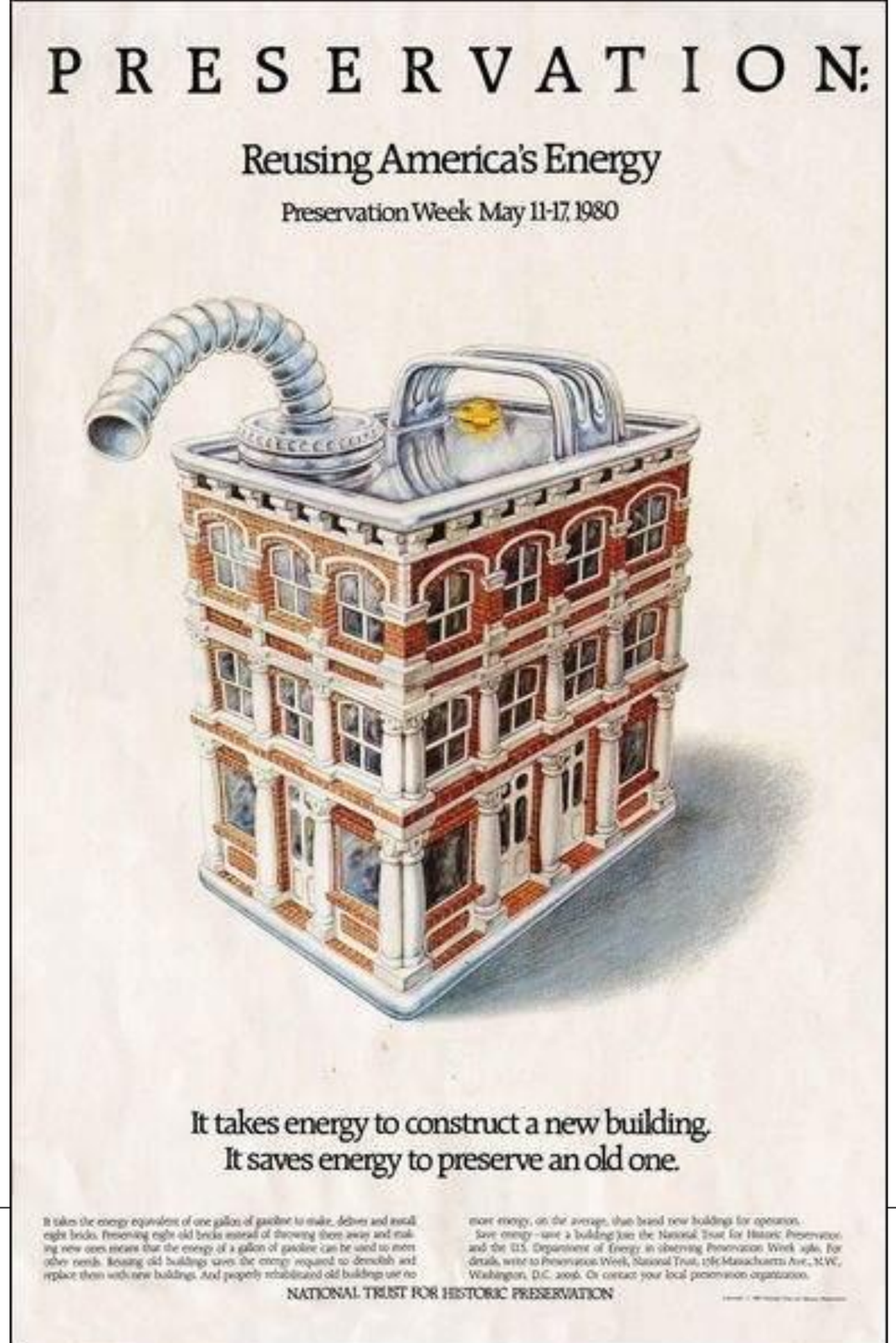
sustainable preservation

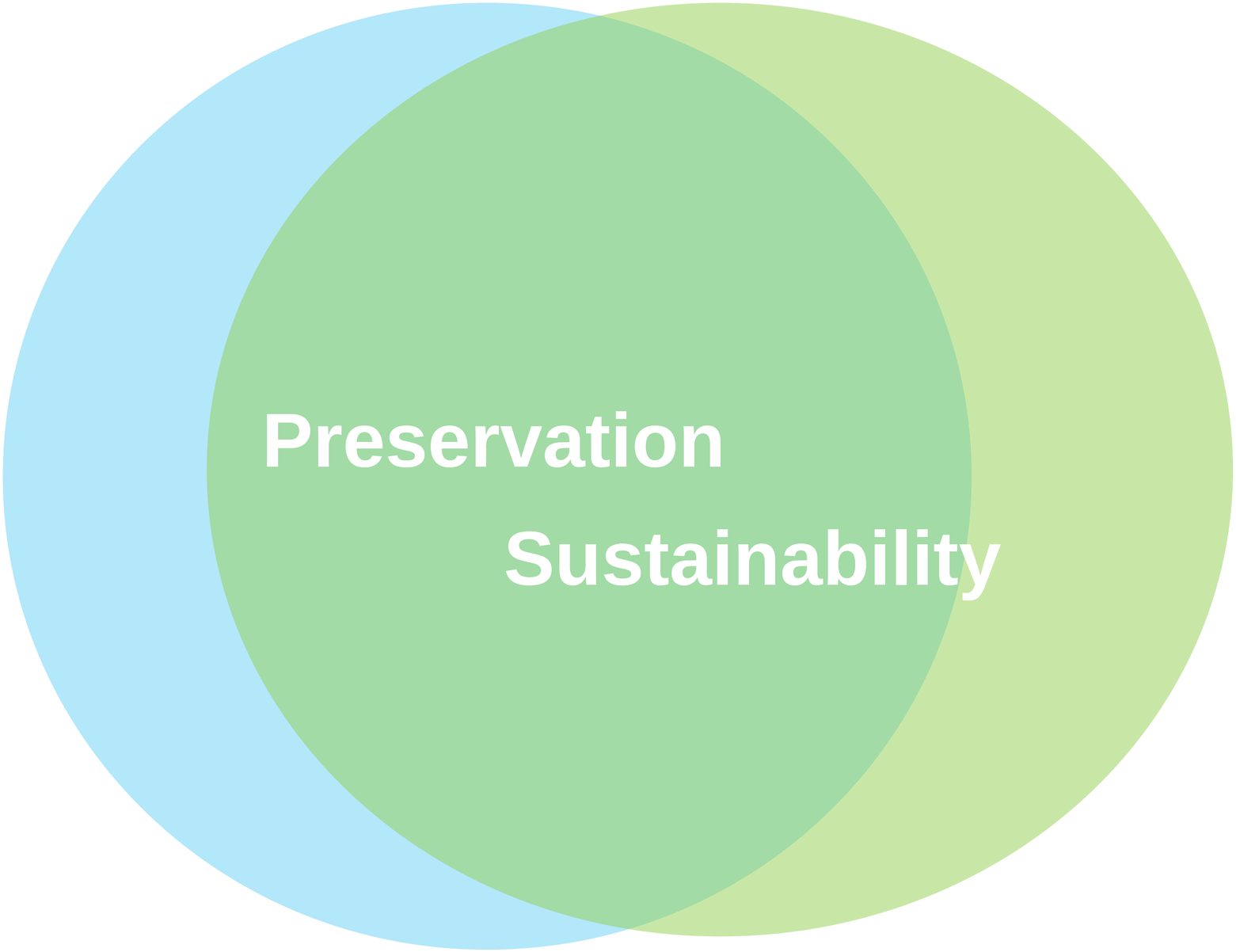
South Carolina Statewide Historic Preservation Conference
April 25, 2025

sustainable preservation

is the idea that preservation has tangible ecological benefits

and **the most sustainable building is one that is already built.**




Preservation
Sustainability

introduction

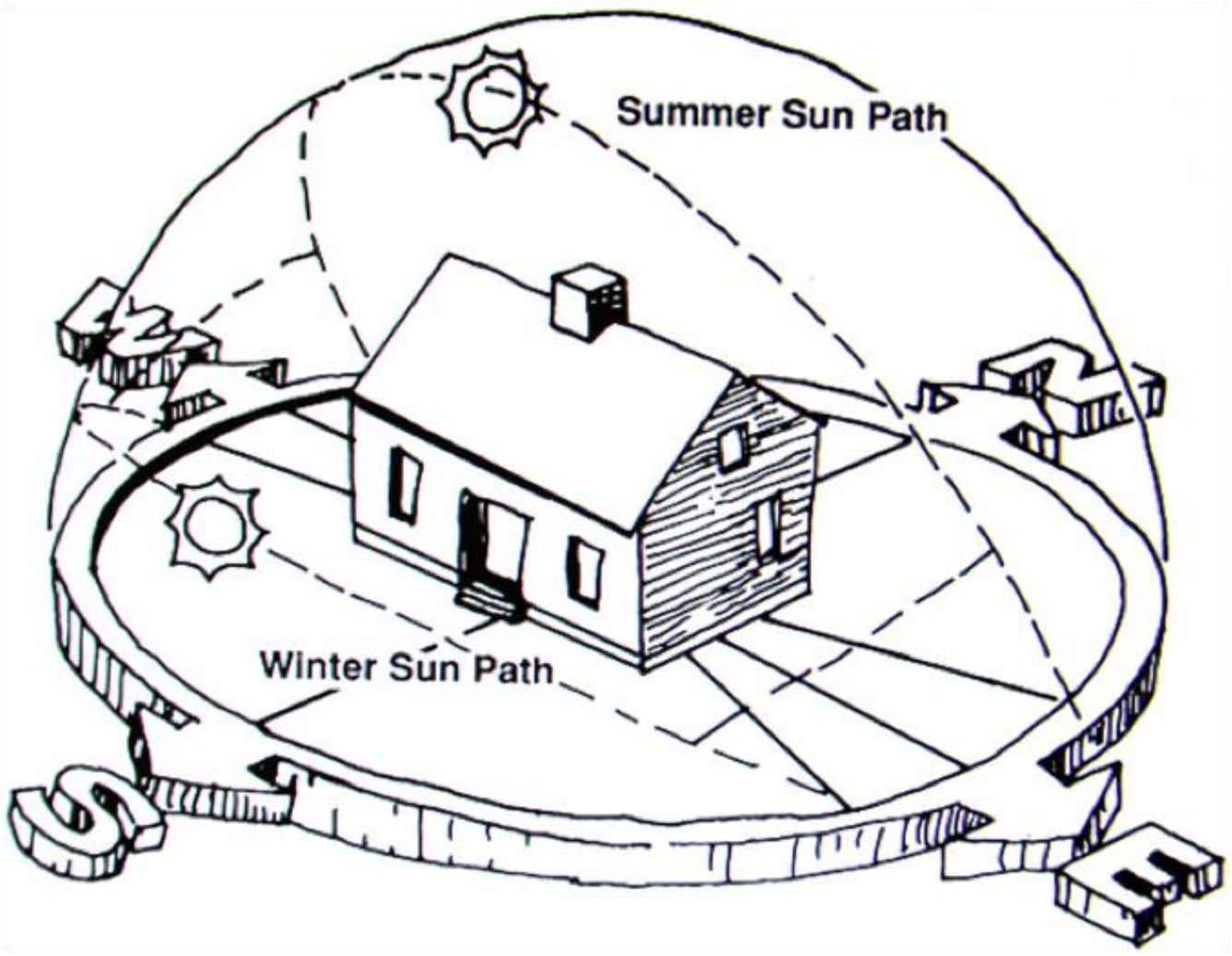
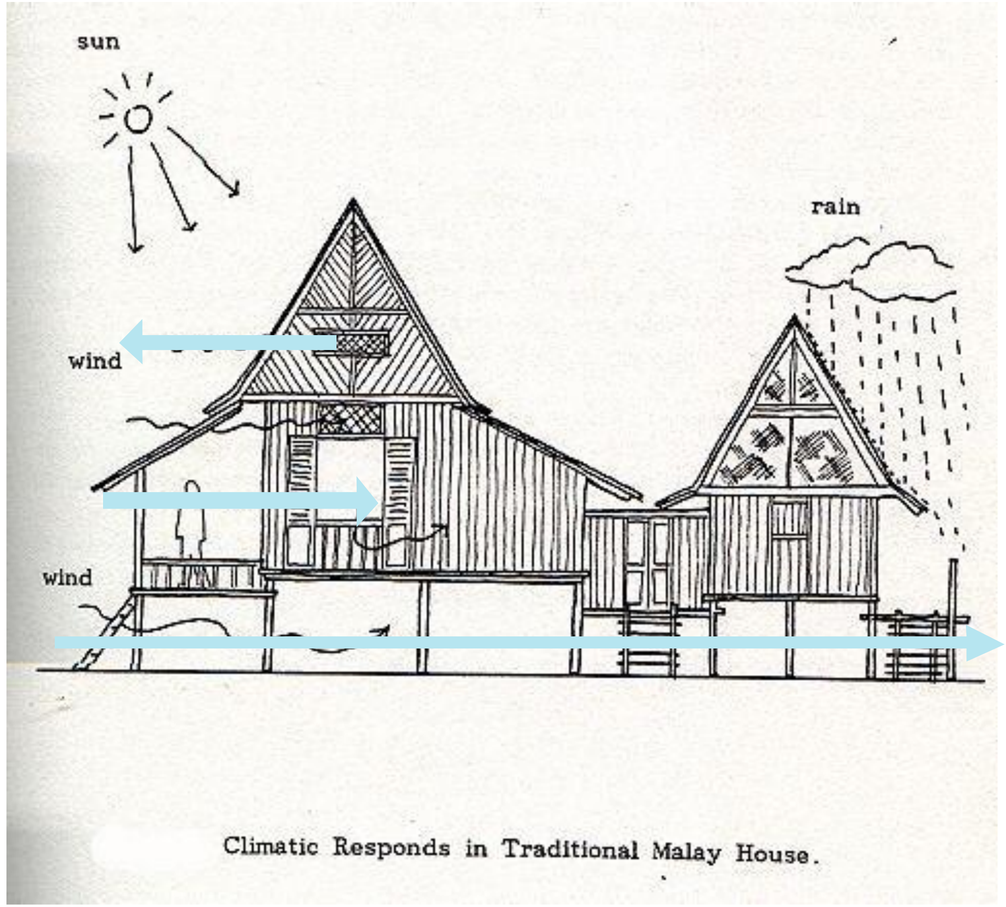


Image Credit : Nilsen Landscape Design

introduction



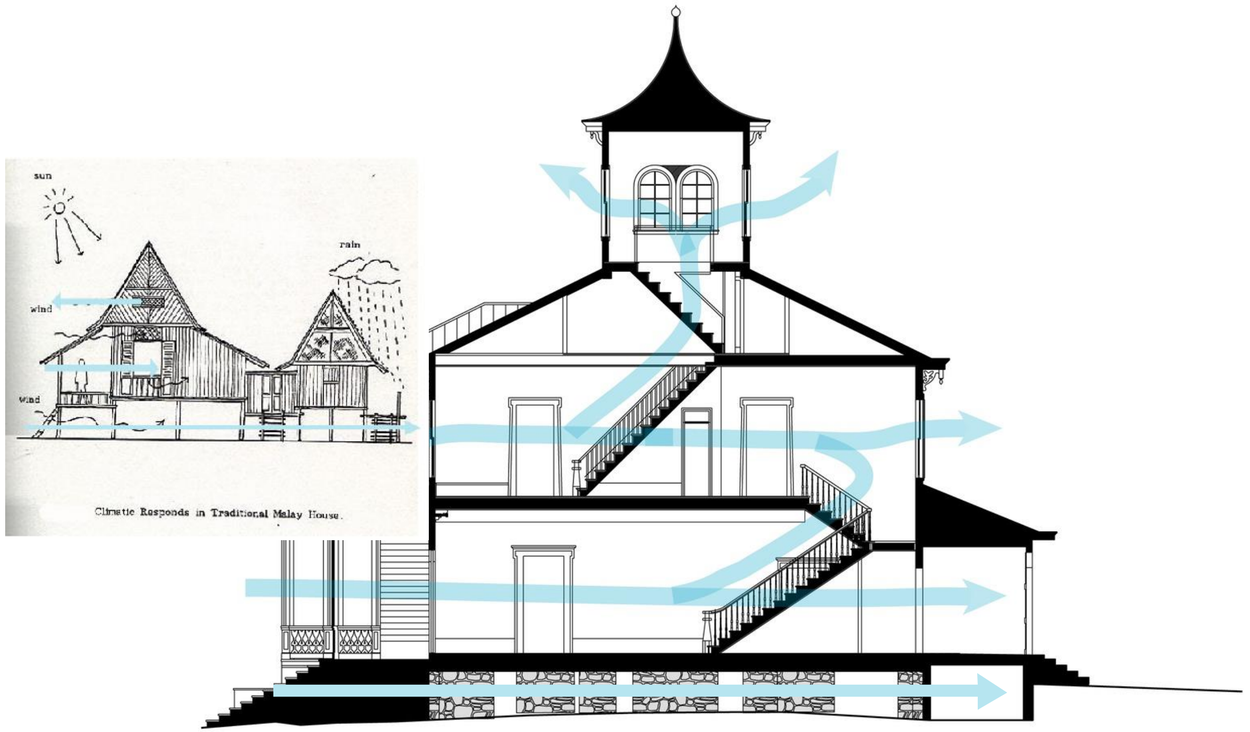


Image Credits : hbp.usm/my, LAS

introduction

GREEN GLOBES®

LIVING BUILDING CHALLENGE℠

sustainable certifications

regenerative certifications

Inherent design features

		1	Credit 3	Enhanced Commissioning	1	
1			Credit 4	Enhanced Refrigerant Management	1	DNR
		1	Credit 5	Measurement & Verification	1	
	1		Credit 6	Green Power	1	DNR

continued...

Yes	?	No				
8	1	4		**Materials & Resources**	13 Points	Responsibility
Y			Prereq 1	**Storage & Collection of Recyclables**	Required	LAS
1			Credit 1.1	**Building Reuse**, Maintain 75% of Existing Walls, Floors & Roof	1	LAS
1			Credit 1.2	**Building Reuse**, Maintain 100% of Existing Walls, Floors & Roof	1	LAS
1			Credit 1.3	**Building Reuse**, Maintain 50% of Interior Non-Structural Elements	1	LAS
1			Credit 2.1	**Construction Waste Management**, Divert 50% from Disposal	1	Garbutt
1			Credit 2.2	**Construction Waste Management**, Divert 75% from Disposal	1	Garbutt
		1	Credit 3.1	**Materials Reuse**, 5%	1	
		1	Credit 3.2	**Materials Reuse**,10%	1	
1			Credit 4.1	**Recycled Content**, 10% (post-consumer + ½ pre-consumer)	1	Garbutt
	1		Credit 4.2	**Recycled Content**, 20% (post-consumer + ½ pre-consumer)	1	Garbutt
1			Credit 5.1	**Regional Materials**, 10% Extracted, Processed & Manufactured Regiona	1	Garbutt
1			Credit 5.2	**Regional Materials**, 20% Extracted, Processed & Manufactured Regiona	1	Garbutt
		1	Credit 6	**Rapidly Renewable Materials**	1	
		1	Credit 7	**Certified Wood**	1	
Yes	?	No				
14	1	0		**Indoor Environmental Quality**	15 Points	Responsibility
Y			Prereq 1	**Minimum IAQ Performance**	Required	LAS
Y			Prereq 2	**Environmental Tobacco Smoke (ETS) Control**	Required	LAS/DNR
1			Credit 1	**Outdoor Air Delivery Monitoring**	1	LAS
1			Credit 2	**Increased Ventilation**	1	LAS
1			Credit 3.1	**Construction IAQ Management Plan**, During Construction	1	Garbutt/DNR
1			Credit 3.2	**Construction IAQ Management Plan**, Before Occupancy	1	DNR
1			Credit 4.1	**Low-Emitting Materials**, Adhesives & Sealants	1	Garbutt
1			Credit 4.2	**Low-Emitting Materials**, Paints & Coatings	1	Garbutt
1			Credit 4.3	**Low-Emitting Materials**, Carpet Systems	1	Garbutt
1			Credit 4.4	**Low-Emitting Materials**, Composite Wood & Agrifiber Products	1	Garbutt
	1		Credit 5	**Indoor Chemical & Pollutant Source Control (walk-off Mat Vent of eq**	1	LAS
1			Credit 6.1	**Controllability of Systems**, Lighting	1	LAS
1			Credit 6.2	**Controllability of Systems**, Thermal Comfort	1	LAS
1			Credit 7.1	**Thermal Comfort**, Design	1	LAS
1			Credit 7.2	**Thermal Comfort**, Verification	1	DNR
1			Credit 8.1	**Daylight & Views**, Daylight 75% of Spaces	1	LAS
1			Credit 8.2	**Daylight & Views**, Views for 90% of Spaces	1	LAS
Yes	?	No				
5	0	0		**Innovation & Design Process**	5 Points	Responsibility
1			Credit 1.1	**Innovation in Design**: Water Use Reduction 40%	1	LAS
1			Credit 1.2	**Innovation in Design**: Maximize Open Space	1	DNR
1			Credit 1.3	**Innovation in Design**: Green Building Education?	1	DNR
1			Credit 1.4	**Innovation in Design**: Provide Specific Title	1	
1			Credit 2	**LEED® Accredited Professional**	1	DNR
Yes	?	No				
48	9	12		**Project Totals** (pre-certification estimates)	69 Points	

Certified: 26-32 points, **Silver:** 33-38 points, **Gold:** 39-51 points, **Platinum:** 52-69 points

the retention of historic fabric

aligns with

Building Life-Cycle Impact Reduction
Reduced Construction Waste
Sourcing of Raw Materials
(Embodied Carbon)

Material treatmen

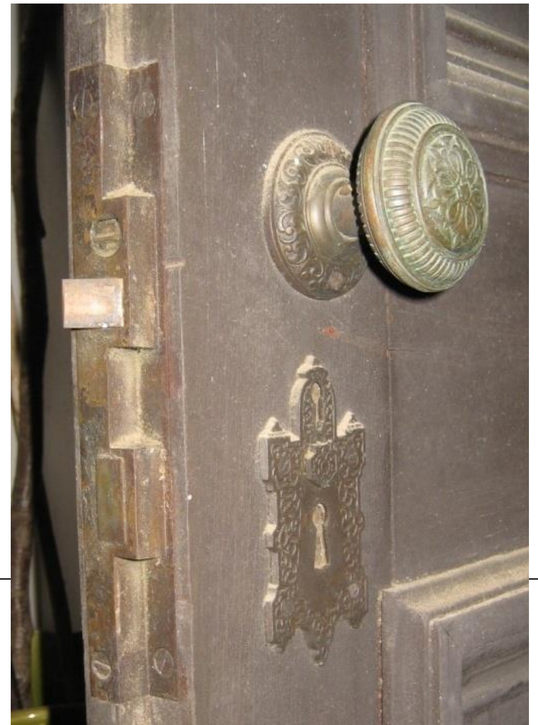
material treatment

Conservation/repair of historic fabric

aligns with

Building Life-Cycle Impact Reduction
Reduced Construction Waste Management

LORD AECK SARGENT



Impactful Product Selections

- LED Lighting
- Low Carbon Products *(concrete, glass, asphalt, steel)*
- Interior Storm Windows
- Locally Sourced Materials

(look where paint and other products are produced)

- Transitioning to all electric use

environmental product declaration

standardized document that provides a detailed analysis of a product's environmental impact throughout its entire life cycle.

nora®

1. General Information

nora systems GmbH

norament® 926

Programme holder
IBU - Institut Bauen und Umwelt e.V.
Panoramastr. 1
10178 Berlin
Germany

Owner of the declaration
nora systems GmbH
Höhnerweg 2-4
69469 Weinheim (Bergstrasse)
Germany

Declaration number
EPD-NOR-20180126-IBA1-EN

Declared product / declared unit
1m² resilient floor covering
(A1-A3: 1m² produced, A1-A5: 1m² installed)

This declaration is based on the product category rules:
Floor coverings, 02/2018
(PCR checked and approved by the SVR)

Scope:
Product line norament® 926
High-pressure pressed homogeneous floor coverings made from rubber in various colours and designs. This declaration is an Environmental Product Declaration according to ISO 14025 describing the specific environmental performance of the mentioned construction products produced in Germany (Weinheim/Bergstraße).

Issue date
06/12/2018

Valid to
05/12/2023

The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

Verification
The standard /EN 15804/ serves as the core PCR
Independent verification of the declaration and data according to /ISO 14025:2010/
☐ internally ☒ externally

Prof. Dr.-Ing. Horst J. Bossenmayer
(President of Institut Bauen und Umwelt e.V.)

Dipl. Ing. Hans Peters
(Head of Board IBU)

Dr. Frank Werner
(Independent verifier appointed by SVR)

2. Product

2.1 Product description / Product definition
In this Environmental Product Declaration (EPD), resilient rubber floor coverings of the nora systems GmbH product line norament® 926 are modelled.

Specific characteristics of the norament® 926 coverings include:

- manufacturing method: high-pressure pressed in tiles
- covering structure: single layer

For the product line norament® 926 further standards apply:

- /DIN EN 12199/: Resilient floor coverings - Specifications for homogeneous and heterogeneous relief rubber floor coverings and depending on design /DIN EN 1817/: Resilient floor coverings -Specification for homogeneous and heterogeneous smooth

Manufacturer:
Nora Systems GmbH

Program Operator:
Institut Bauen und Umwelt e.V.

Conforms with:
ISO 14025 and EN 15804

EDP Type:
Product Specific, Externally Reviewed

LEED v4 = 1 product
LEED v4.1 = 1.5 products

LORD AECK SARGENT

Nutrition Facts

16 servings per container

Serving size **1 Tbsp. (21g)**

Amount per serving

Calories **60**

	% Daily Value*
Total Fat 0g	**0%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 0mg	**0%**
Total Carbohydrate 17g	**6%**
Dietary Fiber 0g	**0%**
Total Sugars 17g	
	34%†
Protein 0g	

Product Impacts

Declared Unit: 1 m^3 of 10,000 psi concrete at 28 days

Amount Per Declared Unit	
Global Warming Potential	445 $kgCO_2eq$
Emitted	460 $kgCO_2eq$
Sequestered	-15 $kgCO_2eq$
Ozone Depletion	0.000 kgCFC11eq
Acidification	2.96 $kgSO_2eq$
Eutrophication	0.09 kgNeq
Smog Formation	0.61 kgO_3eq
Primary Energy Demand	3017 MJ
Non-renewable	3000 MJ
Renewable	17 MJ

Replacement in kind
Material Reuse
aligns with

50-year solutions

aligns with

Sourcing of Raw Materials

Building Life-Cycle Impact Reduction

LORD AECK SARGENT

material treatment

passive cooling strategies

Site Orientation

Deep overhangs at eaves and porches
Reduction of solar gain

Central halls symmetry and cross ventilation

LORD AECK SARGENT

passive cooling strategies
resilience
daylighting

Elevating the structure/Open Foundation
Reduction of solar gain
Flood protection

Natural Daylighting

Passive Environmental Controls

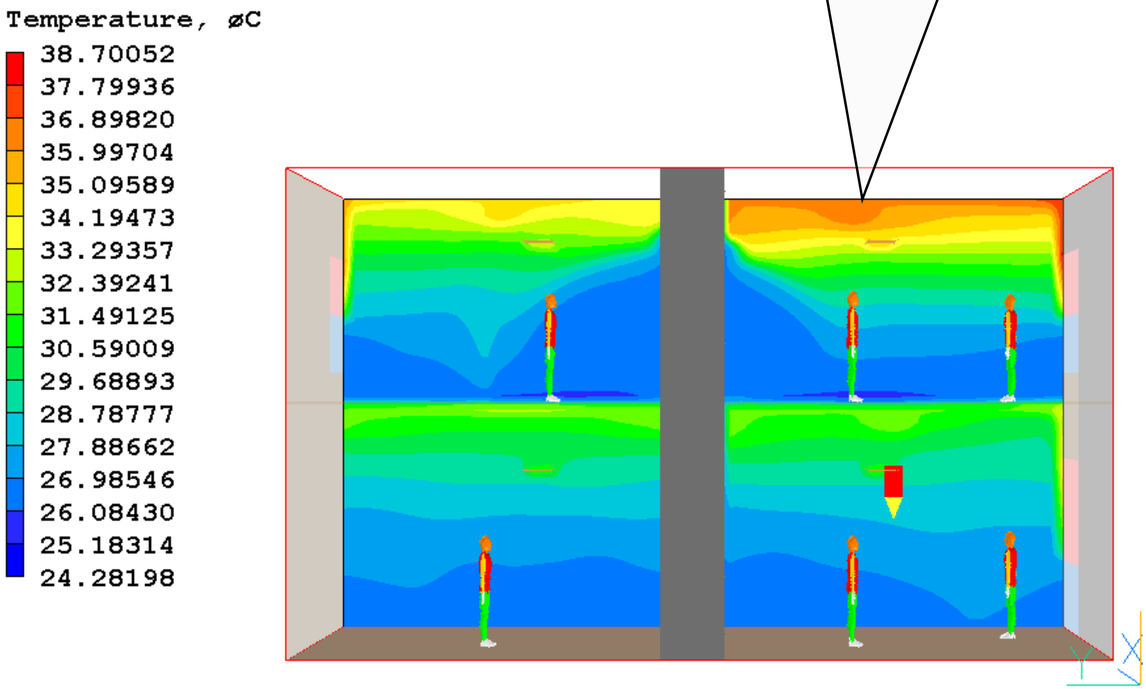
Durability of Materials

Built from Locally Procured Materials

passive cooling
thermal properties

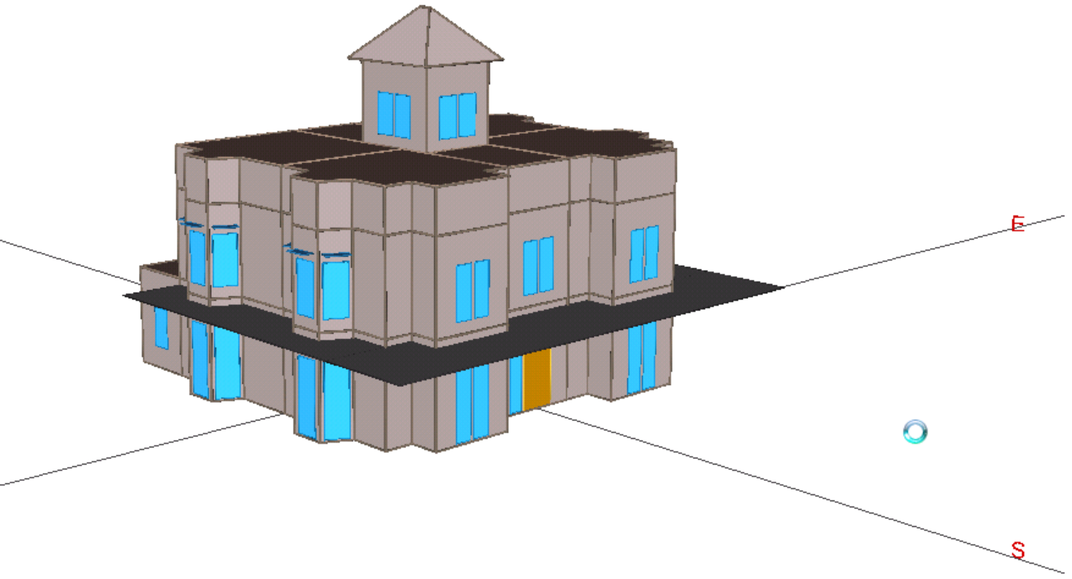
Thermal Mass
Thermal Lag

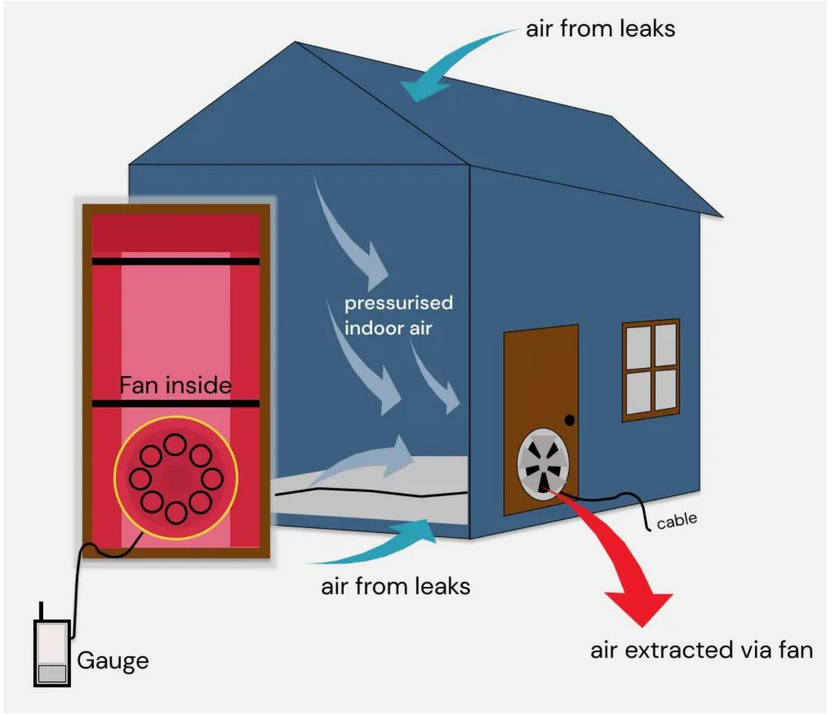
High ceilings and the stack effect



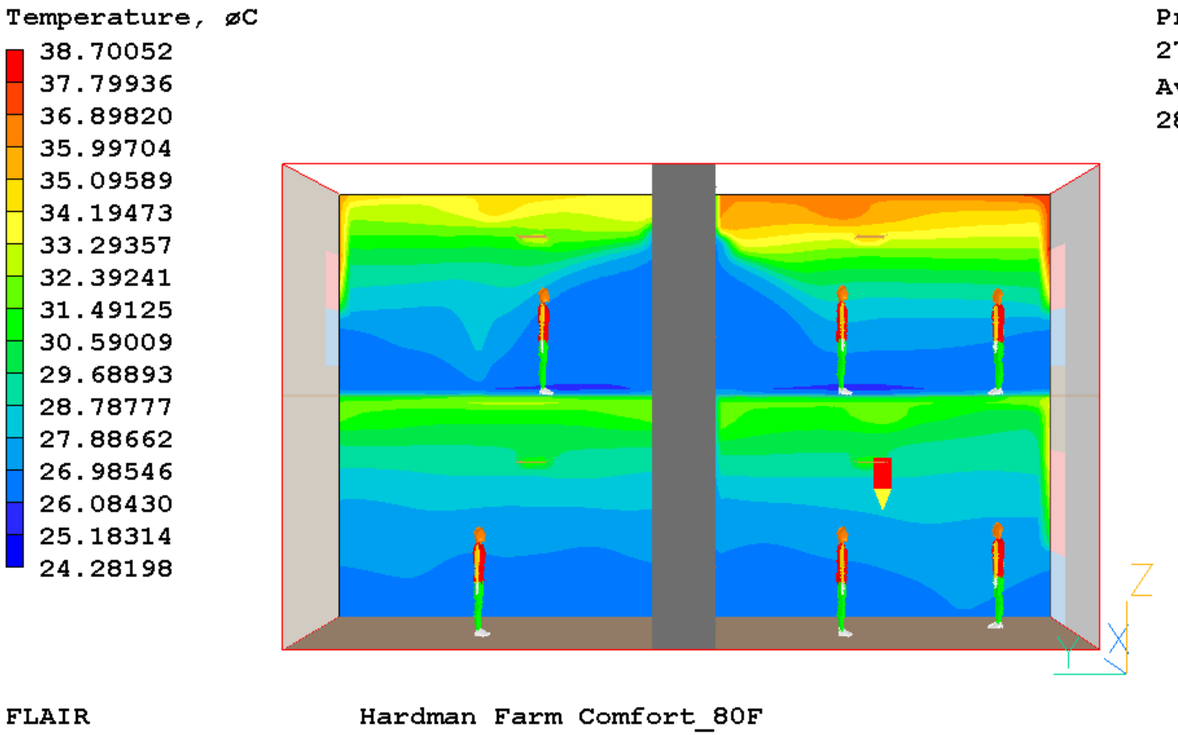
Energy Modeling
requires

- Weather Records
- Utility bIlls
- R - values for the building envelope
- Infiltration Rates
- Temp/Humidity Sensors





Energy Modeling
predicts

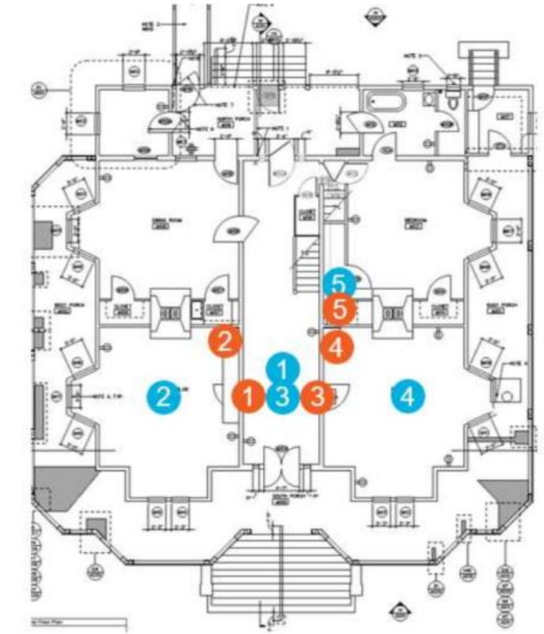


- Air flow/stack effect
- Solar gain
- Thermal Lag
- Seasonal Temperature Swings
- Dew points and condensation

building performance a

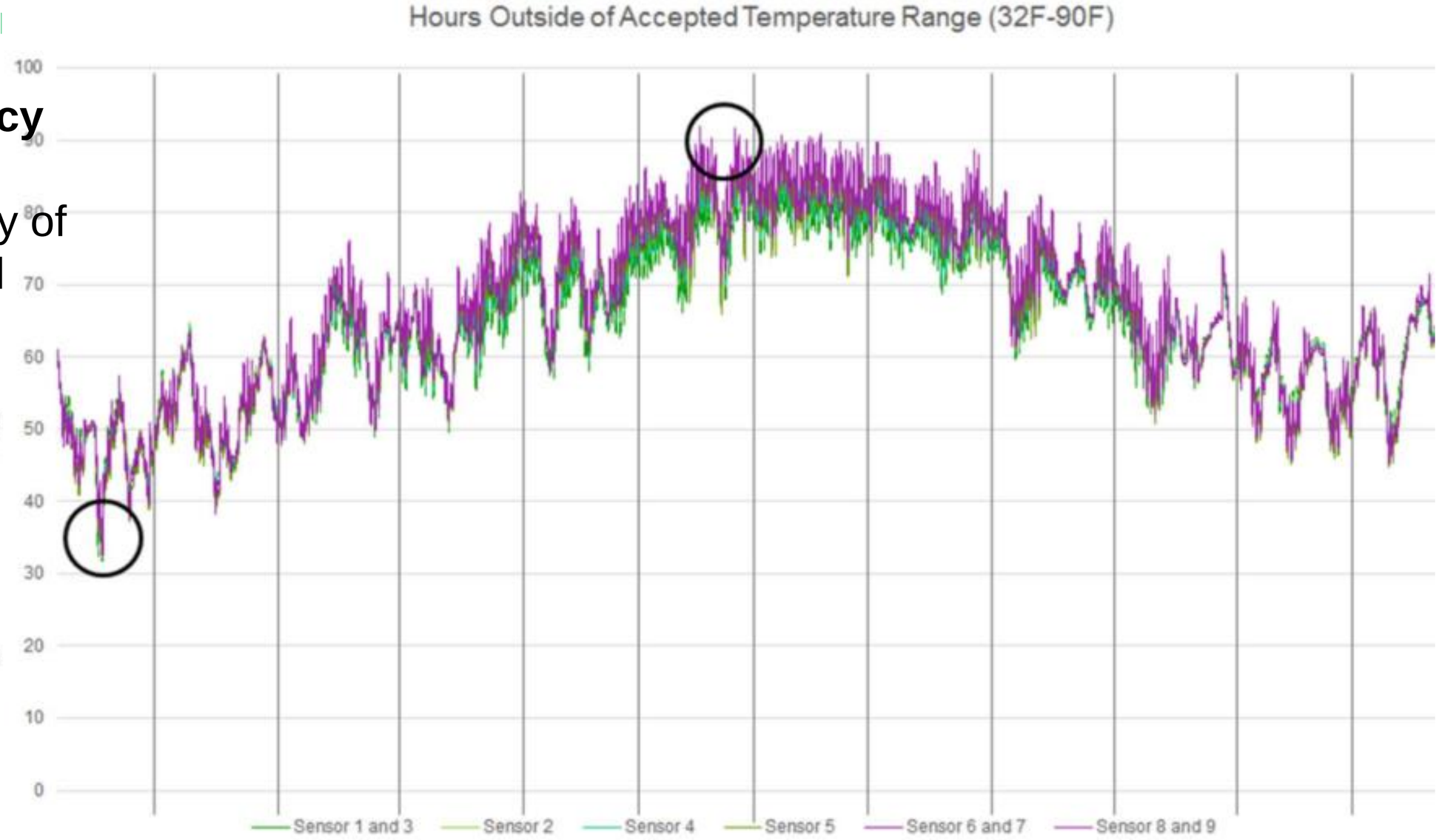
Post Occupancy Evaluations

Confirm accuracy of energy model



First Floor

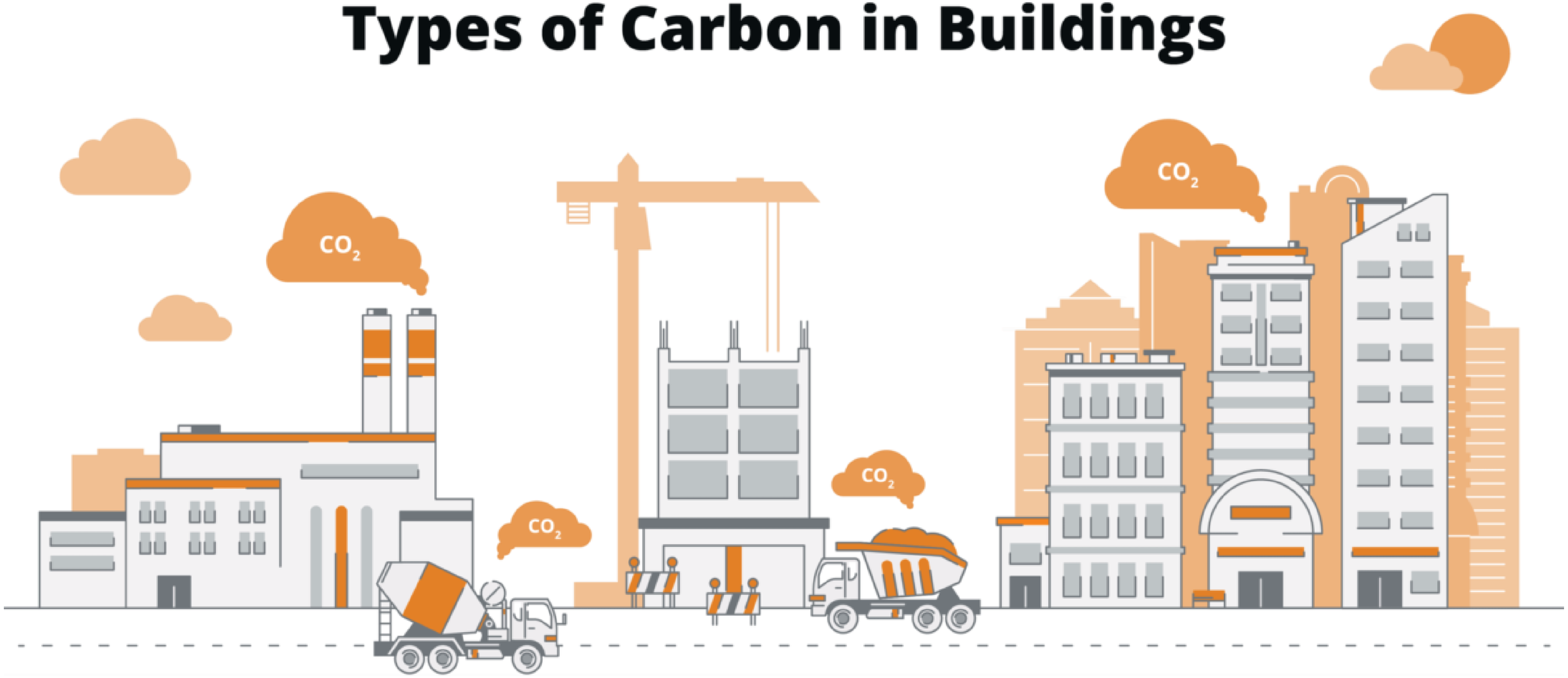
- Location of sensors at Hardman Farm
- Location of sensors in energy model



January – December (plot of all 8760 hours of the year)

LORD AECK SARGENT

Types of Carbon in Buildings



Embodied Carbon
The emissions from manufacturing, transportation, and installation of building materials.

Operational Carbon
The emissions from a building's energy consumption.

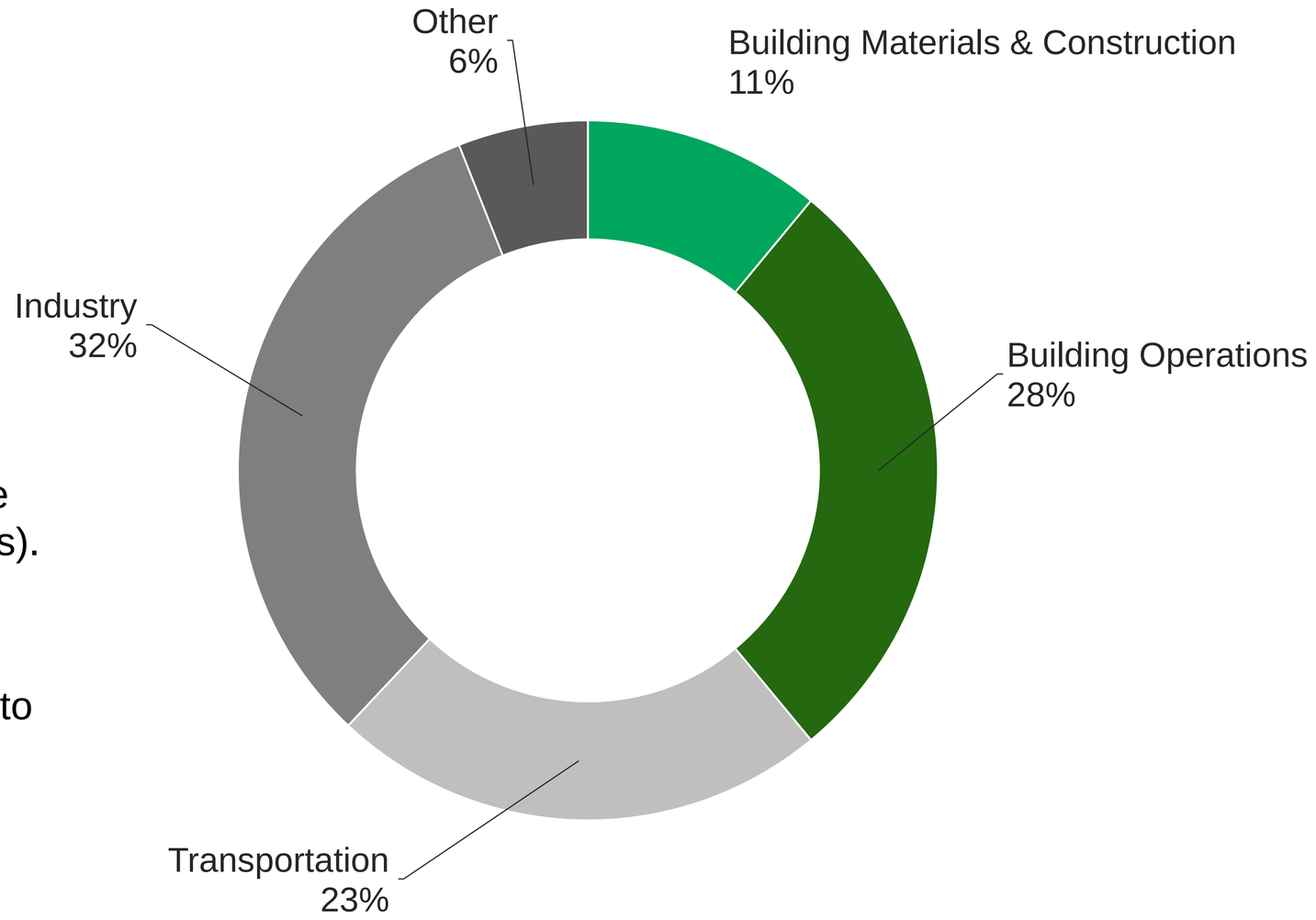
counting carbon

Greenhouse Gases (GHGs)

gases that contribute to the global warming effect, leading to rising surface temperatures. (carbon dioxide (CO2), methane, and fluorinated gases (HFCs, CFHCs).

Global Warming Potential (GWP)

a measure of the potential for increased warming due to the greenhouse effect. We talk about this in terms of **kilograms of Carbon Dioxide and Equivalents, or kgCO2e.**



Data from AIA Blueprint for Better and IECC

Early-phase tool used to compare total carbon impacts for renovation, addition, and new construction projects.

https://www.caretool.org/

c.scale™

Broad-scope LCA tool designed to be used for total carbon impact across the project lifecycle. Supports reuse, renovation, new construction, and scenario comparisons.

https://www.cscale.io/

CARBON CONSCIENCE

Early-phase tool with a landscape and program focus, including carbon sequestration in landscape design.

https://carbon-conscience.web.app/

LORD AECK SARGENT

Dashboard

Export

Terrell Hall

Updated 4/18/2025 at 10:01am

University/College
33,513 sf
Milledgeville, Georgia, United States
2022
Analyzed over 60 years

Life Cycle Stages
A1-A3, A4-A5, B1, B2-B5, B6, C1-C4, D, and Stored Carbon

Categories
Structure, Enclosure, Interiors, Services, Refrigerants, Sitework, Energy Use

All Project Settings

Scenarios

New Scenario

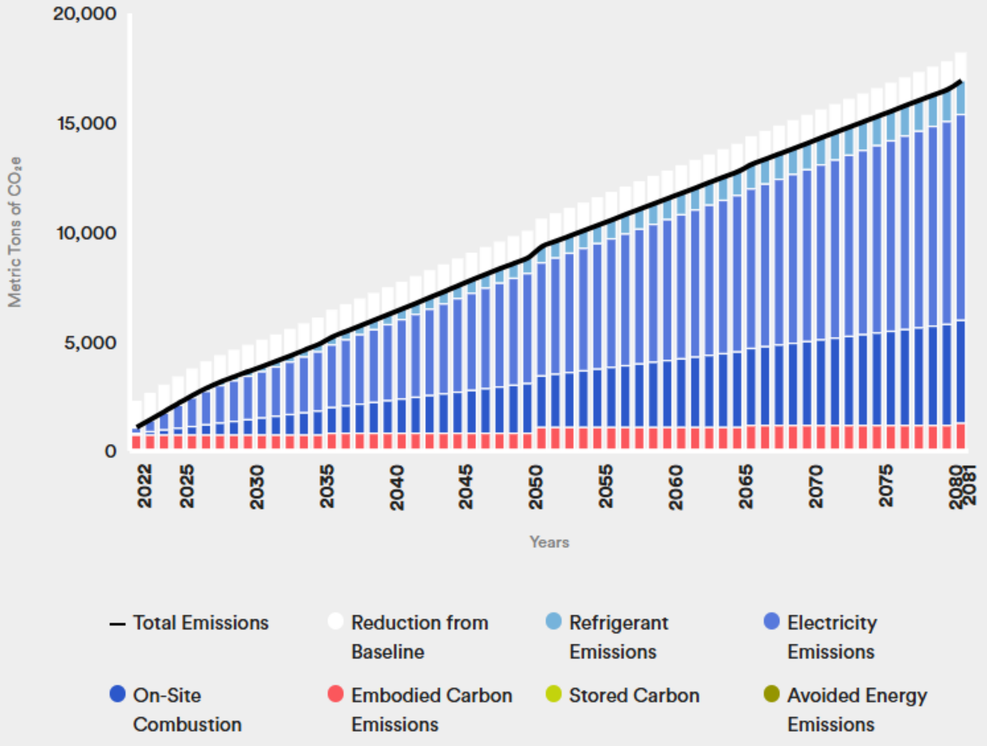
- Renovation (Typ.) — Target
- Renovation (High Performance)
- Renovation (EC)
- New Building (Typ.) — Baseline

This Scenario | Compare Scenarios

Over Time | Life Cycle Emissions | Summary

Cumulative Emissions Over 60 Years

kgCO₂e/m² tCO₂e



Scenario

Renovation (Typ.) Target

Write a scenario description here...

Collapse All

Reuse — 6△

Reuse of existing building assemblies

Structure	95 %
Solid Exterior Wall	100 %
Transparent Exterior Wall	95 %
Roofing	100 %
Interiors	75 %
Services	25 %

Form and Massing — 2△

The form of the building

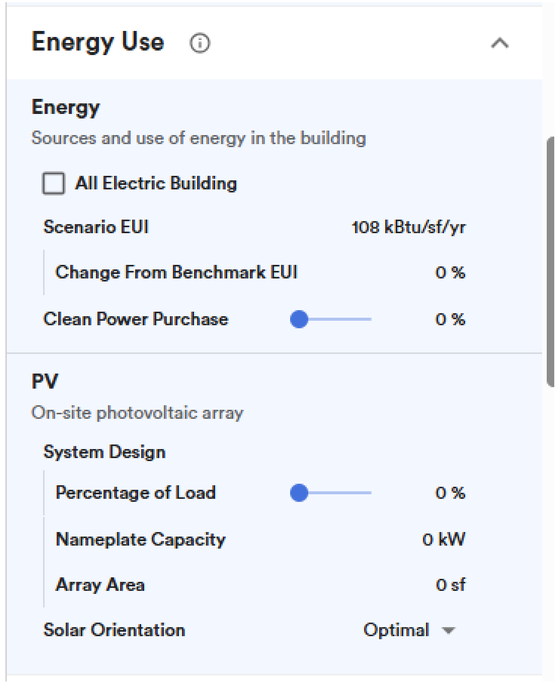
Building Perimeter	431 ft
Floor-to-Floor Height	11 ft
Window-to-Wall Ratio	0.25

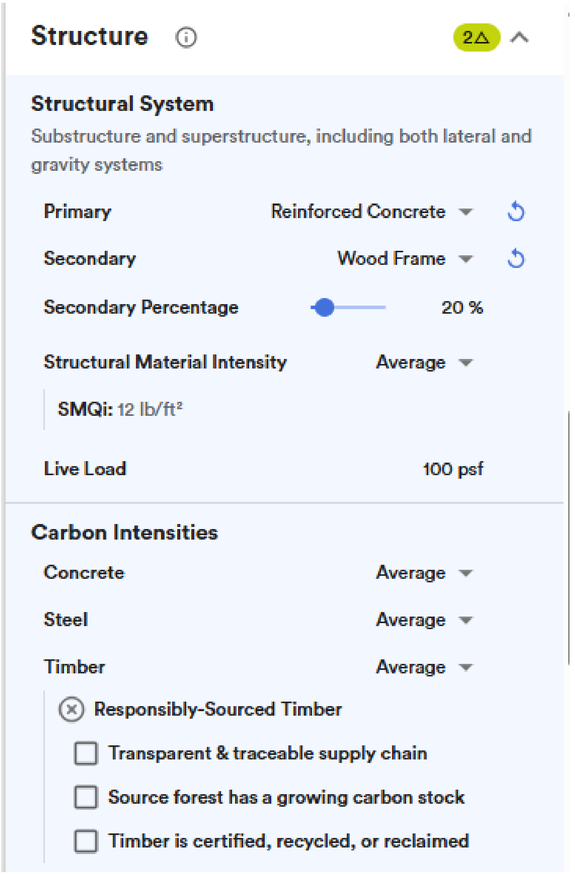
Takeoffs

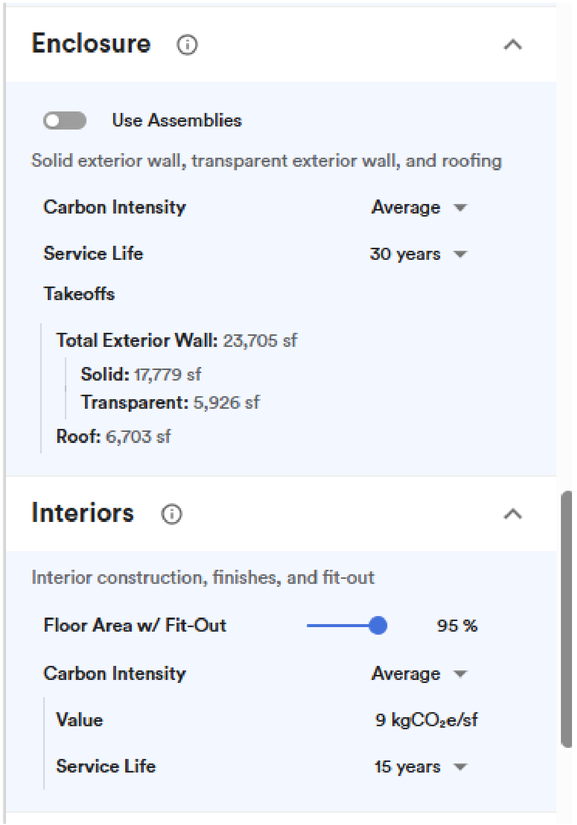
Total Exterior Wall: 23,705 sf
- **Solid:** 17,779 sf
- **Transparent:** 5,926 sf

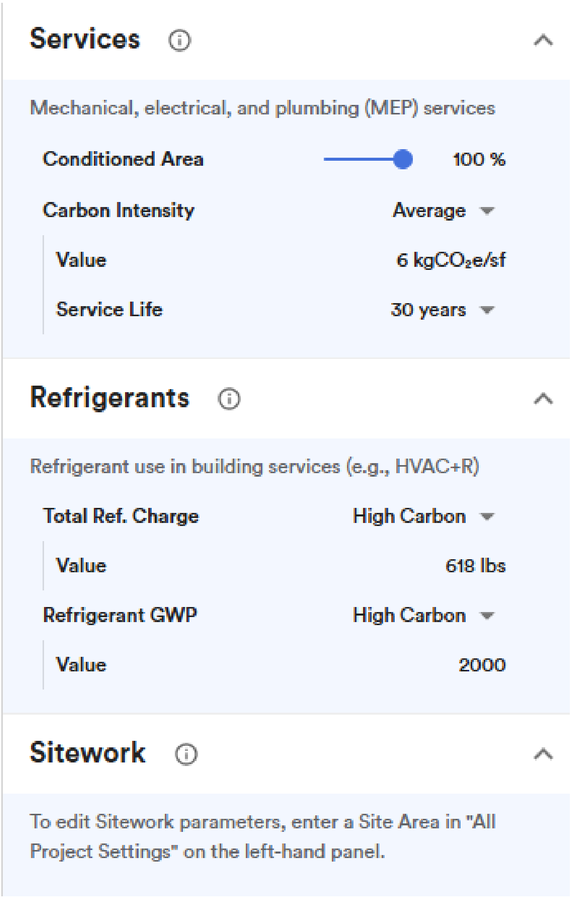
Roof: 6,703 sf

counting carbon – data inputs



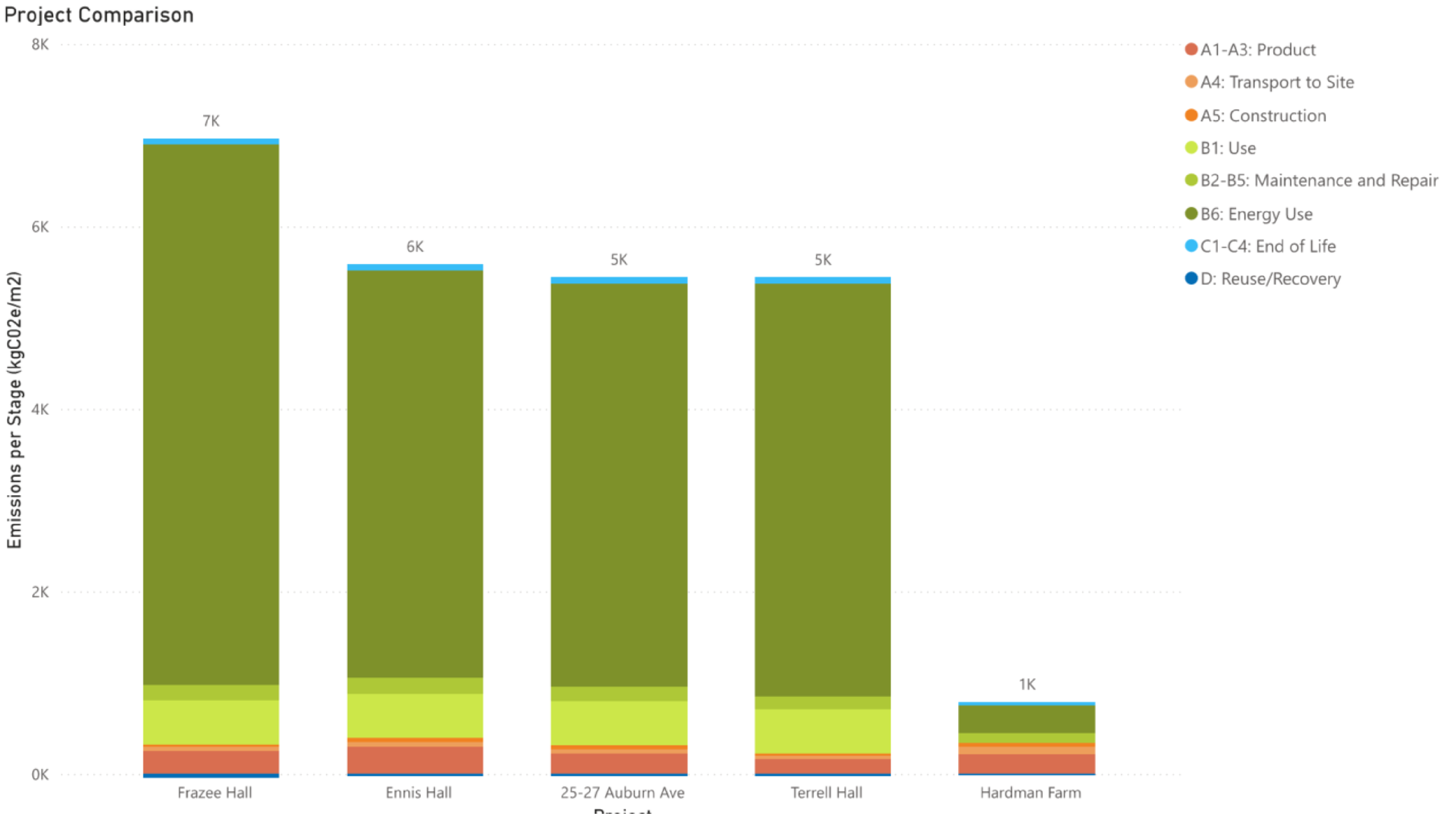






LORD AECK SARGENT

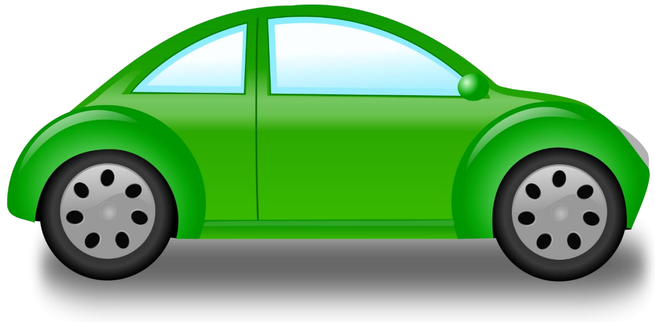
counting carbon



Greenhouse Gas Equivalencies Calculator

1600 $kgCO_2e/m^2$

1600



gasoline-powered passenger vehicles driven for one year

921

homes' energy use for one year

Most Worshipful Prince Hall Grand Lodge of Free and Accepted Masons of the State of Alabama

Construction Completion Date: 1924

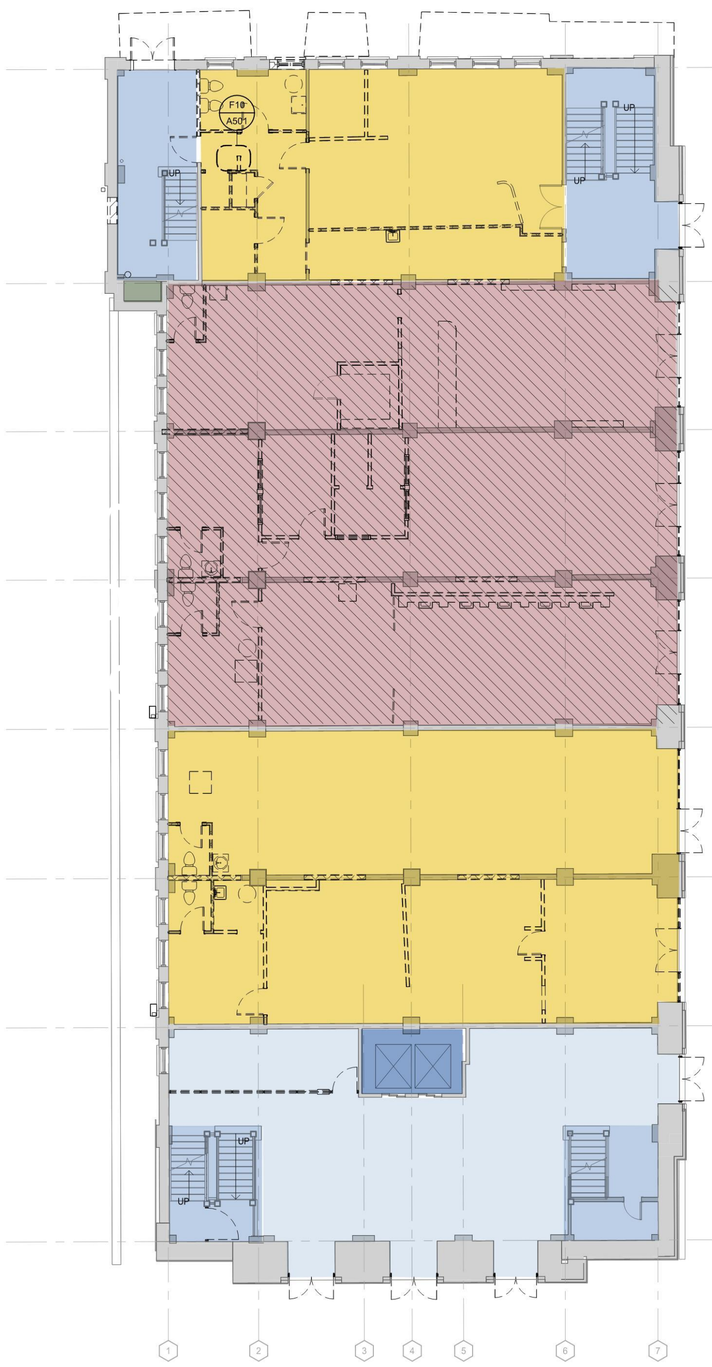
Architect: Robert R. Taylor & Louis Persley

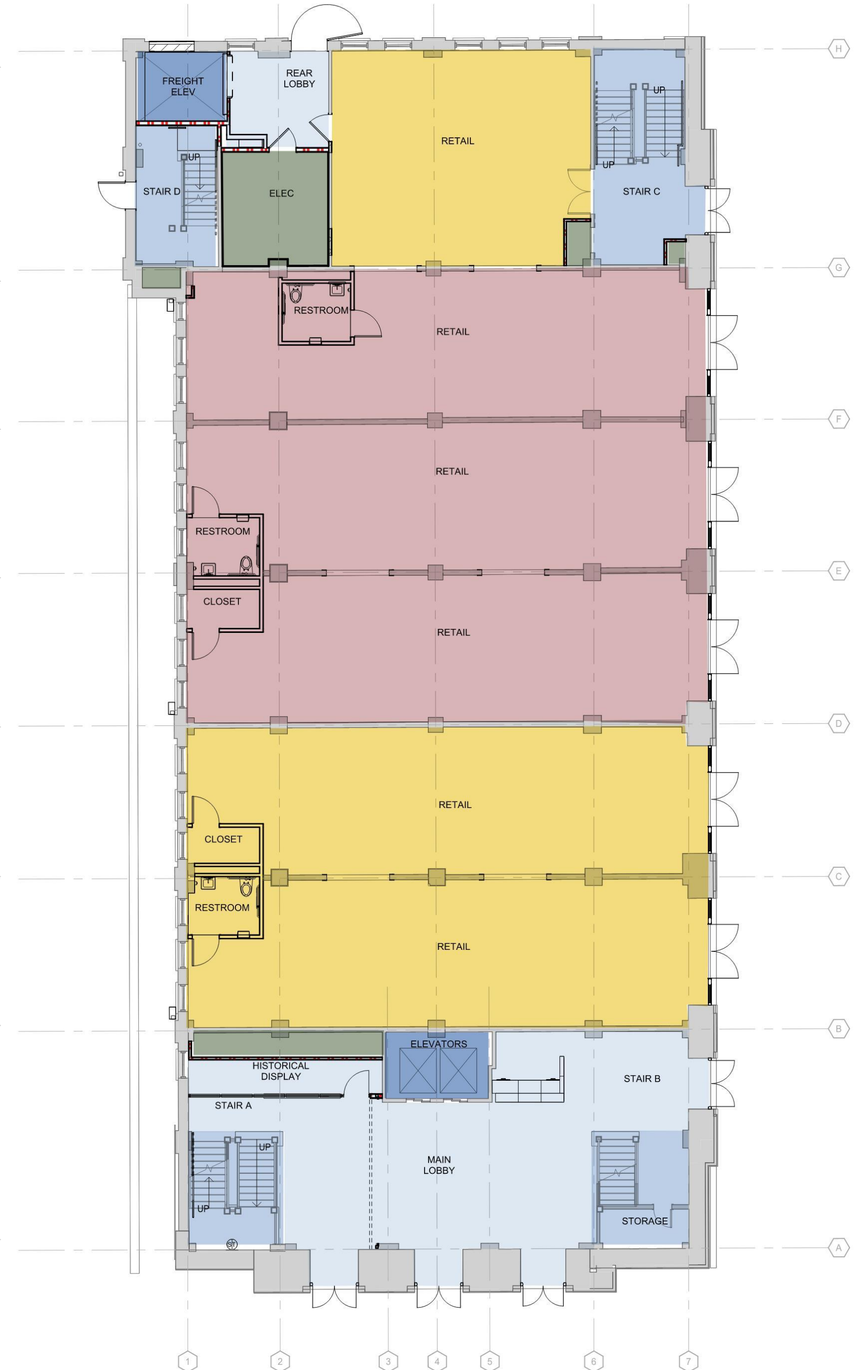
Contractor: Windham Brothers

case study

case study

- Circulation
- Stairs
- Elevators
- Restrooms
- Systems
- Offices
- Retail/Leasable
- Masonic
- Historic





LORD AECK SARGENT

KEY SUSTAINABILITY GOALS

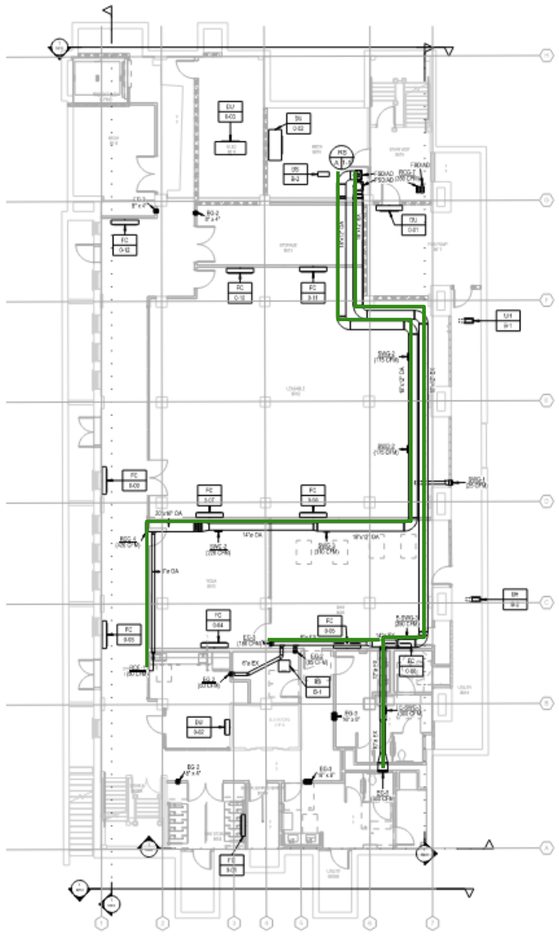
DECREASE:

- water consumption
- energy consumption
- 30% improvement over ASHRAE 90.1/2019
- embodied carbon
- greenhouse gas emissions

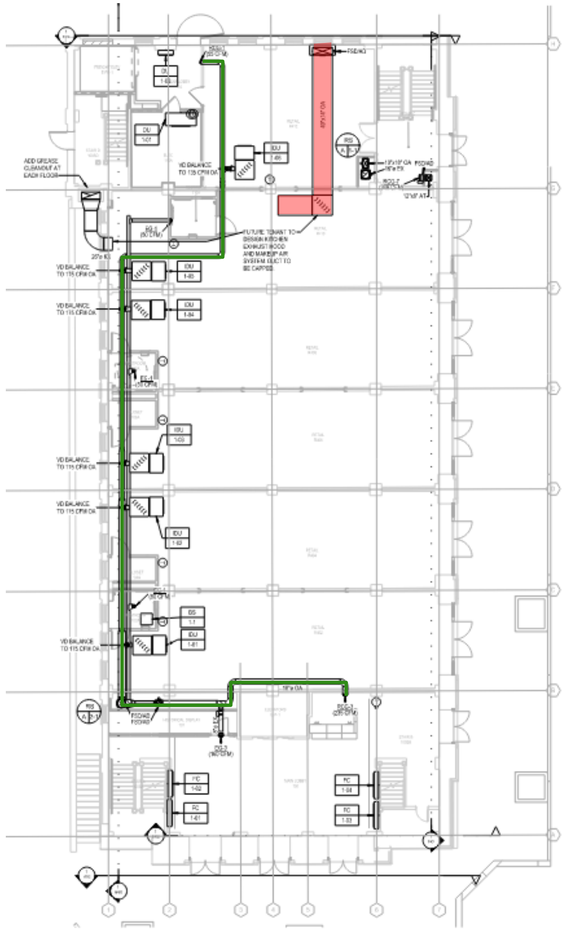
INCREASE:

- indoor environmental quality
- occupant wellbeing
- resource efficiency

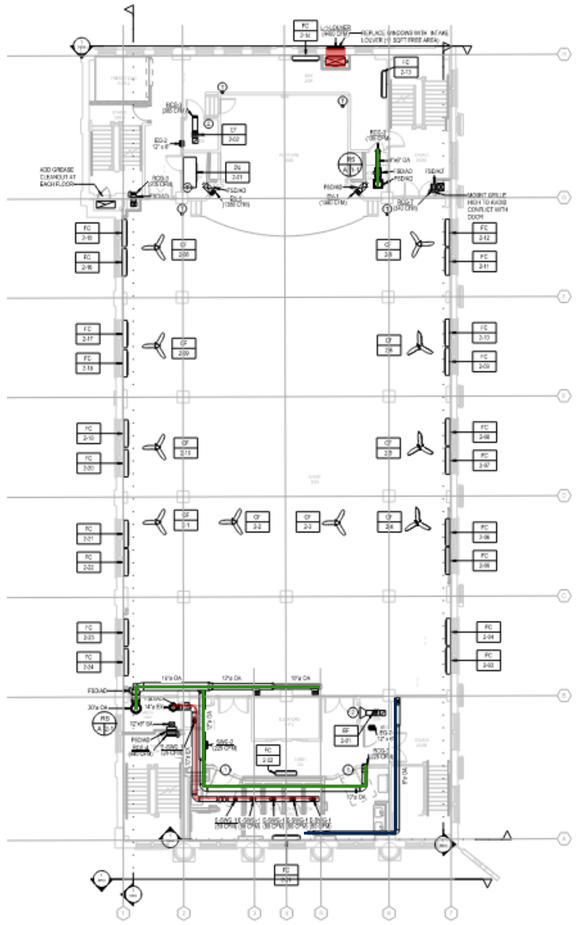
case study - systems Integration



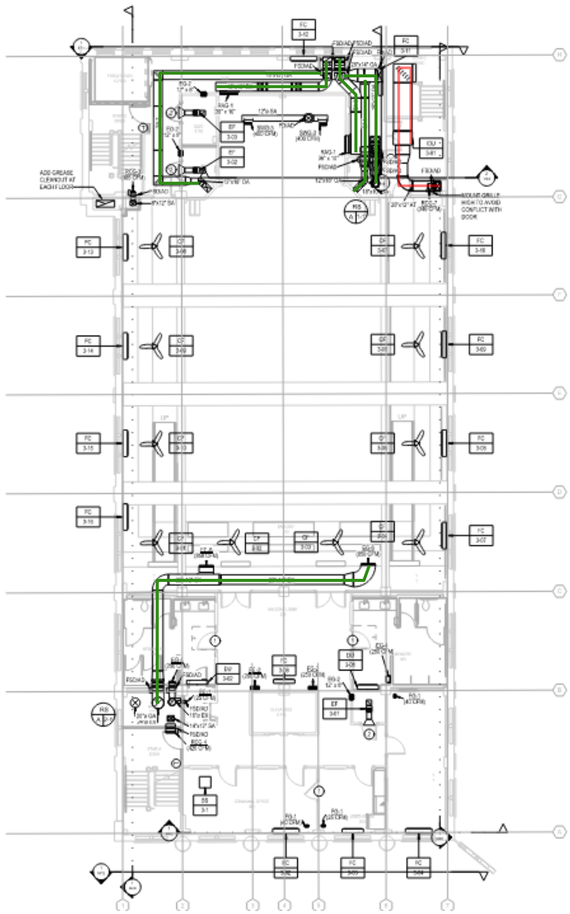
Basement



Level 1

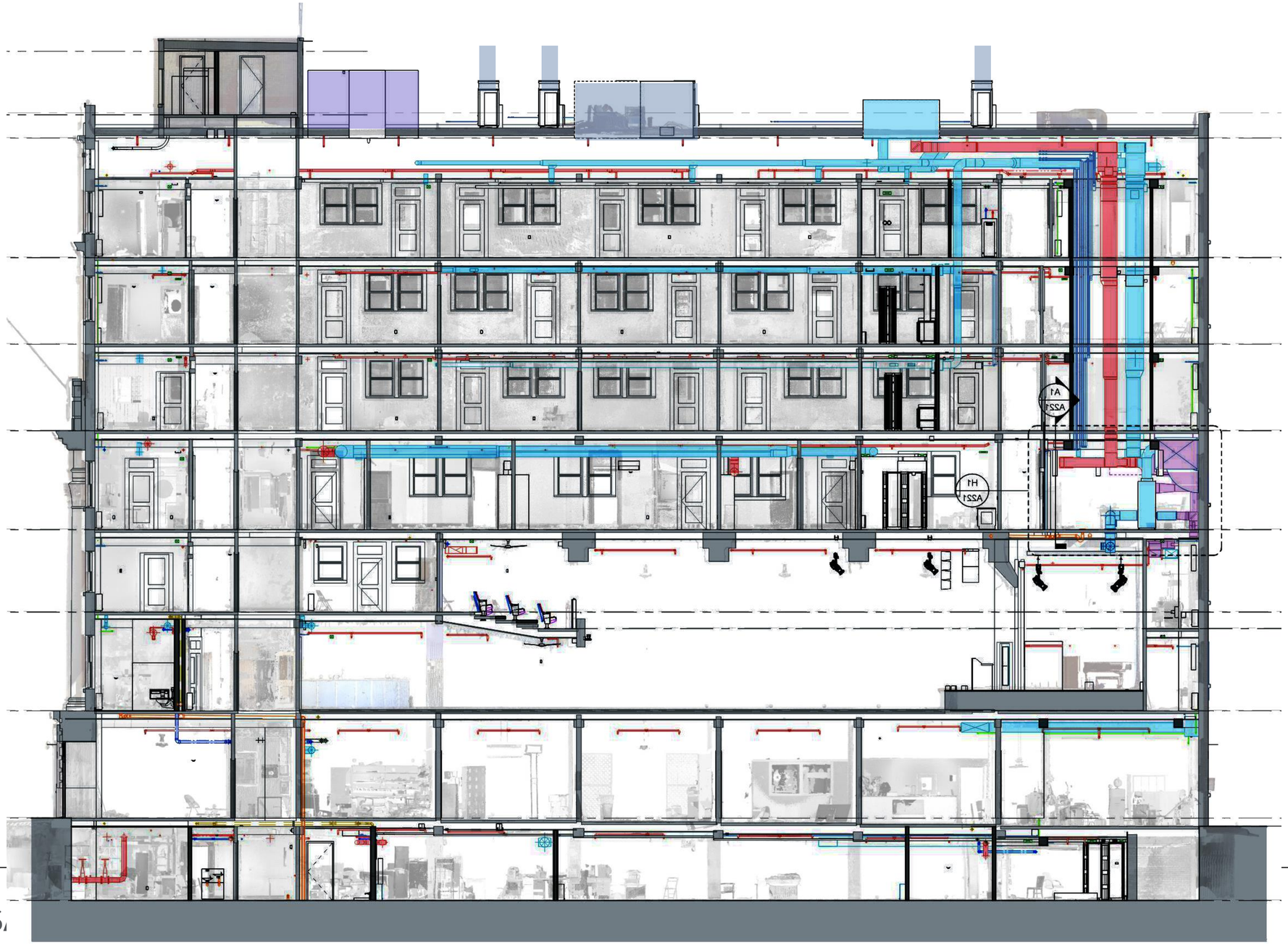


Level 2

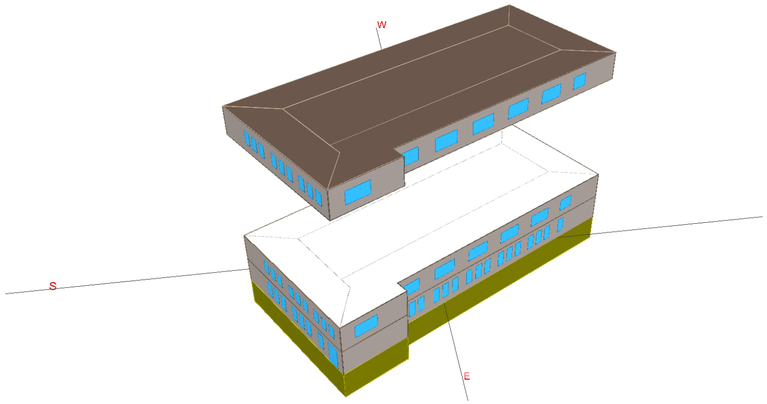


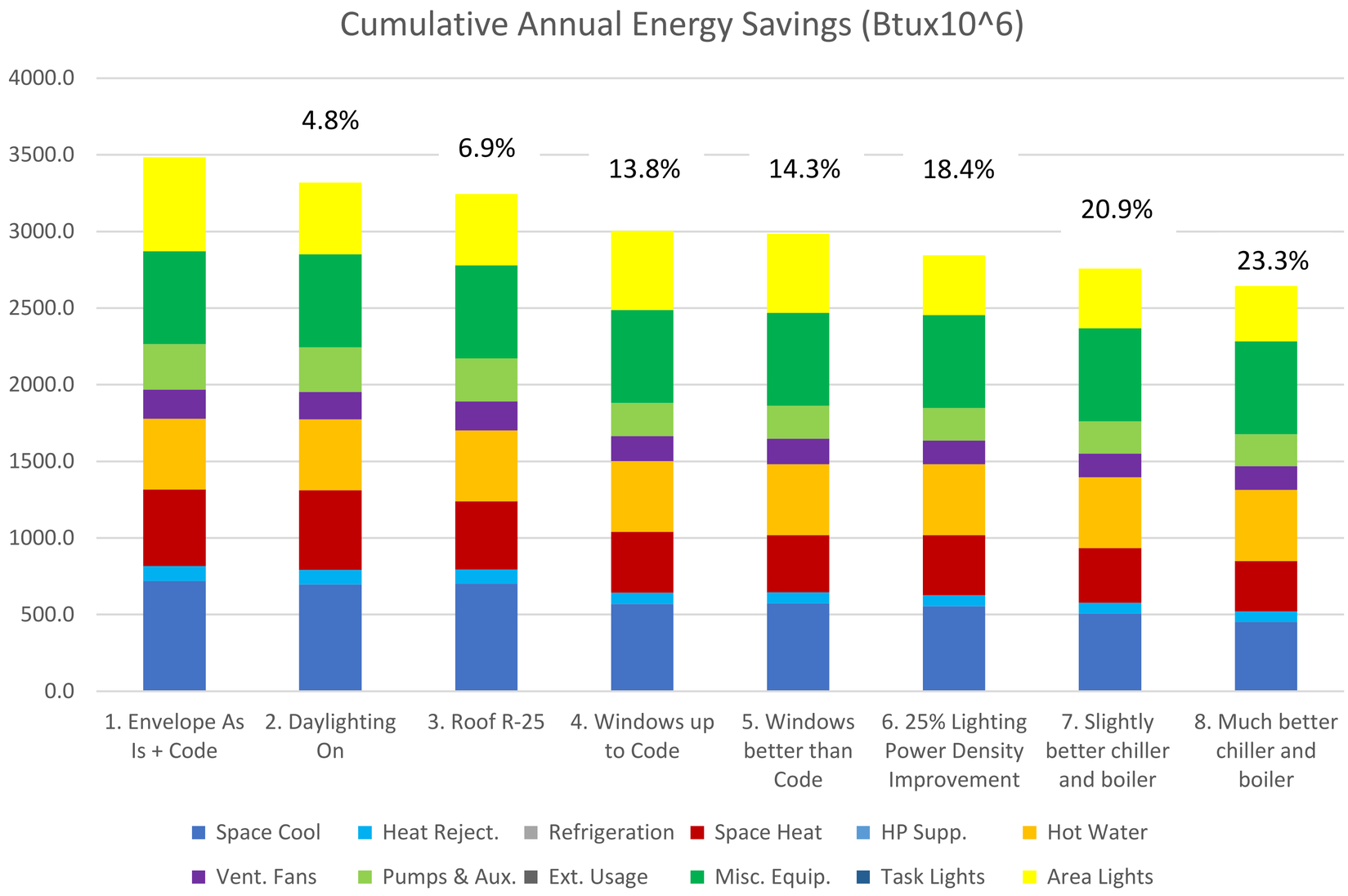
Level 3

case study - systems Integration



case study – energy consumption





case study
energy consumption

2.1 Energy Consumption Summary

The proposed model shows an overall energy consumption savings of **38.5%** over the baseline model, which demonstrates compliance with the project goals to meet a 30% reduction in energy savings over the ASHRAE 90.1-2019 baseline.

The model documented in this report shows that the baseline building has a pEUI of **106.5** kBtu/ft², and the proposed building has a pEUI of **65.4** kBtu/ft². Modelled energy consumption for the building is shown in the chart below.

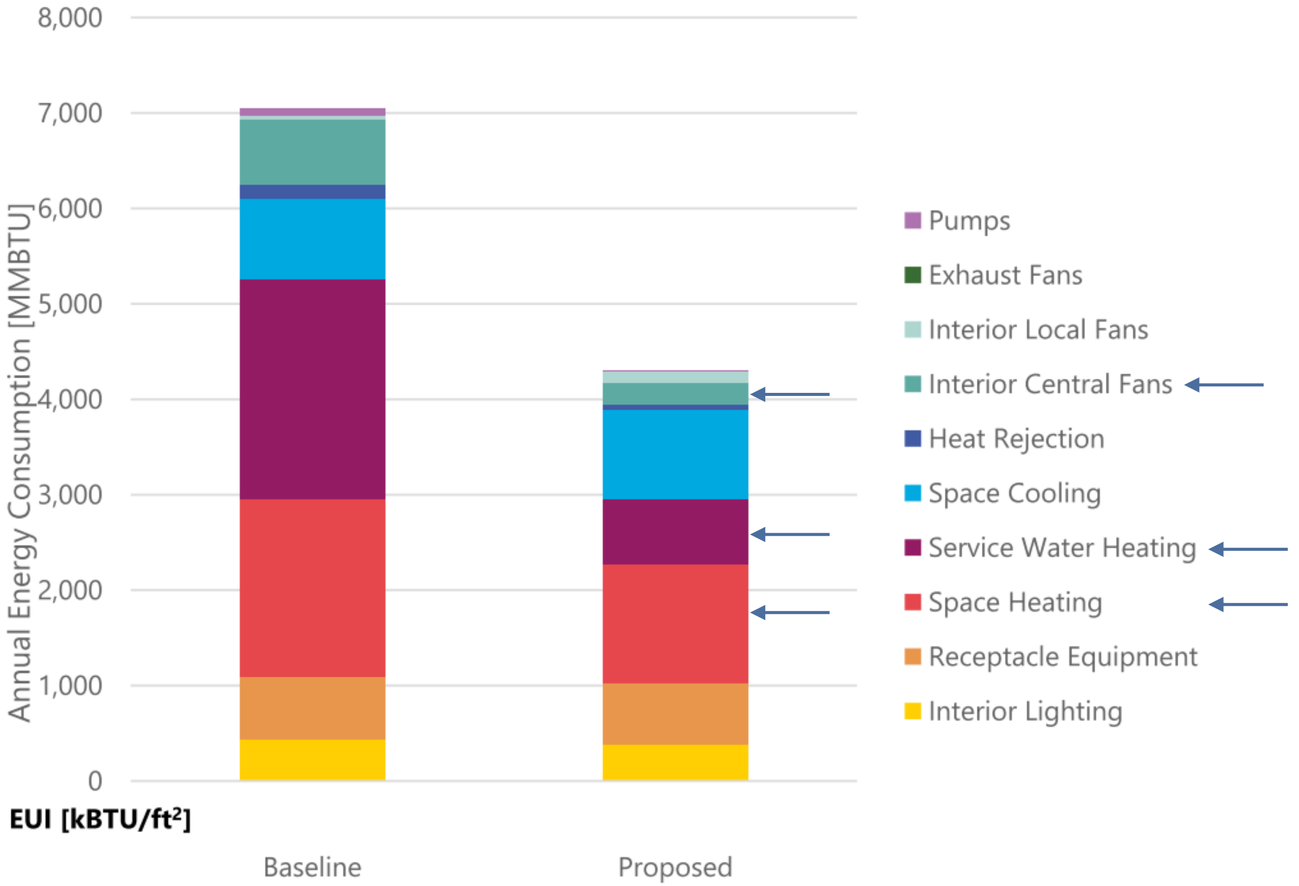
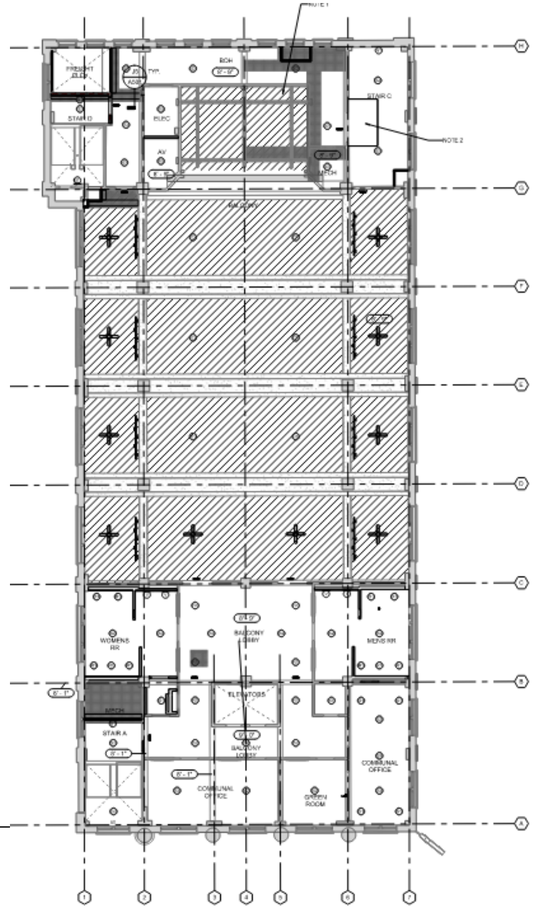
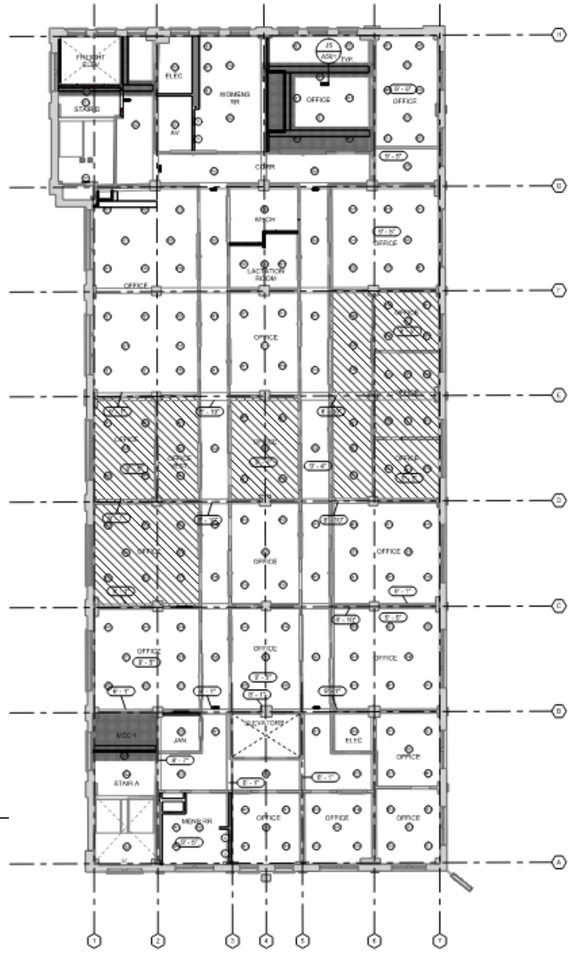


Figure 2—1: Annual Energy Usage

case study
energy consumption





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Helpful Resources

ROI: Designing for reduced embodied carbon | AIA

Embodied Carbon Code Overlays | NBI

Embodied Carbon Resources | NBI

Climate Change: Global Temperature | climate.gov

Federal Sustainability Plan | sustainability.gov

Bringing Embodied Carbon Upfront | WorldGBC

LEED v5: Catching up on Decarbonization, Equity, and Resilience | BuildingGreen

How LEED v4.1 addresses embodied carbon | USGBC

AIA 2030 | MEP 2040 | SE2050

Sustainable Facilities Tool | US GSA

Thank you for your time.