

In association with
SMMA



SKANSKA

East Longmeadow High School

Eco-Charrette

June 07, 2023



Agenda for Today's Eco-Charrette

» Intro and Project Overview	20 min
» Sustainability Overview	20 min
• MSBA and Energy Stretch Code Requirements	
• Sustainability Opportunities	
» Break	5 min
» Break-Out Sessions	40 min
• Sustainable Sites, Transportation and Water Efficiency	
• Energy Efficiency and Renewable Energy	
• Sustainable Materials, Indoor Environmental Quality	
» Wrap-Up	40 min
• Break out sessions' summaries	
• Priority Goals	
Total Time:	2 hours

Neighborhoods!

21st Century
Education!

Healthy
Environments!

Parking
and
Traffic!

\$\$\$

Community
Engagement!

Preservation!

Wetlands!

Sustainability!

Play!

Walking!

Eco-Charrette Goals

Community Engagement & Discussion

1. To familiarize and educate stakeholders on:
 - a. General sustainable design principles,
 - b. MSBA/State sustainable design requirements
 - c. LEED for Schools certification process
2. Identify current and potential sustainable design opportunities
3. Develop sustainable design goals that specifically align with the School District and the Town's goals and mission

Sustainability - Eco-Charrette



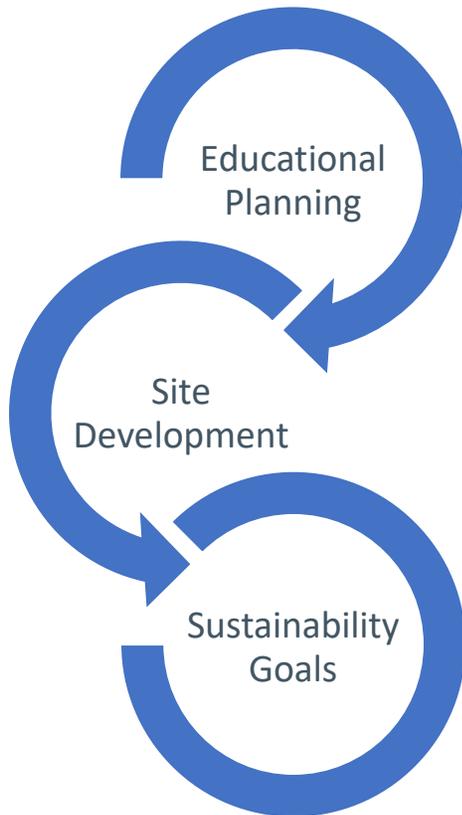
Eco-Charrette Discussion

How do you envision a climate resilient East Longmeadow?



Project Overview

Project Goals



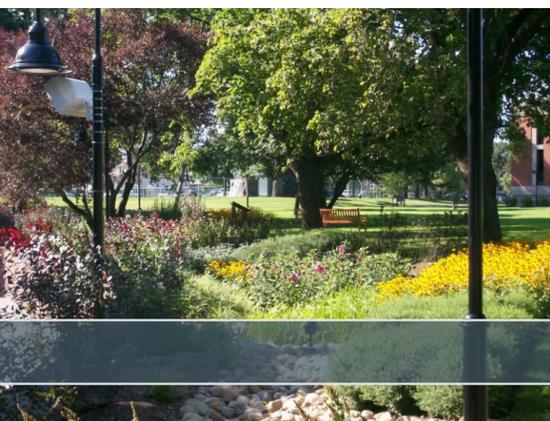
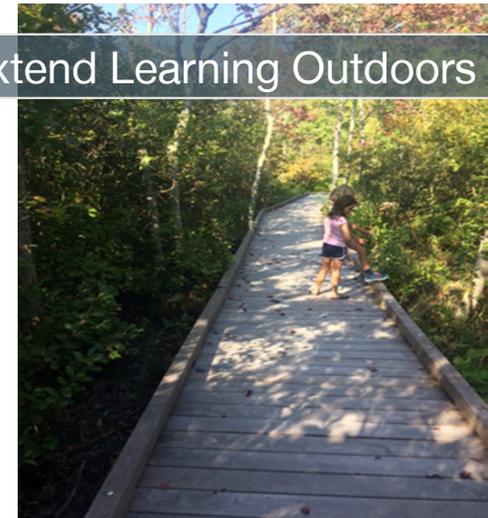
- Meet District Educational Needs
- Meet Town Open Space & Environmental Requirements
- Collaborate, Facilitate & Establish Town's Evolving Environmental Goals

Site Plan - *Proposed*

- » School as connection between recreation & nature
 - Move south towards woods
 - Buffer from Maple St.
 - Relate to game and rec fields
- » Oriented for optimal solar orientation
- » Improve parking, safety & accessibility
- » Manage stormwater on site
- » Improve fields and recreational experiences
- » (2) Outdoor learning spaces and an outdoor dining terrace
- » Improve waste management and emergency vehicle access



Site Sustainability



Project Overview - Floor Plans



First Floor Plan



Second Floor Plan

Building Area
~ 191,780 GSF

Estimated Enrollment
800 Students

All New Construction

**New Furniture, Fixtures
& Equipment**

**Incorporation of District
Offices, Town IT and
ELCAT**

**Connection to proposed
New Community Pool**

The Third Teacher

Building as Teacher

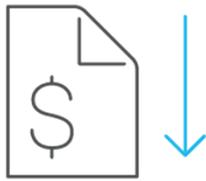
- » Environmental Awareness
- » Participatory
 - Recycling
 - Gardens
 - Connect to nature
- » Measurable/Quantifiable
- » Make Visible (expose what is hidden)
- » Connect to consumption
- » Habit forming





Sustainability Overview

Sustainability Goals: Unique Opportunities



*Reduce costs and
consumption (and Carbon)*



*Promote
environmental
literacy*



*Healthy school
environment*

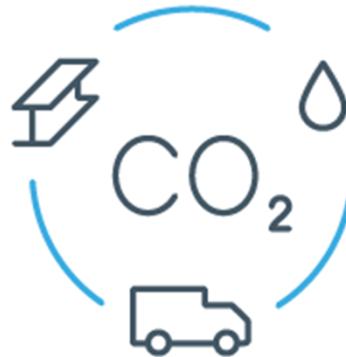
-
- Town's Climate Resiliency Plan
 - Massachusetts Energy Stretch Code
 - MSBA Sustainable Design Requirements
 - Health & Wellness Contributing to Whole Child
 - Incorporate into Curriculum
 - Collaborative Facilitation Process with Town's Constituents

Building a Resilient East Longmeadow HS



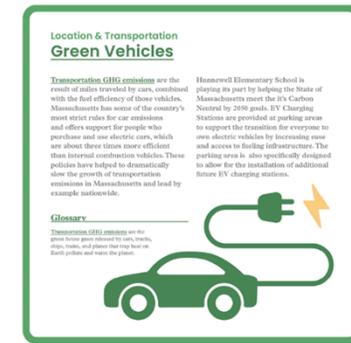
MSBA's Mandate

- LEEDv4
- 20% Energy and Water Performance
- Enhanced Commissioning



MA Carbon 2050

- 2023 MA Stretch Code
- Operational Carbon Reduction
- Transportation Carbon Reduction
- MEPA Permitting



Environmental Literacy

- Outdoor Learning
- Wellness
- Healthy Materials
- Embodied Carbon

MSBA Sustainability Standards

Basic Reimbursement Requirements

- LEED certification (Certified Level)**
- Water use 20% better than code
- MEP & Building Envelope Commissioning

Additional 2% Reimbursement for projects

- Requires to higher performance beyond MA energy Code
- Project will seek all applicable Utility Incentives

**Most Projects are able to achieve LEED Silver Certification



MSBA's Mandate

- LEEDv4
- 20% Energy and Water Performance
- Enhanced Commissioning

Massachusetts Energy Stretch Code

- Airtight and Well Insulated Enclosure:
- Thermal Bridging Derating
- Whole Building Air Infiltration Testing
- Electrification of Heating systems
- HVAC:
 - High Efficiency Heat Pump
 - High Efficiency Heat Recovery
- PV and EV Readiness*

* LEEDv4: requires 2% EV installed, 5% for preferred Green Vehicles (carpooling, hybrids)

LEED Scorecard



LEED v4 for BD+C: Schools
Project Checklist

DRAFT

Project Name: **East Longmeadow High School**
Date: 7-Jun-23

THE CREDITS INDICATED BY "YES" TO BE INCLUDED IN THE PSR BUDGET

LEED Silver Certification Goal

Embodied Carbon Analysis

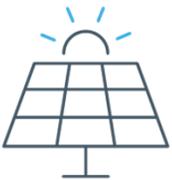
Y	?	N				
1			Cred	Integrative Process		1
1 5 # Location and Transportation Preliminary 15						
	15		Cred	LEED for Neighborhood Development Location		15
	1		Cred	Sensitive Land Protection		1
	1	1	Cred	High Priority Site		2
	1	4	Cred	Surrounding Density and Diverse Uses		5
	1	4	Cred	Access to Quality Transit		4
	1		Cred	Bicycle Facilities		1
	1		Cred	Reduced Parking Footprint		1
	1		Cred	Green Vehicles		1
5 7 1 Sustainable Sites Preliminary 12						
Y			Prereq	Construction Activity Pollution Prevention	Required	
Y			Prereq	Environmental Site Assessment	Required	
	1		Cred	Site Assessment		1
	2		Cred	Site Development - Protect or Restore Habitat		2
	1		Cred	Open Space		1
	2	1	Cred	Rainwater Management		3
	1	1	Cred	Heat Island Reduction		2
	1		Cred	Light Pollution Reduction		1
	1		Cred	Site Master Plan		1
	1		Cred	Joint Use of Facilities		1
5 1 6 Water Efficiency Preliminary 12						
Y			Prereq	Outdoor Water Use Reduction	Required	
Y			Prereq	Indoor Water Use Reduction	Required	
Y			Prereq	Building-Level Water Metering	Required	
	1	1	Cred	Outdoor Water Use Reduction		2
	3	1	Cred	Indoor Water Use Reduction		7
	1	2	Cred	Cooling Tower Water Use		2
	1		Cred	Water Metering		1
21 7 3 Energy and Atmosphere Preliminary 31						
Y			Prereq	Fundamental Commissioning and Verification	Required	
Y			Prereq	Minimum Energy Performance	Required	
Y			Prereq	Building-Level Energy Metering	Required	
Y			Prereq	Fundamental Refrigerant Management	Required	
	8		Cred	Enhanced Commissioning		6
	14	2	Cred	Optimize Energy Performance		16
	1		Cred	Advanced Energy Metering		1
	1	1	Cred	Demand Response		2
	2	1	Cred	Renewable Energy Production		3
	1		Cred	Enhanced Refrigerant Management		1
	2		Cred	Green Power and Carbon Offsets		2
6 2 3 Materials and Resources Preliminary 13						
Y			Prereq	Storage and Collection of Recyclables	Required	
Y			Prereq	Construction and Demolition Waste Management Planning	Required	
	1	1	Cred	Building Life-Cycle Impact Reduction		5
	1		Cred	Building Product Disclosure and Optimization - Environmental Product		2
	1	1	Cred	Building Product Disclosure and Optimization - Sourcing of Raw Mate		2
	1		Cred	Building Product Disclosure and Optimization - Material Ingredients		2
	2		Cred	Construction and Demolition Waste Management		2
8 6 2 Indoor Environmental Quality Preliminary 16						
Y			Prereq	Minimum Indoor Air Quality Performance	Required	
Y			Prereq	Environmental Tobacco Smoke Control	Required	
Y			Prereq	Minimum Acoustic Performance	Required	
	2		Cred	Enhanced Indoor Air Quality Strategies		2
	1	2	Cred	Low-Emitting Materials		3
	1		Cred	Construction Indoor Air Quality Management Plan		1
	1	1	Cred	Indoor Air Quality Assessment		2
	1		Cred	Thermal Comfort		1
	1	1	Cred	Interior Lighting		2
	1	2	Cred	Daylight		3
	1		Cred	Quality Views		1
	1		Cred	Acoustic Performance		1
6 0 0 Innovation Preliminary 6						
	5		Cred	Innovation: Green Ed., Low Mass, Long, Except, RPD, & EPO, pilot ...		5
	1		Cred	LEED Accredited Professional		1
1 2 1 Regional Priority Preliminary 4						
	1		Cred	Regional Priority: Building LCA - MR credit (Tally)		1
	1		Cred	Regional Priority: Optimize Energy Performance (8 points min)		1
	1		Cred	Regional Priority: Renewable Energy Production (2 points min)		1
	1		Cred	Regional Priority: Outdoor Water Use Reduction (2 points min)		1
54 # 40 TOTALS Possible Points: 110						
Certified: 40 to 49 points, Silver: 50 to 59 points, Gold: 60 to 79 points, Platinum: 80 to 110						
<i>Note: Renewable Energy and Green Power Credits - project PV/renewable procurement only qualifies if school district owns the RECs through owning system or through PPA agreement/RE purchase agreement.</i>						

Eco-Charrette Discussion

What are the main sustainable design challenges associated with a resilient East Longmeadow High School project?

Sustainability Opportunities

Net Zero Energy Ready



Ultra-Low Water Use



Sustainable Site



IEQ Health & Wellness



Sustainable & Low Carbon Materials



Post-Occupancy Evaluations



North Middlesex Regional HS PV



Rainwater Harvesting System, BCBS



Outdoor Learning/ Classroom



Abundant Daylight Ayer-Shirley HS



Material Re-use Wellesley HS



Environmental Literacy Wellesley HS

Sustainability – Eco-Charrette



All-Electric Heating and Cooling
Net Zero Energy Ready
Solar PV [Readiness]
MEP and Building Enclosure Commissioning
Plug Load Reduction & Management
Passive House Strategies
Air Infiltration Reduction Testing

Outdoor Learning Classrooms
EV Charging Stations
Native Landscaping plants
Heat Island Reduction
Composting Ready (Kitchen)
Students Community Gardens

Low-Flow Fixtures
Drought resistant plantings
Drip irrigation or no irrigation
Water Management and Metering
Stormwater Retention & Reduction



Sustainability – Eco-Charrette



Materials Re-use
Embodied Carbon Analysis
Recycled Content
FSC Wood
Environmental Product Declaration (EPD)
Health Product Declaration (HPD)



Thermal Comfort
Abundant Daylight
Low Emitting Materials
Stair Accessibility/Fitness
Biophilia
Circadian Rhythm Lighting Strategies



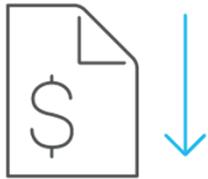
User Behavior
Plug Load Management

- Measured Energy Use
- Measured Daylight
- Measured Thermal Comfort

Green Educational Curriculum



Environmental Literacy: Students' Vision



*Reduce costs and
consumption*



*Promote
environmental
literacy*



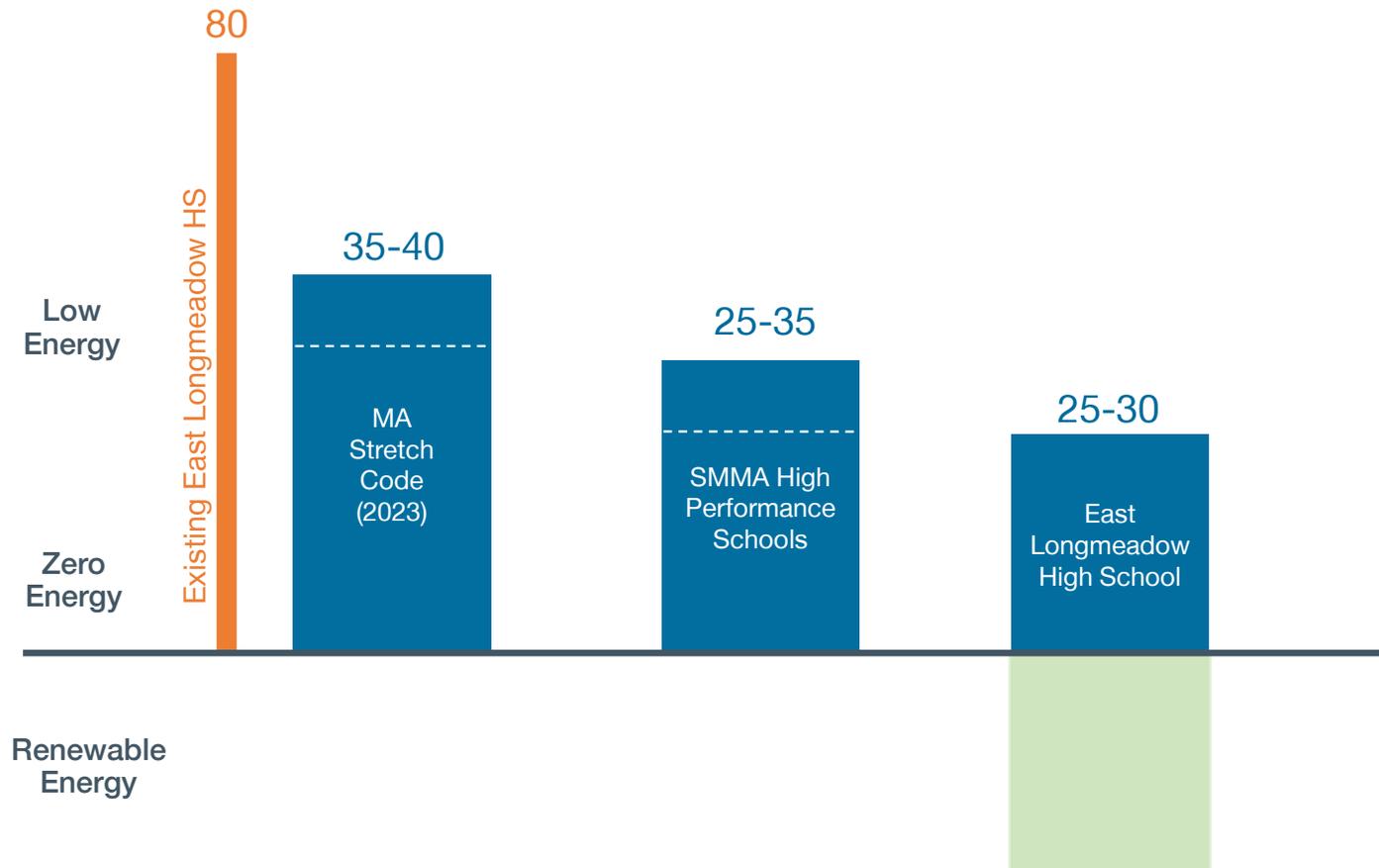
*Healthy school
environment*

-
- Student perspective
 - Educated and committed use
 - Curriculum opportunities
 - Operations and behavioral management

Eco-Charrette Discussion

What sustainability goals or opportunities would you like to see accomplished for this project?

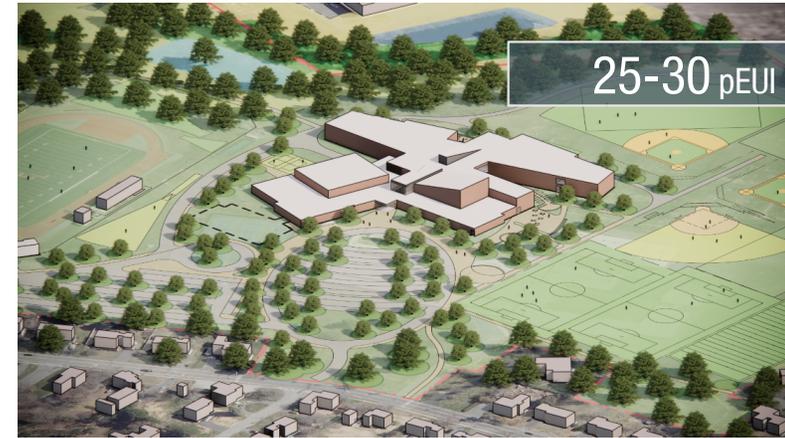
Energy Use Intensity Goal: 25-30 kBtu/SF/yr. or better



Energy Efficiency Goal

Energy Use Intensity [EUI] as a metric

- Energy consumed per square foot of a building's area – kBtu/SF/Yr.
- Predicted Energy Use Intensity (pEUI)



New East Longmeadow HS



Existing East Longmeadow HS



Wakefield Memorial HS



Waltham HS



Somerville HS

High-Performance Enclosure and Systems

Airtight and Well Insulated Enclosure

All Electric Heating and Cooling System (ASHP/VRF/GSHP)

Passive House Strategies

Life Cycle Cost Factors

Air infiltration Reduction and Testing

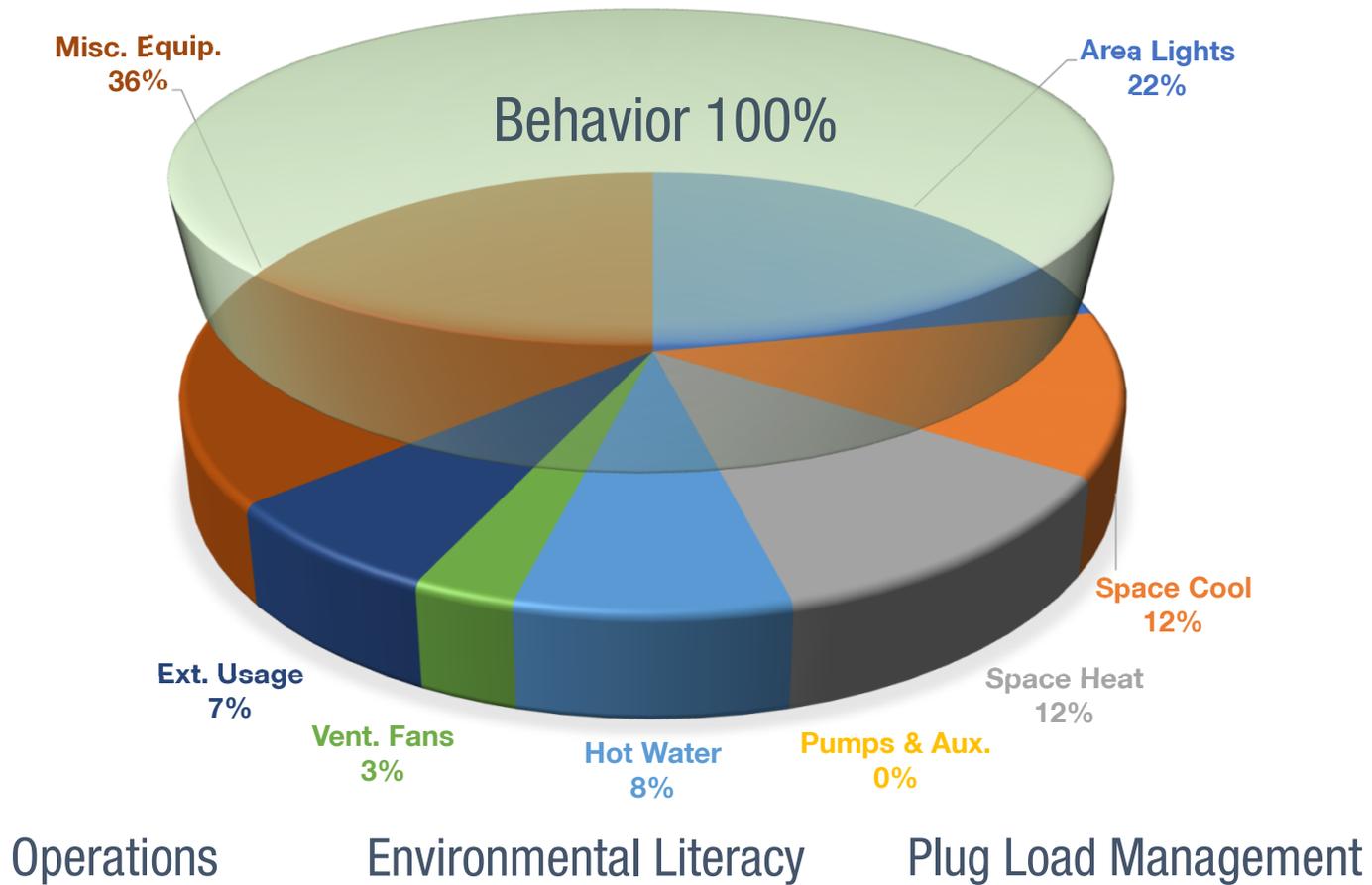
Plug Load Controls

Commissioning Enclosure & Energy Systems

25-30

**kBtu/SF/YR.
pEUI**

Achieving Operational Goals



Pathway to Future Carbon Neutrality for ELHS

Renewable Energy Resources

- Optimized on site PV ready roof and parking canopies
- School committee has elected to include a Solar PV systems
- Consideration for energy storage or e-storage ready
- Early PV ready assessment



North Middlesex Regional High School

Embodied Carbon Analysis

Life Cycle Assessment

Environmental impacts related to:

- Global Warming Potential (Embodied Carbon)
- Ozone Depletion
- Eutrophication
- Acidification
- Smog Formation

Where have we used it:

- K-12 Schools
- All LEED projects
- Corporate (volunteer reporting for Boston)

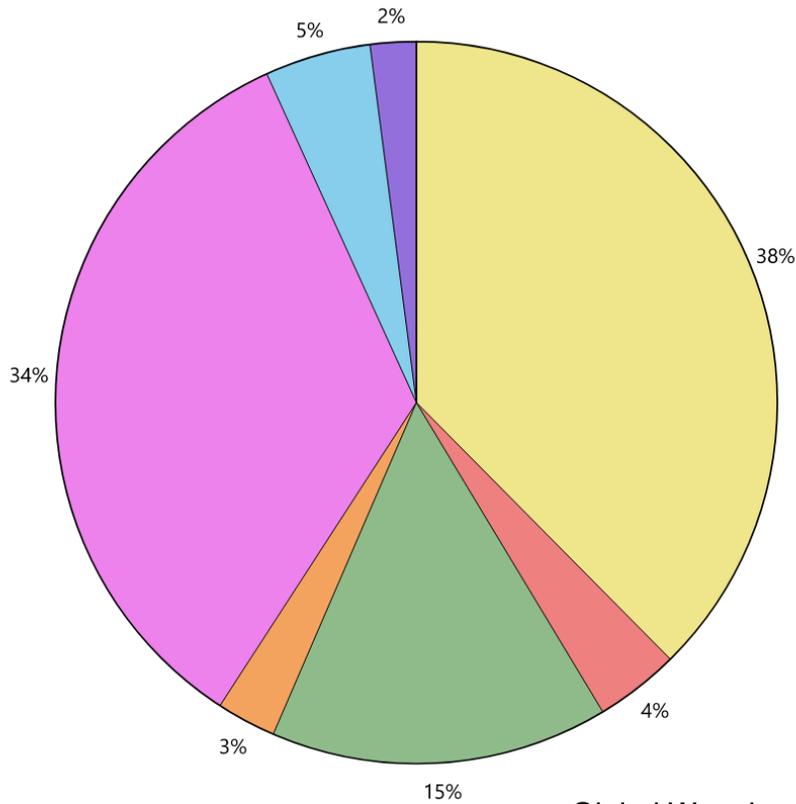


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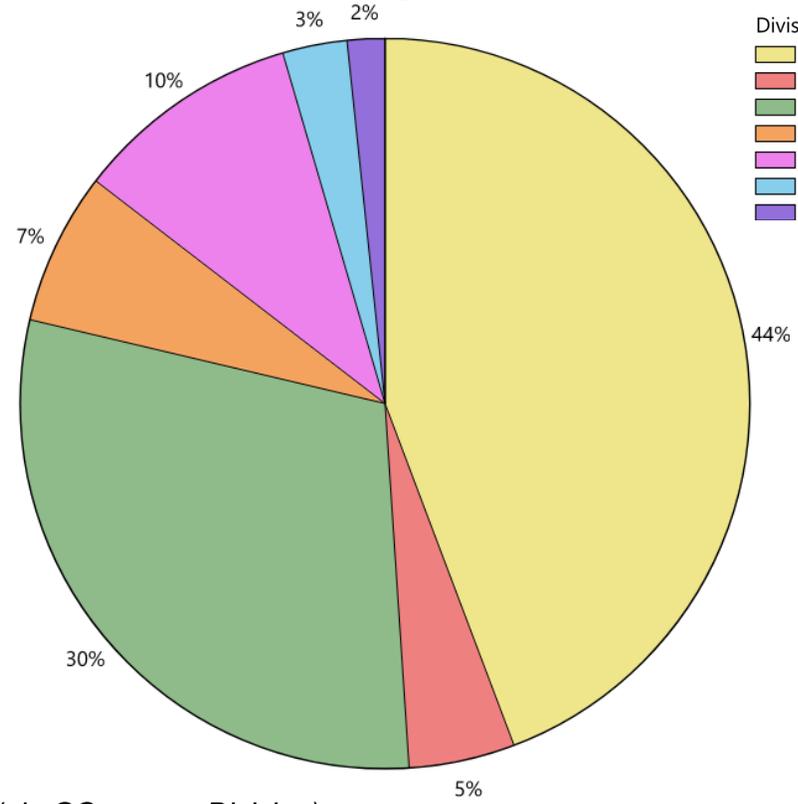
tally[®]

Embodied Carbon: K-12 Schools Case Studies

Somerville High School



Waltham High School



Legend

Divisions

- 03 - Concrete
- 04 - Masonry
- 05 - Metals
- 06 - Wood/Plastics/Composites
- 07 - Thermal and Moisture Protection
- 08 - Openings and Glazing
- 09 - Finishes

Global Warming Potential (% kgCO₂eq per Division)



Breakout Sessions

Sustainability – Eco-Charrette

Break Out Sessions – (2) 20 minutes

1. Sustainable Sites & Transportation, Water Efficiency
2. Energy Efficiency and Renewable Energy
3. Sustainable Materials, Indoor Environmental Quality



Break Out Sessions - Directives



For each group identify:

Note taker and timekeeper

Speaker

Priorities



Rules:

Introduction

Allow everyone to talk

Keep an open mind

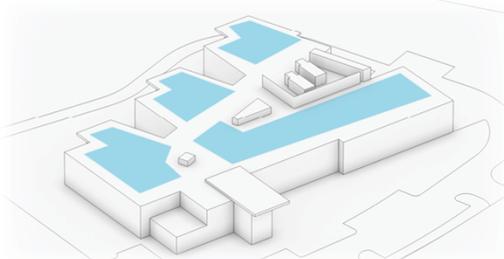
Out of scope items in the “Bike Rack”



Thank you

NZE/NZER Schools: Carbon Metrics

HUNNEWELL ES
76,000 sf

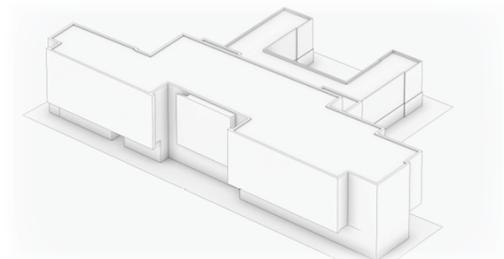


NZER **LEED Silver**

Carbon Reduction	42.8 %
Incremental Costs	0.9 %
Payback	7.1 yrs
EUI with PV %	8.7 (60% NZE)

EUI (kBtu/sf)	26.5
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LAWRENCE OLIVER SCHOOL
160,000 sf

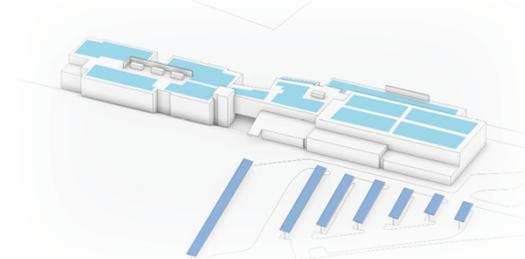


LEED Silver

Carbon Reduction	48.3 % (DD)
Incremental Costs	1.4 % (DD)
Payback	4.8 yrs (DD)
Solar Photovoltaics	PV Ready

EUI (kBtu/sf)	38.0 pEUI (DD)
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CONCORD MS
140,000 sf



NZER

Carbon Reduction	42.4 %
Incremental Costs	1.2 %
Payback	7.3 yrs
Solar Photovoltaics	100% PV

EUI (kBtu/sf)	25.5
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Sustainability – Eco-Charrette

Predicted EUI

23.9 kBtu/sf

Wall R-Value = **34**

Roof R-Value = **60**

Windows/Curtain wall R-Value= **5**

Window/Wall Ratio = **23%**

Air Infiltration Goal = **0.15 cfm/sf@ 75 PA**

SMMA

JWA
JONES WHITSETT
ARCHITECTS

SKANSKA



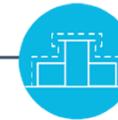
Energy Recovery Units
All Electric VRF System



Occupants-Plug Load Controls



PV Panels



Super Insulated Envelope



Triple Pane Fiberglass Windows

