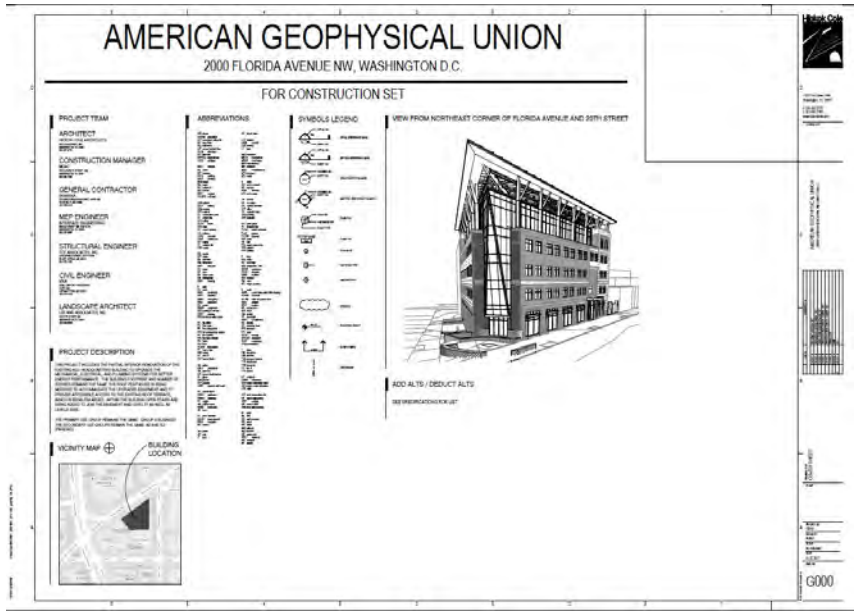
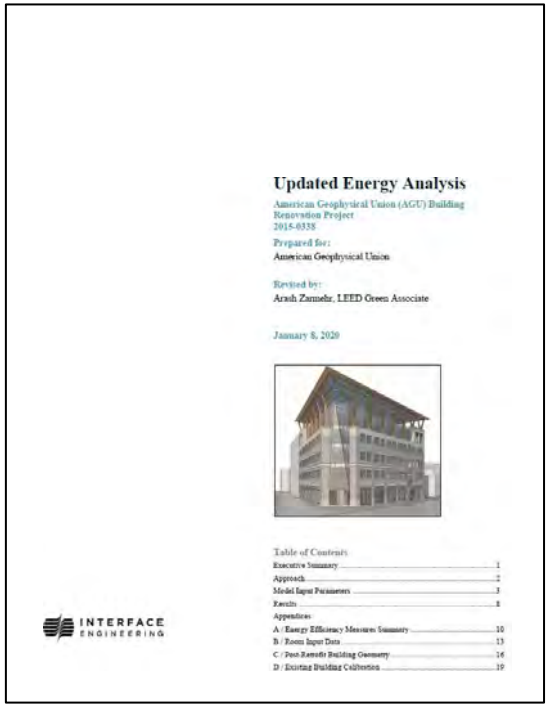
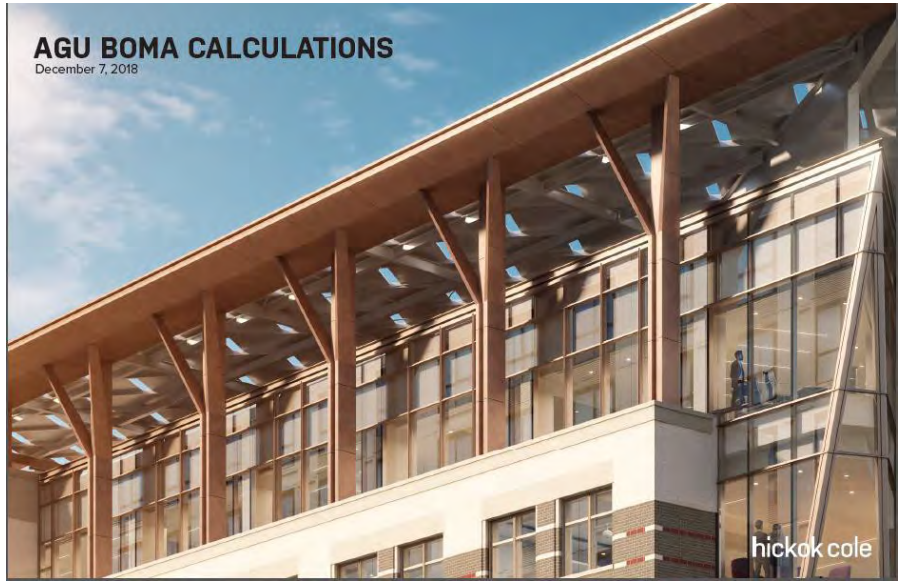
• Seek additional data
Calculation
• Enter tool with base building data
• Enter improved building data
Submit

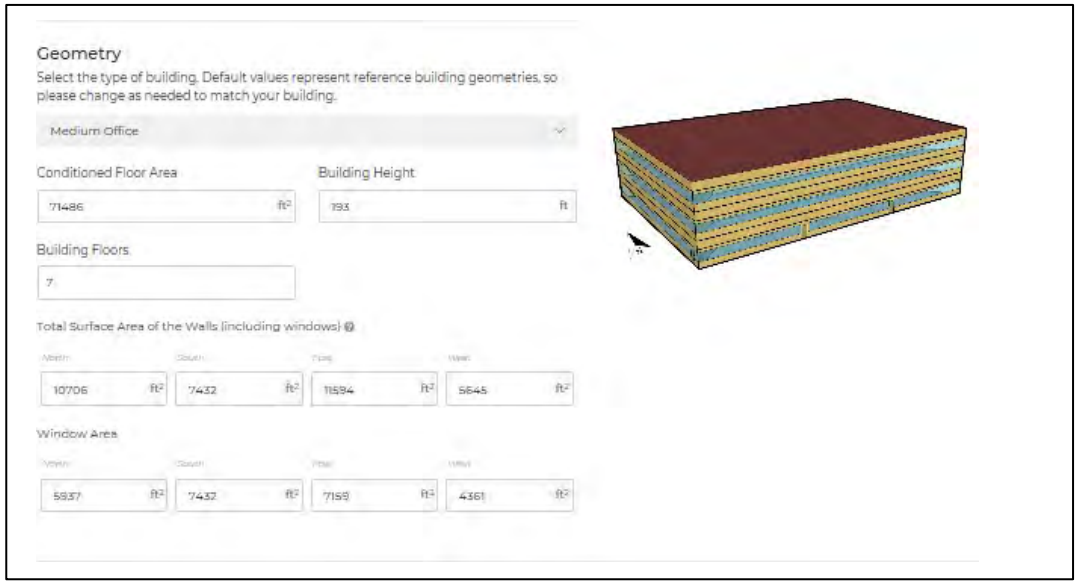
Gather Info


AMERICAN GEOPHYSICAL UNION
2000 FLORIDA AVENUE NW, WASHINGTON D.C.
FOR CONSTRUCTION SET
PROJECT TEAM
ARCHITECT
CONSTRUCTION MANAGER
GENERAL CONTRACTOR
MEP ENGINEER
STRUCTURAL ENGINEER
CIVIL ENGINEER
LANDSCAPE ARCHITECT
ABBREVIATIONS
SYMBOLS LEGEND
VIEW FROM NORTHEAST CORNER OF FLORIDA AVENUE AND 20TH STREET
PROJECT DESCRIPTION
ADD ALTS / DEDUCT ALTS
VICINITY MAP
BUILDING LOCATION
G000

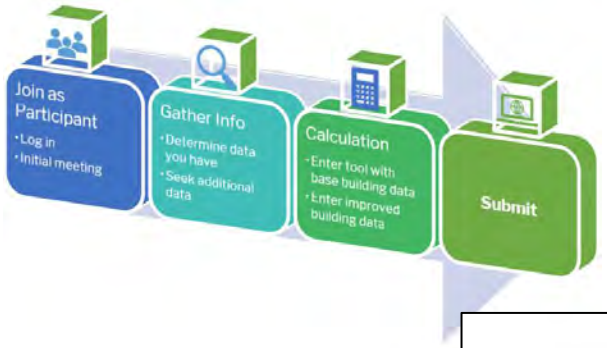

Updated Energy Analysis
American Geophysical Union (AGU) Building Renovation Project
2015-0338
Prepared for:
American Geophysical Union
Revised by:
Arash Zarmehr, LEED Green Associate
January 8, 2020
INTERFACE ENGINEERING
Table of Contents
Executive Summary 1
Approach 2
Model Input Parameters 3
Results 8
Appendices
A / Energy Efficiency Measures Summary 10
B / Room Input Data 13
C / Post-Retrofit Building Geometry 16
D / Existing Building Calibration 19


AGU BOMA CALCULATIONS
December 7, 2018
hickok cole

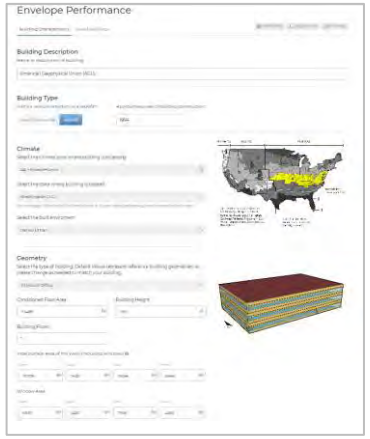
Gather Info

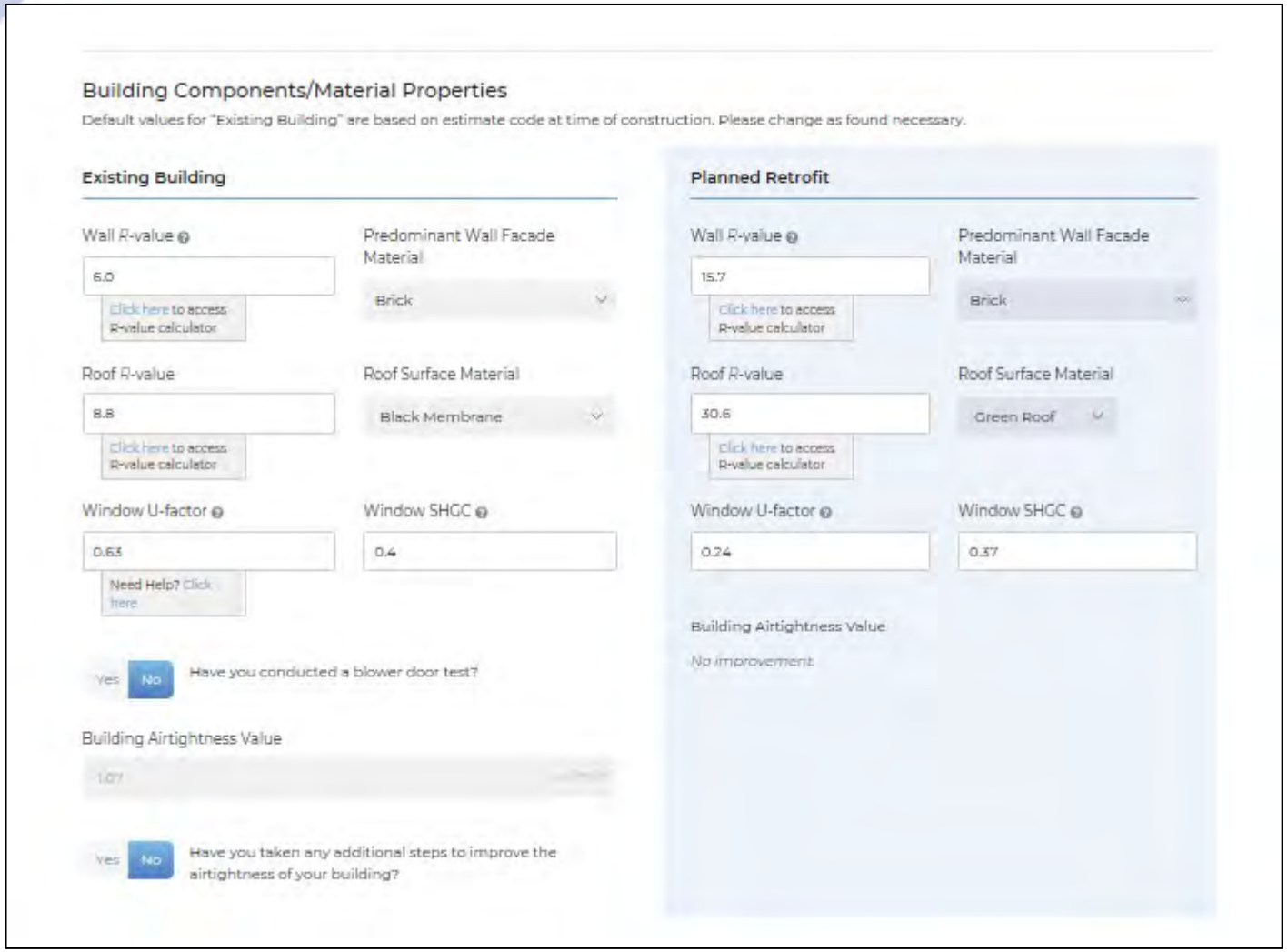


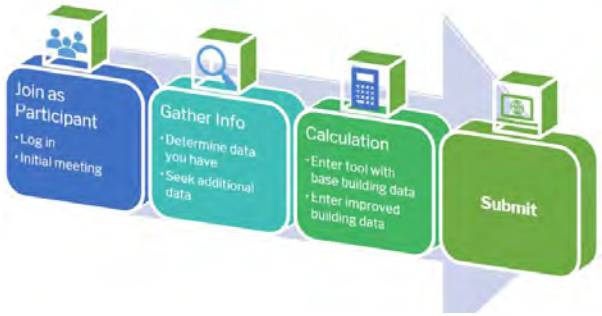
Elevation	HCA Submission ft²	Adj N/E consoldiation ft²	N-S-E-W Submission ft²
Window Surface ft2			
North	4567.12	4769.88	4770
South	0		0
East	4231.89	4434.65	4435
West	1284.43		1284
Prow (NE)	405.52	202.76	
	10488.96		10489
Total Surface ft²			
North	10085.95	10706.83	10707
South	7432.33		7432
East	10973.00	11593.88	11594
West	5645.30		5645
Prow (NE)	1241.75	620.88	
Total	35378.33		35378
Wall Surface ft²			
North	5518.83	5936.95	5937
South	7432.33		7432
East	6741.11	7159.23	7159
West	4360.87		4361
Prow (NE)	836.23	418.12	
Total			24889



Calculations







Calculations – Advanced Options

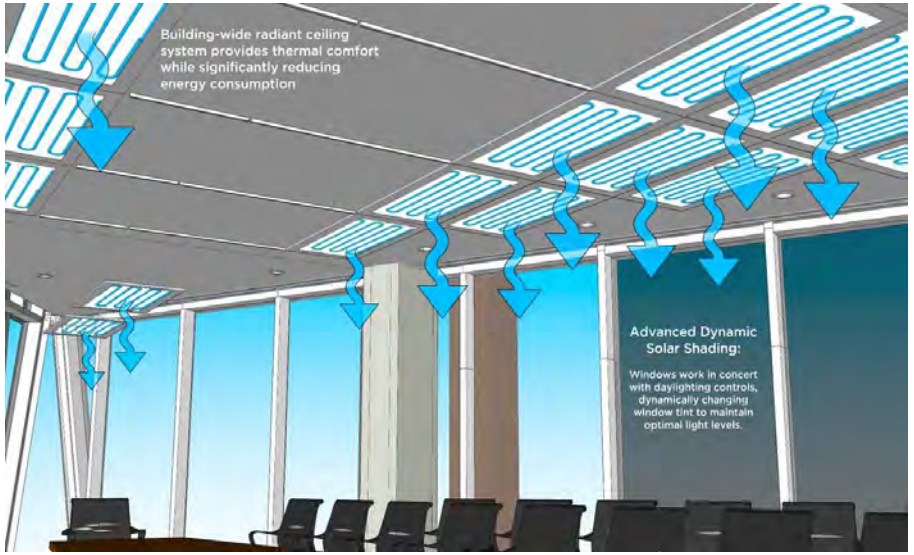
Advanced Options

Yes | No

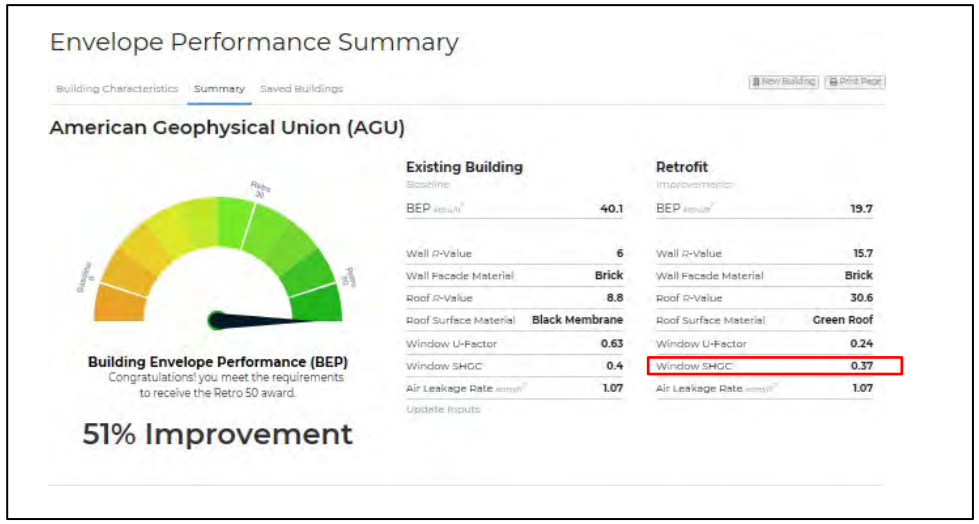
Would you like access to advanced inputs?

Thermostat Setpoint Options

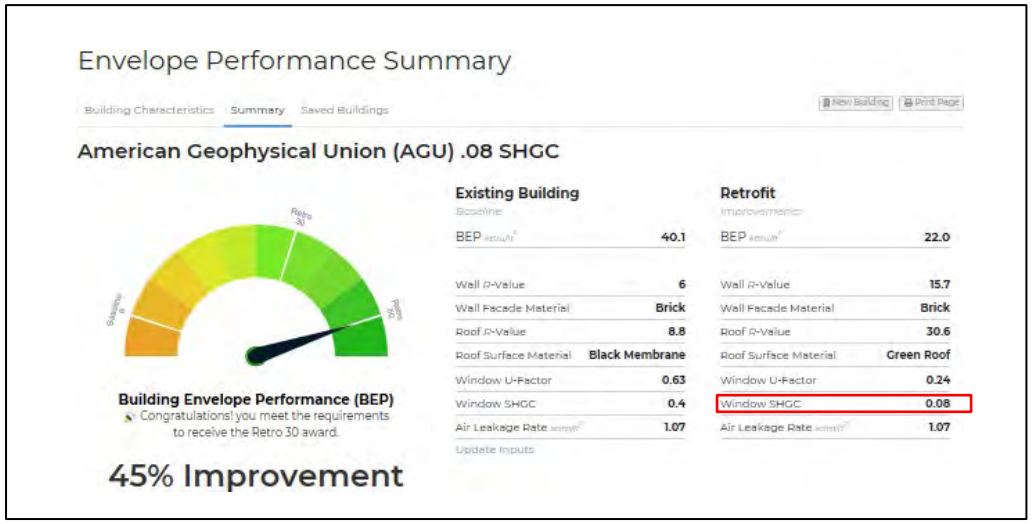
Heating Setpoint	Cooling Setpoint	Heating Setback	Cooling Setback
70.0 °F	78.0 °F	60.0 °F	80.0 °F



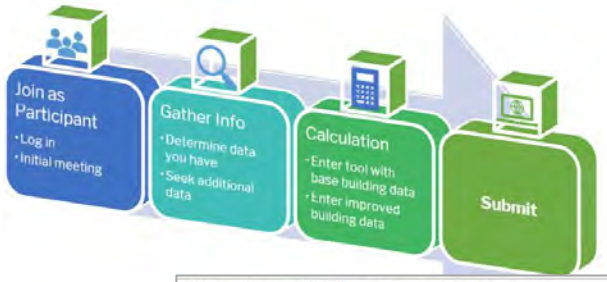
Calculations –See Results



SHGC = .37



SHGC = .08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•Enter improved building data
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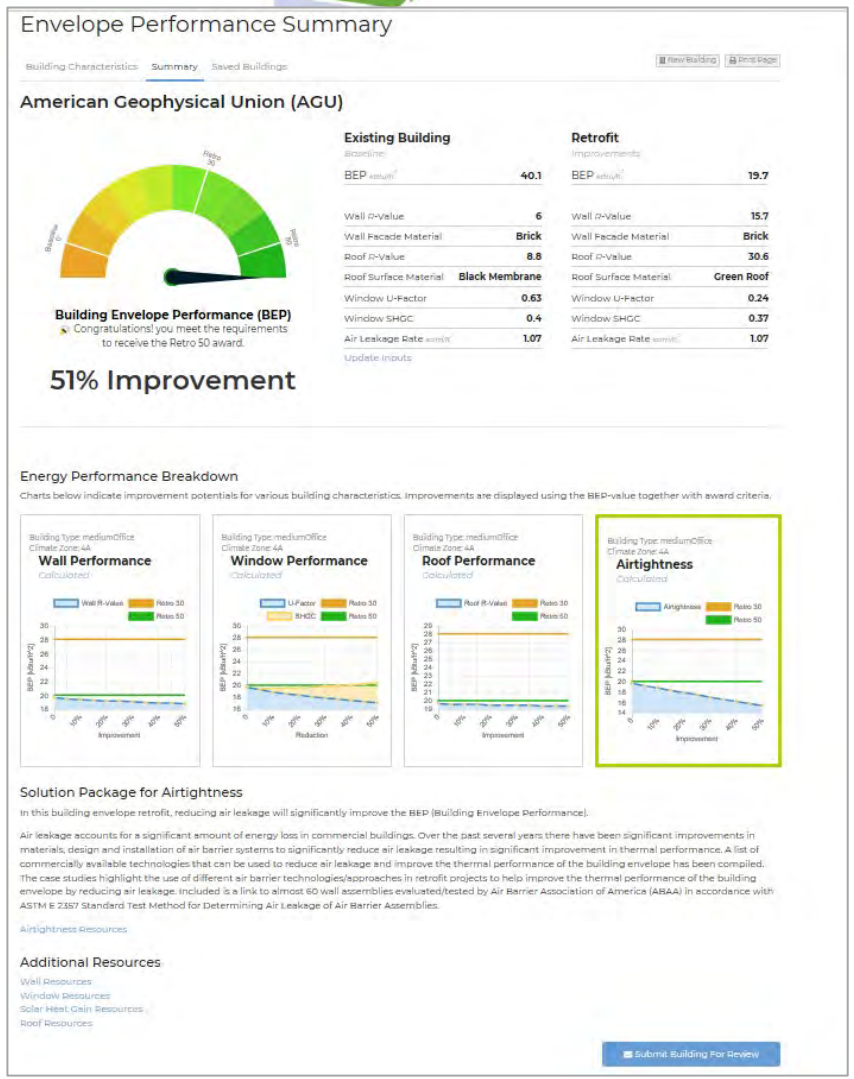
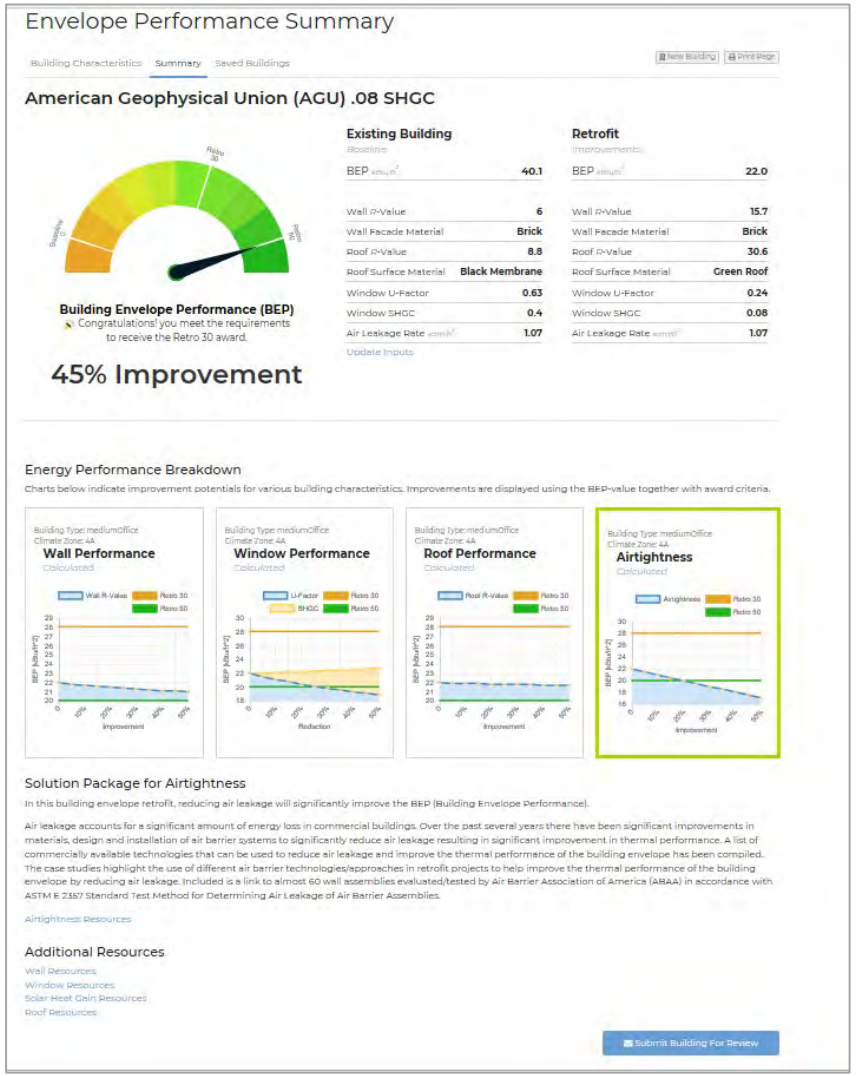
Submit


Envelope Performance Summary
Building Characteristics
Summary
Saved Buildings
New Building
Print Page
American Geophysical Union (AGU)
Existing Building
Baseline
BEP
40.1
Wall R-Value
6
Wall Facade Material
Brick
Roof R-Value
8.8
Roof Surface Material
Black Membrane
Window U-Factor
0.63
Window SHGC
0.4
Air Leakage Rate
1.07
Update Inputs
Retrofit
Improvements
BEP
19.7
Wall R-Value
15.7
Wall Facade Material
Brick
Roof R-Value
30.6
Roof Surface Material
Green Roof
Window U-Factor
0.24
Window SHGC
0.37
Air Leakage Rate
1.07
Building Envelope Performance (BEP)
Congratulations! you meet the requirements to receive the Retro 50 award.
51% Improvement
Energy Performance Breakdown
Charts below indicate improvement potentials for various building characteristics. Improvements are displayed using the BEP-value together with award criteria.
Wall Performance
Window Performance
Roof Performance
Airtightness
Solution Package for Airtightness
In this building envelope retrofit, reducing air leakage will significantly improve the BEP (Building Envelope Performance).
Air leakage accounts for a significant amount of energy loss in commercial buildings. Over the past several years there have been significant improvements in materials, design and installation of air barrier systems to significantly reduce air leakage resulting in significant improvement in thermal performance. A list of commercially available technologies that can be used to reduce air leakage and improve the thermal performance of the building envelope has been compiled. The case studies highlight the use of different air barrier technologies/approaches in retrofit projects to help improve the thermal performance of the building envelope by reducing air leakage. Included is a link to almost 60 wall assemblies evaluated/tested by Air Barrier Association of America (ABAA) in accordance with ASTM E 2357 Standard Test Method for Determining Air Leakage of Air Barrier Assemblies.
Airtightness Resources
Additional Resources
Wall Resources
Window Resources
Solar Heat Gain Resources
Roof Resources
Submit Building For Review


Envelope Performance Summary
Building Characteristics
Summary
Saved Buildings
New Building
Print Page
American Geophysical Union (AGU) .08 SHGC
Existing Building
Baseline
BEP
40.1
Wall R-Value
6
Wall Facade Material
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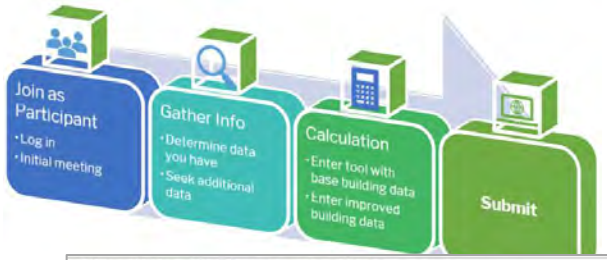
Roof R-Value
8.8
Roof Surface Material
Black Membrane
Window U-Factor
0.63
Window SHGC
0.4
Air Leakage Rate
1.07
Update Inputs
Retrofit
Improvements
BEP
22.0
Wall R-Value
15.7
Wall Facade Material
Brick
Roof R-Value
30.6
Roof Surface Material
Green Roof
Window U-Factor
0.24
Window SHGC
0.08
Air Leakage Rate
1.07
Building Envelope Performance (BEP)
Congratulations! you meet the requirements to receive the Retro 30 award.
45% Improvement
Energy Performance Breakdown
Charts below indicate improvement potentials for various building characteristics. Improvements are displayed using the BEP-value together with award criteria.
Wall Performance
Window Performance
Roof Performance
Airtightness
Solution Package for Airtightness
In this building envelope retrofit, reducing air leakage will significantly improve the BEP (Building Envelope Performance).
Air leakage accounts for a significant amount of energy loss in commercial buildings. Over the past several years there have been significant improvements in materials, design and installation of air barrier systems to significantly reduce air leakage resulting in significant improvement in thermal performance. A list of commercially available technologies that can be used to reduce air leakage and improve the thermal performance of the building envelope has been compiled. The case studies highlight the use of different air barrier technologies/approaches in retrofit projects to help improve the thermal performance of the building envelope by reducing air leakage. Included is a link to almost 60 wall assemblies evaluated/tested by Air Barrier Association of America (ABAA) in accordance with ASTM E 2357 Standard Test Method for Determining Air Leakage of Air Barrier Assemblies.
Airtightness Resources
Additional Resources
Wall Resources
Window Resources
Solar Heat Gain Resources
Roof Resources
Submit Building For Review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•Seek additional data
Calculation
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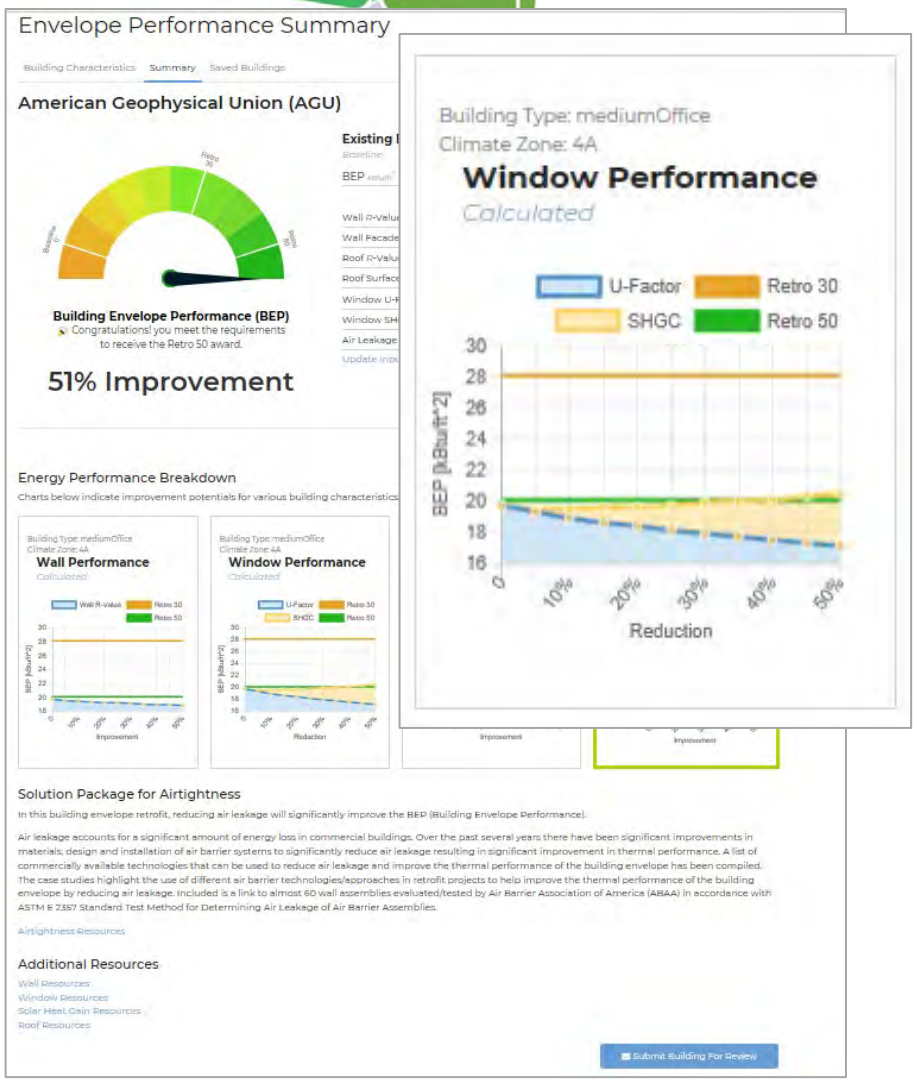
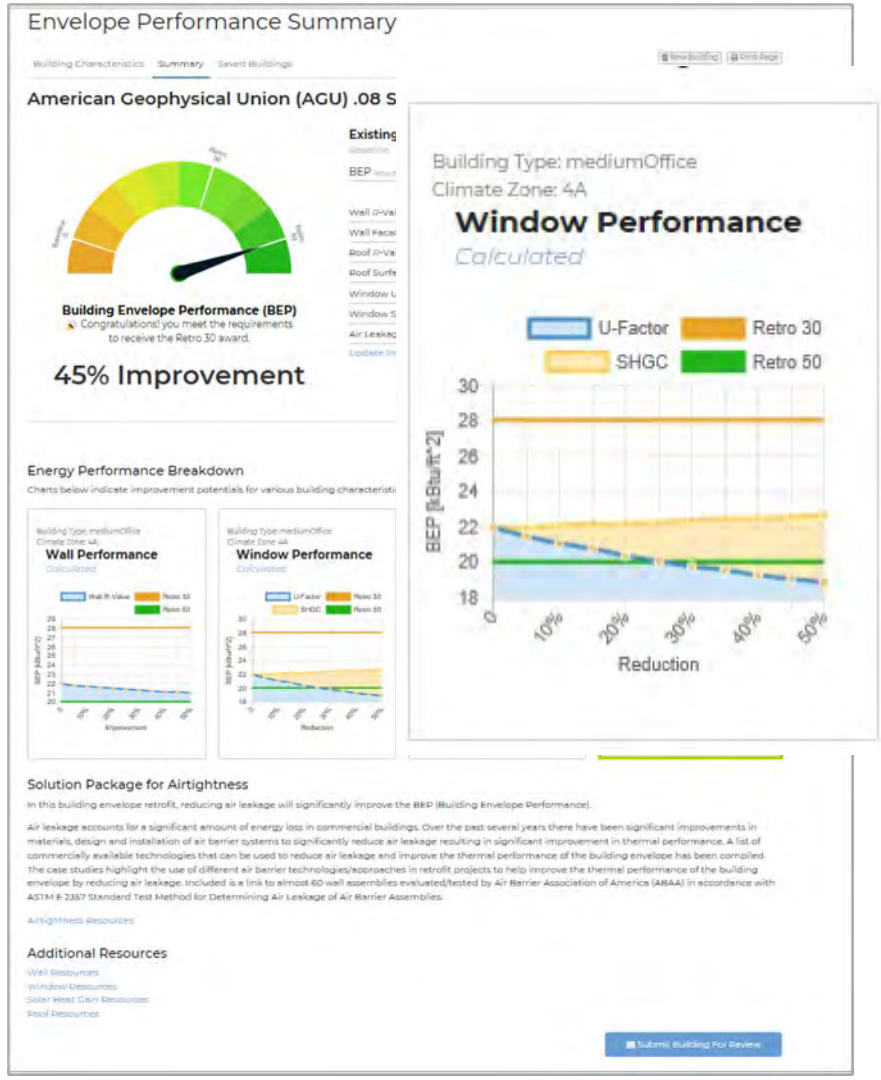
•Enter improved building data
Submit

SHGC


Envelope Performance Summary
Building Characteristics
Summary
Saved Buildings
American Geophysical Union (AGU)
Building Envelope Performance (BEP)
Congratulations! you meet the requirements to receive the Retro 50 award.
51% Improvement
Energy Performance Breakdown
Charts below indicate improvement potentials for various building characteristics
Wall Performance
Window Performance
Building Type: mediumOffice
Climate Zone: 4A
Window Performance
Calculated
U-Factor
Retro 30
SHGC
Retro 50
BEP [kBtu/ft^2]
Reduction
Solution Package for Airtightness
In this building envelope retrofit, reducing air leakage will significantly improve the BEP (Building Envelope Performance).
Air leakage accounts for a significant amount of energy loss in commercial buildings. Over the past several years there have been significant improvements in materials, design and installation of air barrier systems to significantly reduce air leakage resulting in significant improvement in thermal performance. A list of commercially available technologies that can be used to reduce air leakage and improve the thermal performance of the building envelope has been compiled. The case studies highlight the use of different air barrier technologies/approaches in retrofit projects to help improve the thermal performance of the building envelope by reducing air leakage. Included is a link to almost 60 wall assemblies evaluated/tested by Air Barrier Association of America (ABAA) in accordance with ASTM E 2357 Standard Test Method for Determining Air Leakage of Air Barrier Assemblies.
Airtightness Resources
Additional Resources
Wall Resources
Window Resources
Solar Heat Gain Resources
Roof Resources
Submit Building For Review


Envelope Performance Summary
Building Characteristics
Summary
Saved Buildings
American Geophysical Union (AGU) .08 S
Building Envelope Performance (BEP)
Congratulations! you meet the requirements to receive the Retro 30 award.
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Energy Performance Breakdown
Wall Performance
Window Performance
Building Type: mediumOffice
Climate Zone: 4A
Window Performance
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Retro 30
SHGC
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Airtightness Resources
Additional Resources
Wall Resources
Window Resources
Solar Heat Gain Resources
Roof Resources
Submit Building For Review

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Poll #3

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Q & A

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www.slido.com event code **#DOE**

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Additional Resources

- AGU Building Projects
- USGBC Case Study
- Interface Engineering AGU Net Zero Case Study webinar
- Clean Energy DC Award

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BUILDING RESILIENT COMMUNITIES:
STATE AND LOCAL PERSPECTIVES

Tue, Sep 15, 2020 | 3:00 - 4:00 PM ET

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SCALING IMPACT:
MULTI-BUILDING APPROACHES TO CARBON REDUCTION

Tue, Dec 1, 2020 | 3:00 - 4:30 PM ET

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PERSPECTIVES ON RESILIENCE:
INSUARANCE AND CREDIT UNDERWRITING

Tue, Feb 9, 2021 | 3:00 - 4:00 PM ET

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IMPACTS, CHALLENGES, AND WHAT COMES NEXT

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QUANTIFYING THE ADDITIONAL BENEFITS FROM ENERGY EFFICIENCY

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STORIES FROM THE FIELD

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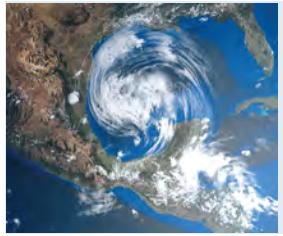

PLANNING FOR RESILIENCE IN MULTIFAMILY HOUSING:
A PORTFOLIO-WIDE APPROACH

Tue, Nov 17, 2020 | 3:00 - 4:15 PM ET

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EVALUATING BUILDING SITES FOR PORTFOLIO RESILIENCE

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Often, energy-saving projects can yield extra benefits beyond reduced energy use and costs. These benefits can include reduced maintenance, improved productivity, waste reduction, and more. Join this webinar to learn about a new methodology to quantify the non-energy savings and revenues from energy efficiency projects.


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Through Better Buildings webinars, experts discuss a variety of topics from Air Management to Zero Energy. These webinars are helpful resources on key subject areas in energy efficiency, water efficiency, resilience, and more. Below are webinars we have held over previous years. For each webinar, you can watch the video recording and follow along with the slide deck. To sign up for an upcoming live webinar, click here.

EXPLORE BY TOPIC

Building Envelope | Communications & Engagement | Data Centers | Energy Data Management | Financing | Green Leasing | Health & Wellness | Industrial | K-12 Schools | Lighting | Multifamily | Plug & Process Loads | Refrigeration | Renewables Integration | Resilience | Smart Labs | Space Conditioning | Treasure Hunts | Waste Reduction | Water & Wastewater | Workforce Development | Working with National Labs | Zero Energy Buildings

Indicates the session was a part of the 2020 Virtual Summit. To view a full list of the Summit Sessions, click here.

BUILDING ENVELOPE

A building's envelope (walls, windows, roof, and foundation) accounts for approximately 30% of the primary energy consumed in residential and commercial buildings. Explore all previously recorded webinars on this topic by pressing MORE.

- Unsealed: The Building Envelope Campaign (2020)
- Sneak Peek of the Building Envelope Campaign (2020)
- Addressing the Envelope: Recognizing Building Enclosure Improvements (2020)
- Innovative Wall Technologies for Commercial Buildings (2019)
- Energy Savings Impact of Airtightness in U.S. Commercial Buildings (2019)
- Building Envelope/Enclosure Commissioning and Retro-commissioning (2017)

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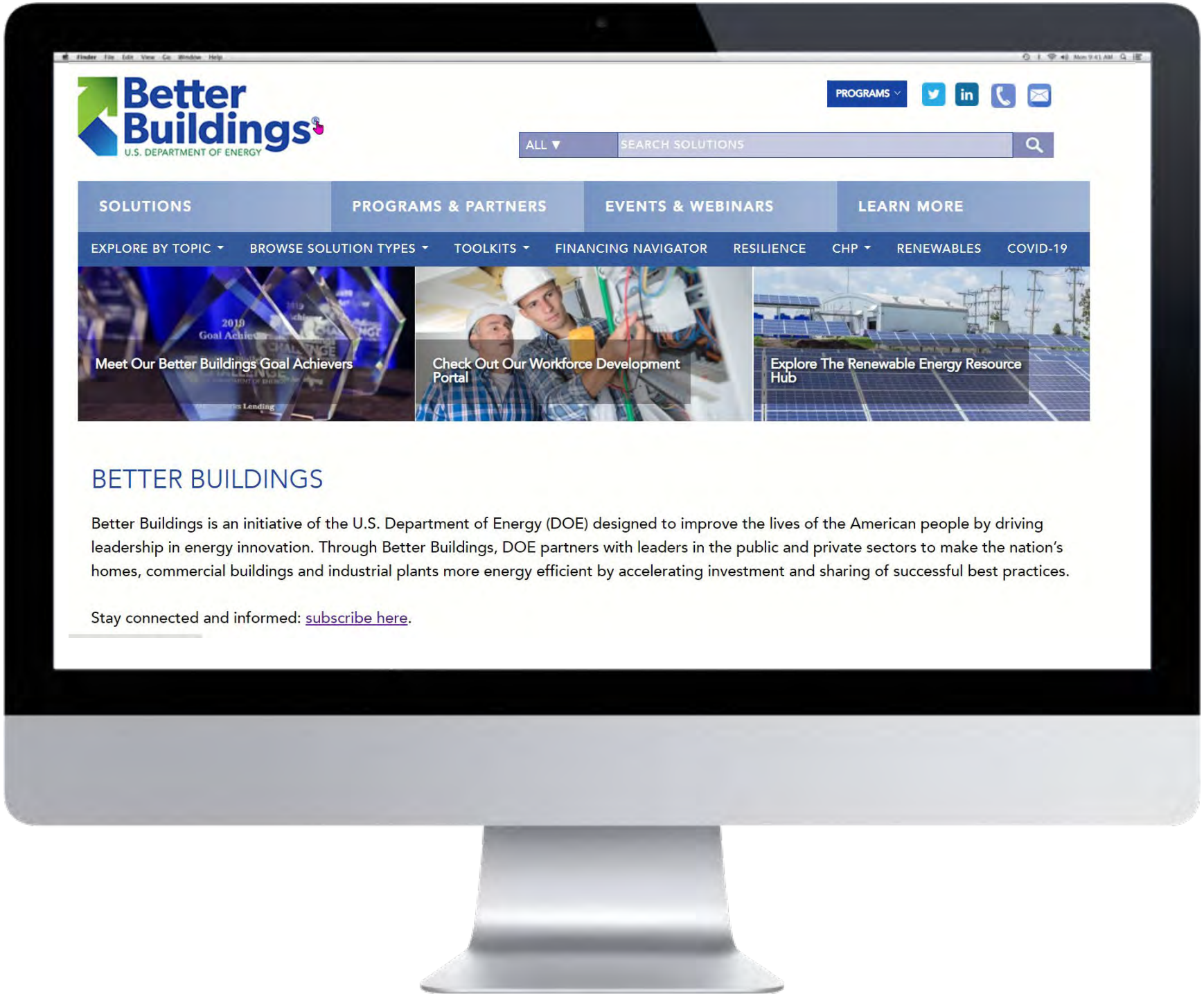

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Better Buildings Solution Center
https://betterbuildingssolutioncenter.energy.gov/

General Inquiries
BetterBuildings@retechadvisors.com

Program Support
ksanderson@retechadvisors.com

Hayley McLeod
Oak Ridge National Laboratory
mcleodhd@ornl.gov

Dr. Simon Pallin
Oak Ridge National Laboratory
pallinsb@ornl.gov

Cristine Gibney
American Geophysical Union
cgibney@agu.org