Medford High School

Sustainability and MEP Systems Advisory Team Meeting

Meeting #2

01/15/2026



smma

LeftField

THE RIGHT CHOICE IN PROJECT MANAGEMENT

MEDFORD · FOUNDED 1630 · INCORPORATED A CITY 1892

Meeting #2 Agenda

- Welcome & Introductions
- Overview of the Advisory Team Process and Milestones
- Goals & Aspirations – Takeaways from Meeting #1
  - LEEDv5 Preliminary Overview
  - Climate Resiliency
  - Embodied Carbon
  - Healthfulness and Environmental Literacy
  - Life Cycle Cost Analysis Overview
- Next Steps

Welcome & Introductions

Sustainability and MEP Systems / Team Intro

SMMA



Matt Rice
Principal-in-Charge



Helen Fantini
Project Manager



Soala Ajienka
Architectural Designer



Andrew Barros
Electrical Engineer



Emily Ehlers
Mechanical Engineer

SMMA



Martine Dion
Sustainable Design Director



Brenda Lam
Sustainable Design Team Member

Transsolar



Tommaso Bitossi
Sustainable Design Consultant

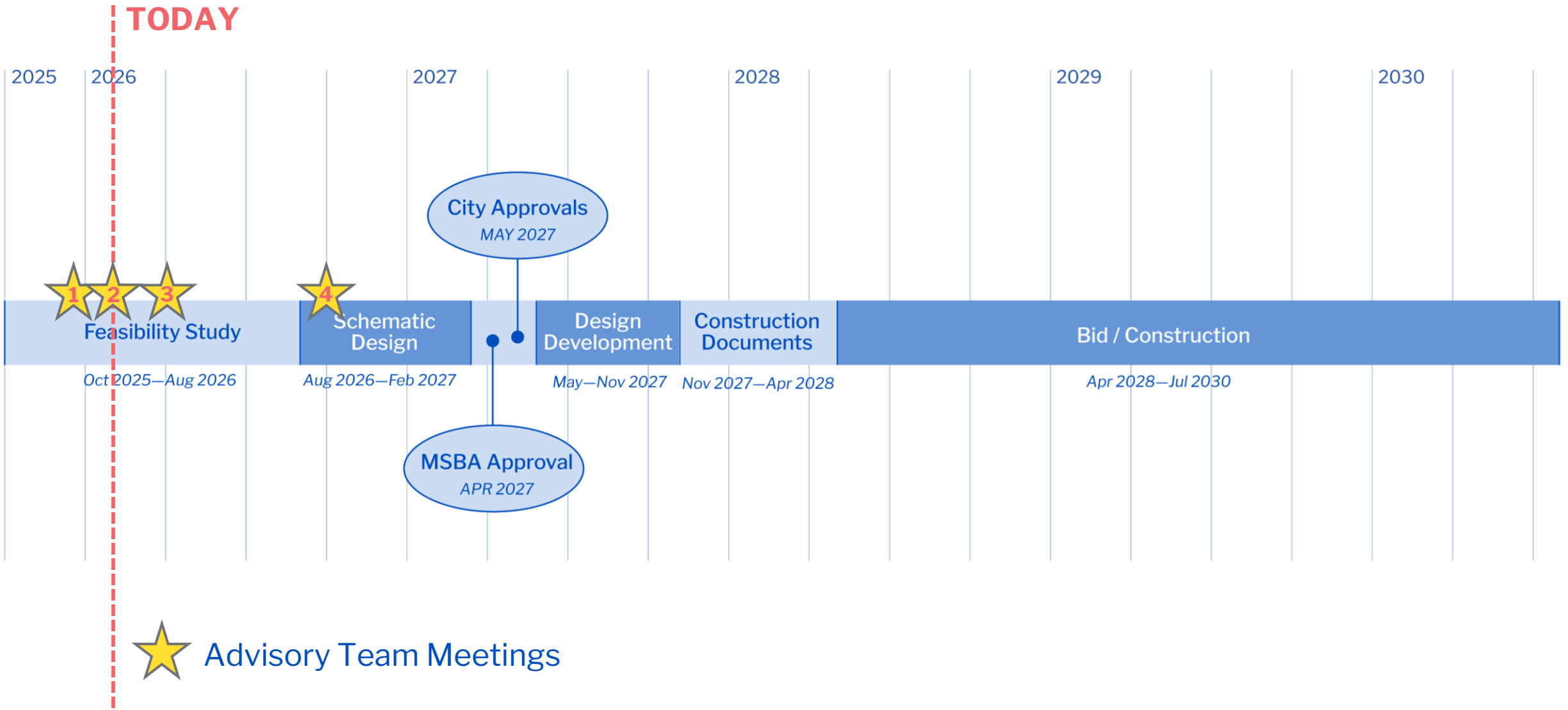
AKAL



James Job
Plumbing and Fire Protection Engineer

1. Libby Brown
2. Suni Dillard
3. Austin Ditz
4. Audrey Feitor
5. Jenny Graham
6. Chris Hogan
7. Elisabeth Krautscheid
8. Ken Lord
9. Sarah Michelman
10. Nicole Morell
11. Jessica Parks
12. Brenda Pike
13. Luke Preisner
14. Chris Richard
15. Paul Ruseau
16. Nathan Scott

Project Timeline

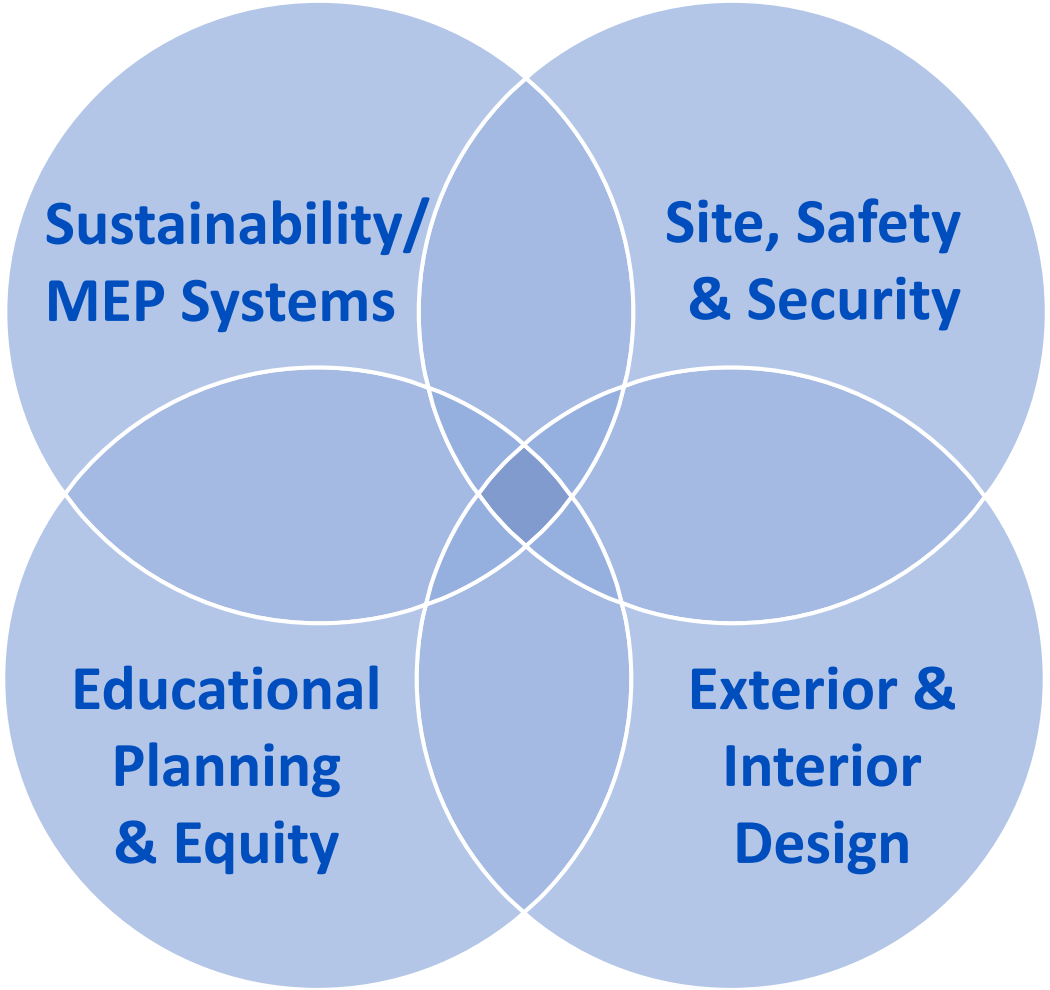


Community Stakeholder Engagement / Advisory Teams

Advisory teams are a method of collecting broad community input on key priorities and desired outcomes for the project.

***Who* : Educators, Students, City Departments, Boards & Commissions, Expert Community Members**

Reviews preferred MEP systems, sustainable design features and components, healthy materials; site design and landscape features for environmentally friendly design.

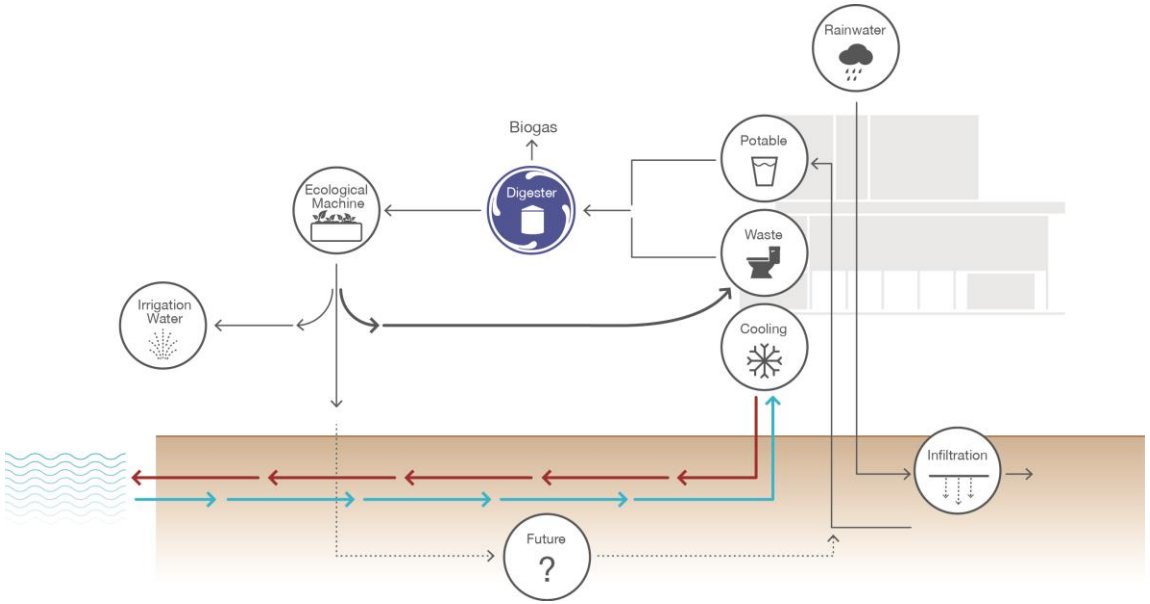


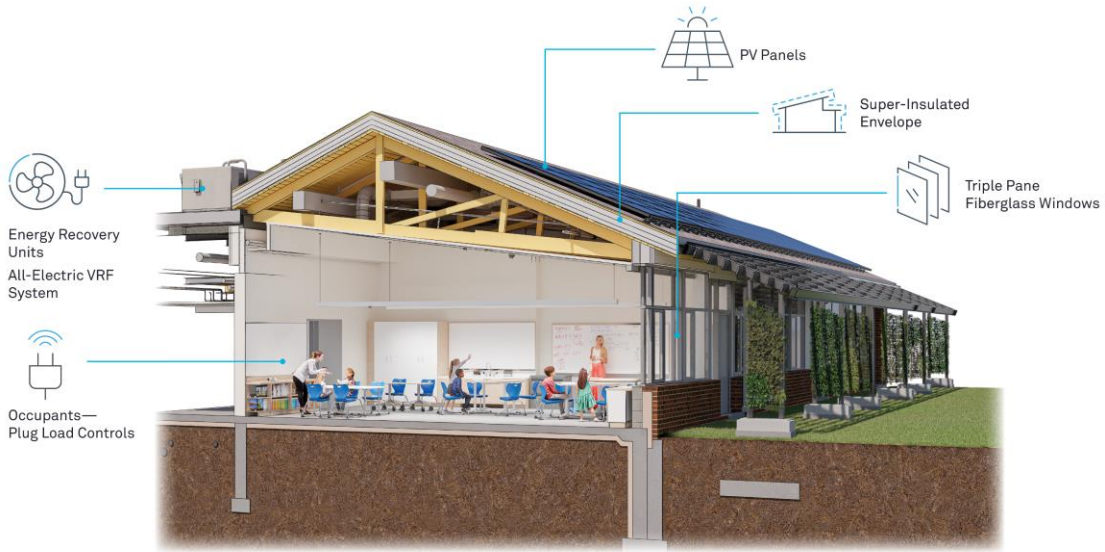
Reviews development of the site design for traffic, circulation, safety and security. Includes conversations about parking, driveways and circulation, fields, and offsite improvements and coordination with City Departments.

Reviews overall goals from educational planning perspectives, educational programming meetings and visioning sessions.

Reviews exterior design concepts including composition of form and exterior material selections. Review of the products and materials selected for interior finishes such as flooring, paint colors, wall finishes and ceilings.

Objective: Reviews preferred MEP systems, sustainable design features and components, healthy materials; site design and landscape features for environmentally friendly design.





Topics & Priorities
from Meeting #1

Givens

1. Massachusetts Specialized Energy Stretch Code
2. MSBA:
   - LEEDv5 Silver Certification
   - Commissioning
   - Healthy Materials credits
3. Medford Solar Policy
4. Medford Sustainability Guidelines

Topics and Strategies

1. **LEEDv5 Overview** [10 min]
2. **Climate Resiliency** [20 min]
   - Energy Efficiency
   - MEP Systems
   - Operations & Systems Maintenance
   - Passive Design Strategies
   - Solar PV & Energy Storage
   - EV Charging
3. **Embodied Carbon** [10 min]
4. **Healthfulness, Environmental Quality & Literacy** [10 min]
   - Enhanced Ventilation
   - Daylight Optimization
   - Access to Nature, Outdoor classrooms
5. **LCCA – Cost Effectiveness** [10 min]

LEED Preliminary Overview



Sustainability and MEP Systems – LEEDv5 Silver Certification

- Integrative Process, Planning, and Assessments
- Location and Transportation
- Sustainable Sites
- Water Efficiency
- Energy and Atmosphere
- Materials and Resources
- Indoor Environmental Quality
- Project Priorities



Sustainability and MEP Systems – LEEDv5 Silver Certification

LEED v5 for Building Design and Construction: New Construction

Project scorecard

Yes	Maybe	No		Total Possible Points
			Integrative Process, Planning and Assessments (IP)	**1**
☑	☐	☐	IPp1 Climate Resilience Assessment	Required
☑	☐	☐	IPp2 Human Impact Assessment	Required
☑	☐	☐	IPp3 Carbon Assessment	Required
1	0	0	IPc1 Integrative Design Process	1
			Location and Transportation (LT)	**15**
1	0	0	LTc1 Sensitive Land Protection	1
1	0	1	LTc2 Equitable Development	2
1	1	4	LTc3 Compact and Connected Development	6
2	1	1	LTc4 Transportation Demand Management	4
2	0	0	LTc5 Electric Vehicles	2
			Sustainable Sites (SS)	**11**
☑	☐	☐	SSp1 Minimize Site Disturbance	Required
1	1	0	SSc1 Biodiverse Habitat	2
1	0	0	SSc2 Accessible Outdoor Space	1
3	0	0	SSc3 Rainwater Management	3
2	0	0	SSc4 Enhanced Resilient Site Design	2
2	0	0	SSc5 Heat Island Reduction	2
0	1	0	SSc6 Light Pollution Reduction	1
			Water Efficiency (WE)	**9**
☑	☐	☐	WEp1 Water Metering and Reporting	Required
☑	☐	☐	WEp2 Minimum Water Efficiency	Required
1	0	0	WEc1 Water Metering and Leak Detection	1
4	1	3	WEc2 Enhanced Water Efficiency	8
			Energy and Atmosphere (EA)	**33**
☑	☐	☐	EAp1 Operational Carbon Projection and Decarbonization Plan	Required
☑	☐	☐	EAp2 Minimum Energy Efficiency	Required
☑	☐	☐	EAp3 Fundamental Commissioning	Required
☑	☐	☐	EAp4 Energy Metering and Reporting	Required
☑	☐	☐	EAp5 Fundamental Refrigerant Management	Required
1	2	2	EAc1 Electrification	5
1	1	3	EAc2 Reduce Peak Thermal Loads	5
5	2	3	EAc3 Enhanced Energy Efficiency	10
3	1	1	EAc4 Renewable Energy	5
4	0	0	EAc5 Enhanced Commissioning	4
1	0	1	EAc6 Grid Interactive	2
0	1	1	EAc7 Enhanced Refrigerant Management	2
			Materials and Resources (MR)	**18**
☑	☐	☐	MRp1 Planning for Zero Waste Operations	Required
☑	☐	☐	MRp2 Quantify and Assess Embodied Carbon	Required
1	1	1	MRc1 Building and Materials Reuse	3
2	1	3	MRc2 Reduce Embodied Carbon	6
1	1	0	MRc3 Low-Emitting Materials	2
2	1	2	MRc4 Building Product Selection and Procurement	5
2	0	0	MRc5 Construction and Demolition Waste Diversion	2
			Indoor Environmental Quality (EQ)	**13**
☑	☐	☐	EQp1 Construction Management	Required
☑	☐	☐	EQp2 Fundamental Air Quality	Required
☑	☐	☐	EQp3 No Smoking or Vehicle Idling	Required
1	0	0	EQc1 Enhanced Air Quality	1
2	1	4	EQc2 Occupant Experience	7
1	0	0	EQc3 Accessibility and Inclusion	1
0	1	1	EQc4 Resilient Spaces	2
1	0	1	EQc5 Air Quality Testing and Monitoring	2
			Project Priorities (PR)	**10**
			PRc1 Project Priorities	9
1	0	0	Project Priority 1: *PRINc4 Ingrating Energy Modeling in the Design Process*	
1	0	0	Project Priority 2: *PRINc2 Joint Use of Facilities*	
1	0	0	Project Priority 3: *MRpc181 Multi-Attribute Structure, Enclosure, Hardscape*	
1	0	0	Project Priority 4: *MPRpc180 Triple Bottom Line-Informed Design*	
1	0	0	Project Priority 5: *MRpc183 Design for Circularity*	
0	0	0	Project Priority 6:	
0	0	0	Project Priority 7:	
0	0	0	Project Priority 8:	
0	0	0	Project Priority 9:	
1	0	0	PRc2 LEED AP	1
56	**18**	**32**	**Total**	**110**

Silver 50-59 | Gold 60-79 | Platinum 80+ (zero operational carbon, full electrification, complete WBLCA)

Sustainability and MEP Systems – LEEDv5 Silver Certification

LEEDv5 Overview

- Project registration during Design Development phase.
- Project required to LEEDv5 Silver Certified - MSBA

LEEDv5	LEED Silver (MSBA Required) [50 points minimum]	LEED Gold [60 points minimum]
Integrated Process, Planning and Assessments	1	1
Location & Transportation	7	9
Sustainable Sites	9	11
Water Efficiency	5	6
Energy & Atmosphere	15	22
Materials & Resources	8	12
Indoor Environmental Quality	5	7
Project Priorities	6	9
TOTAL	**56**	**74**

Aspiration to Gold/Platinum Certification?

Climate Resiliency

Energy Efficiency
MEP Systems
Operations & Systems Maintenance
Passive Design Strategies
Solar PV & Energy Storage
EV Charging

Sustainable Sites

Stormwater Management Optimization

Urban Heat Island Reduction

- Light colored roof & paving
- Green vegetated roofs, Trees for shading

Transportation Demand Management

- Bicycle Storage and maintenance
- Green vehicles: EV Charging Stations (10% installed)

Accessible Outdoor Space

- Optimization and access to green recreational areas.
- Outdoor classrooms, garden, etc.

Biodiverse Habitat

Water Efficiency

Outdoor Water Reduction

- Low/No Irrigation
- Native Plants

Indoor Water Reduction

- 20% Min. Reduction [MSBA]
- 30-40% Reduction Goal [LEEDv5 Silver]

Water Sub-Metering

Water Leak Detection

Energy and Atmosphere

40% > ASHRAE 90.1-2019/2022
- MSBA required threshold (# points)
- LEEDv5 credit criteria is Source Energy Based
- Supported through the MA Specialized Stretch Code
- Siting/Orientation and Passive Strategies

Electrification

Decarbonization Planning [pre-requisite]

Advanced Energy Metering

Grid Interactive
- Demand Response Readiness

Enhanced Ozone-Friendly Refrigerants

Enhanced Commissioning (Cx):
- MEP, Bldg. Enclosure Cx and ongoing Cx [MSBA required]

Renewable Energy
- Installed (1-5 pts) or procured (1 pt)

Sustainability and MEP Systems – Climate Resiliency

Predicted EUI Goal

25-35

kBtu/SF/Yr. [Goal]

Realistic impact of vocational trade programs consideration



Passive Strategies



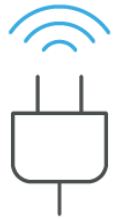
Super-insulated Enclosure



Triple Glazing

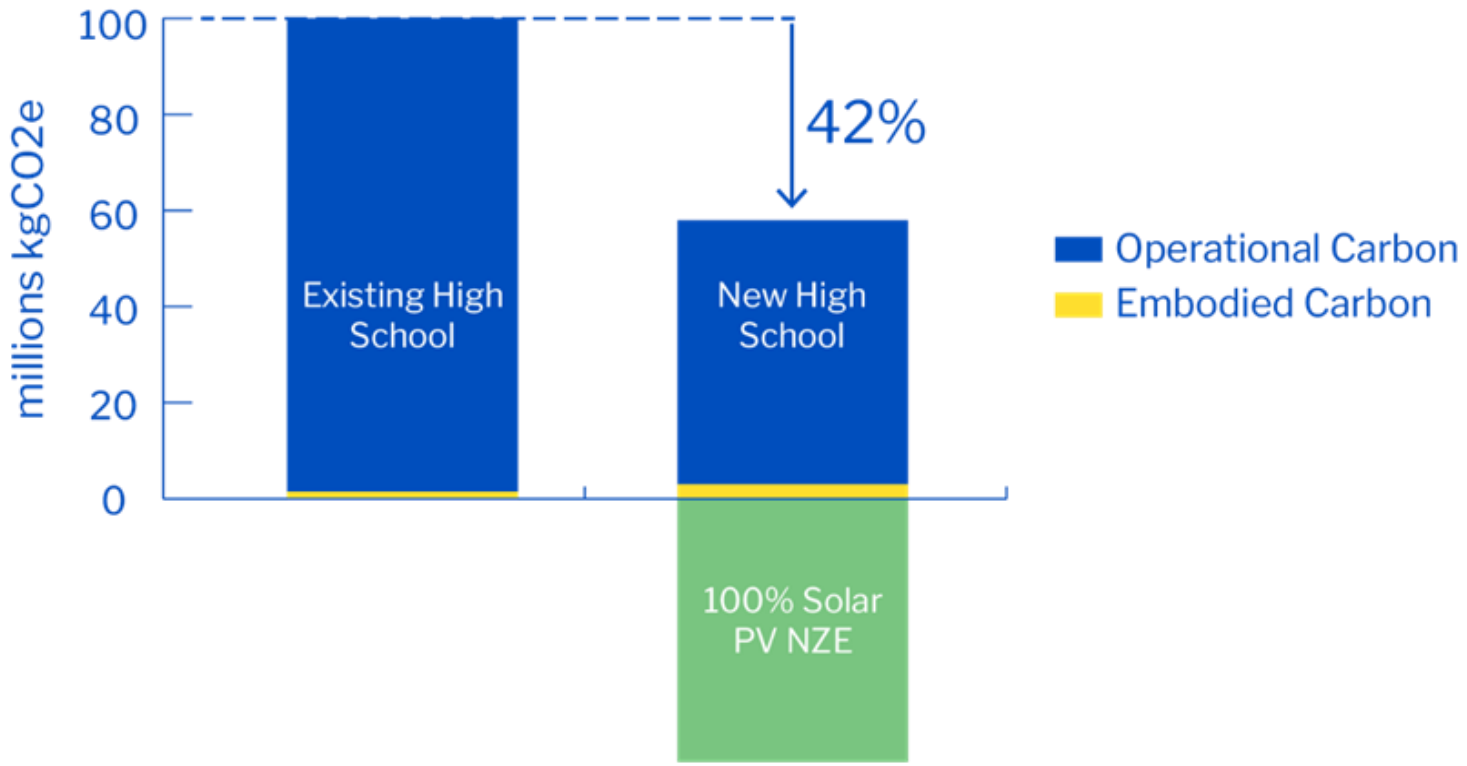


All-Electric HVAC



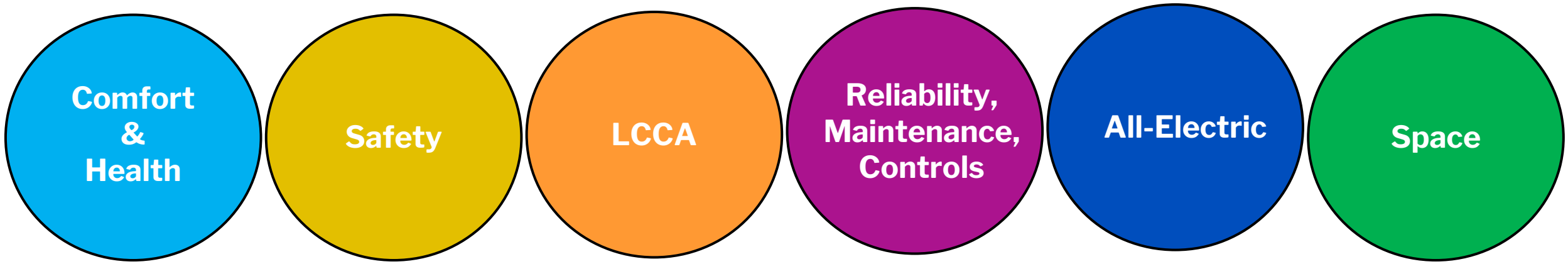
Plug Load Management

Existing Facility vs. Proposed Design over 60 Years



Total Building Carbon

Sustainability and MEP Systems – HVAC Design Considerations



Acoustics

Temperature Control

Occupant Experience

Refrigerants

Indoor Air Quality

Alarms

Incentives

Upfront & Operational Costs

Embodied & Operational Carbon

System Lifespan

All-Weather Operation

Setpoints & Schedules

Centralized BMS

MA Specialized Stretch Code Req.

LEED V5

Site Potential

Roof Space

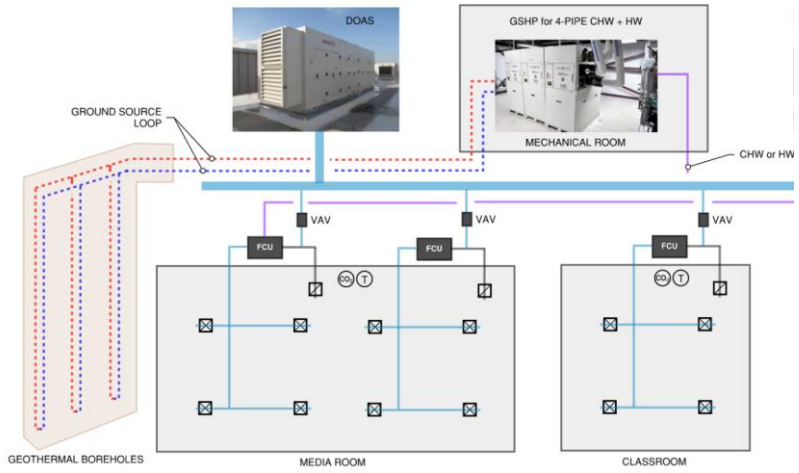
Sustainability and MEP Systems – System Operations

- **Building Operations and System Maintenance**
  - Well-trained Facilities Team
  - Educating the Staff
  - Building systems that operate as designed
  - Commissioning

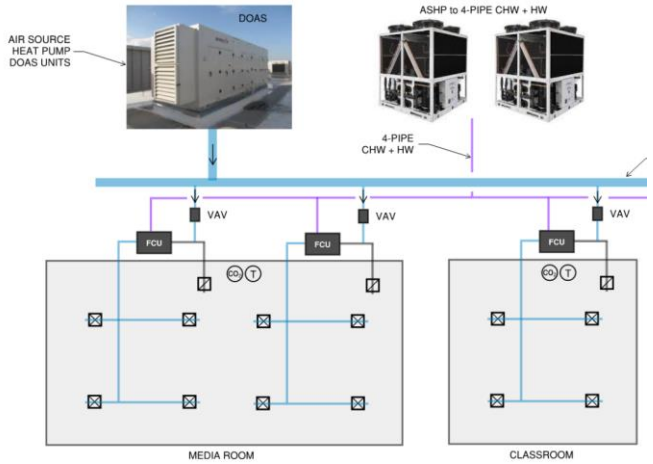


Sustainability and MEP Systems – Potential HVAC System Options

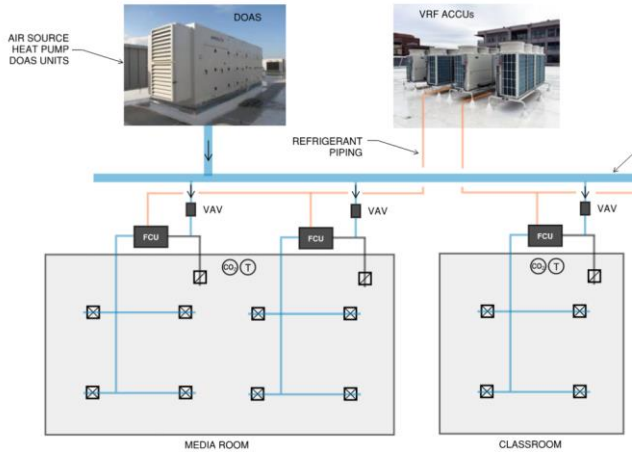
Ground Source Heat Pump



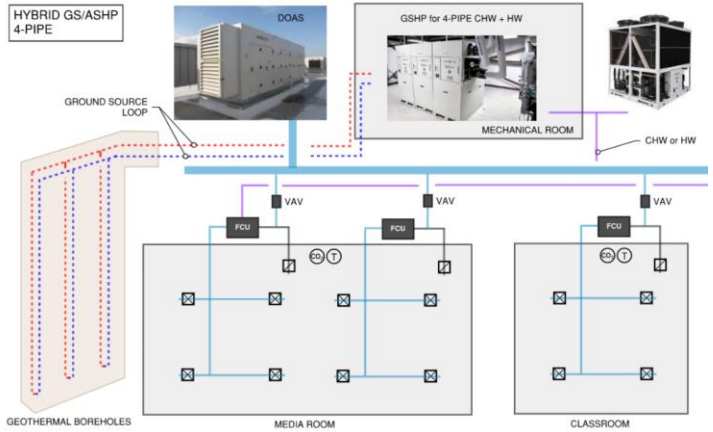
Air Source to Water Heat Pump



Air Source Heat Pump



Hybrid



Sustainability and MEP Systems – Solar PV and Energy Storage

Medford Solar PV Policy: Required for >=10,000 sq-ft

- Sized 50% of the roof area of all buildings
- 90% of Top Level of uncovered parking structures
- Exemptions: Unsuitable space, roof shaded 50% of the year, building conversions with insufficient structural load capacity.

Specialized Stretch Code:

- All Electric Pathway: Standard Stretch Code: 40% of usable roof area
- Fossil Fuel [heating, DHW]: Install Solar PV equivalent to fossil fuel emissions (culinary, pool, labs, other vocational programs)
- Battery Storage Readiness

LEEDv5:

- Contributes to additional points (TBD)

Additional Solar PV Area Opportunities:

- Parking, Walkways, Outdoor Classrooms Arrays
- Roof: High Canopy, Occupied Area (Patio) and Roof Screens
- Building Mounted BIPV: Awnings, Wall (vertical)



Source : SMMA



Source : Solar Design Associates (SDA)

Sustainability and MEP Systems – Electric Vehicle Charging Stations

Level 1 Charging

- Flexible charging options

Level 2 Charging

- LEEDv5 - 5% or 10%
- Infrastructure readiness for future installations
  - Medford req. 20% EV Ready
  - Stretch Code req. 20% EV Ready

Level 3 Charging

- Utility infrastructure required

Charging Stations Power Usage		
Electric Bus (Level 3)	**Electric Vehicle** (Level 2)	**Electric Bicycle** (Level 1)
50 - 150 kWatts DC Current	**3.3 - 8.3 kWatts** AC Current	**1.5 kWatts** AC Current





Embodied Carbon

Materials and Resources

Reduce Embodied Carbon

- LEEDv5 LCA credit
- ***Medford: TBD % Goal***
- Low Carbon Materials
- Building Re-use
- Environmental Product Declarations (EPDs)

Construction Waste Management

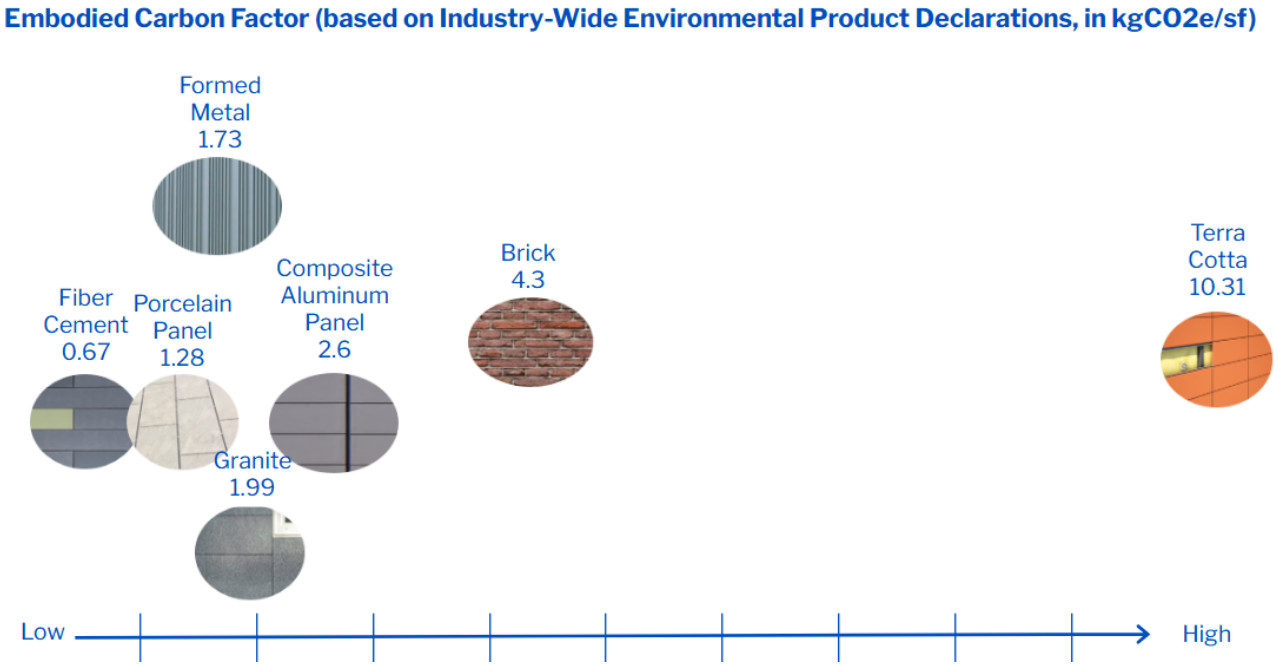
- 95% Goal

Sustainable Building Products Selection

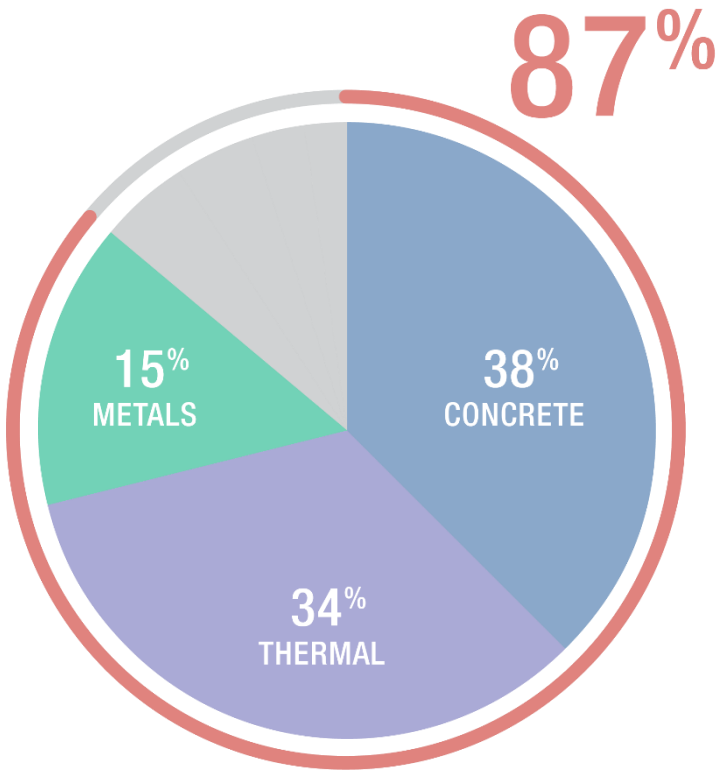
- Recycled Content, FSC Wood, Regional Materials
- Low- emitting, Health Product Declaration (HPDs)
- Declare/ Red List

Zero Waste Operations

- Recycling Planning and Program



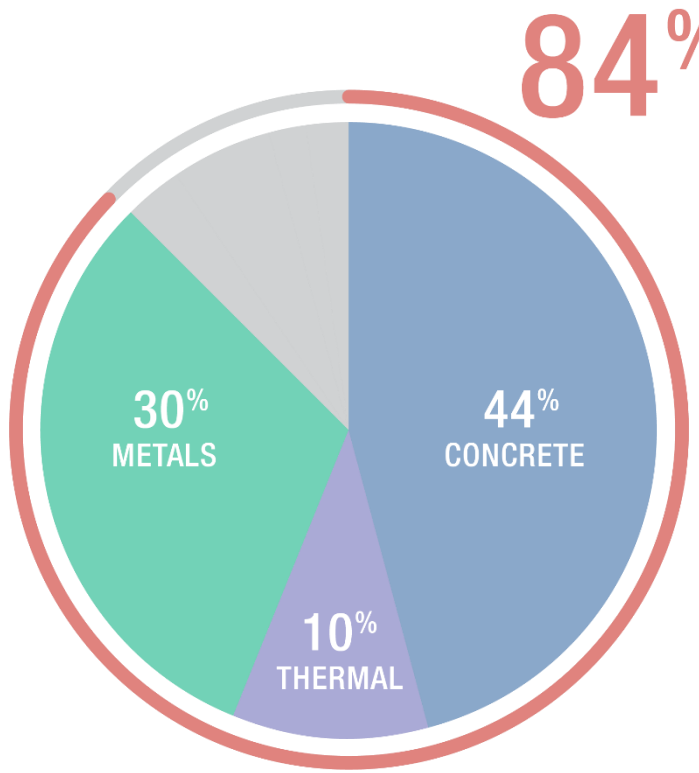
Embodied Carbon



Somerville High School
Embodied Carbon

Building Enclosure & Structure

Building Interior



Waltham High School
Embodied Carbon

Low Carbon Materials

Low Carbon Concrete

Structural Steel

- Optimization of recycled content

Low Carbon Materials

- Insulation
- Low Carbon Gypsum
- Exposed Ceilings, where applicable

Consideration for Mass Timber/Wood Structural Components

- Full Structure Option
- Hybrid Option

Healthfulness, Environmental Quality & Literacy

Indoor Environmental Quality

Daylight Optimization
Enhanced Air Quality Strategies
Occupant Experience

- Interior Lighting Design
- Acoustical Performance
- Thermal Comfort
- Access to Views

Construction IAQ Practices
[Flush Out]



Source : SMMA – Somerville HS

Healthfulness

Healthfulness:

- Access and Interaction with Nature
- Red List Materials Screening *[beyond LEED]*
- Biophilia
- Ventilation Flush Out at/prior occupancy

Environmental Literacy

- Outdoor Classrooms
- Educational Program Integration:
  - Signage
  - STEM & Comprehensive Programs



URBAN FOREST
Heat island mitigation
Habitat Connectivity
Air Quality Improvement

URBAN MEADOW
Habitat Connectivity
Pollinator Habitat





EMERGENT WETLAND
Flood Control
Water Quality Improvement
Biodiversity Support

Low Emitting and Red List Materials

- Target Red List materials priority list to be presented to SBC
- Schematic Design: Decision on Red List materials to be included in the specifications

TIER 1: LEED Equivalency	TIER 2: Targeted Categories	TIER 3: Division 9 Focus	TIER 4: Division 9 & Beyond
LEEDv4 or LEED v4.1 equivalency for materials credits (HPDs for all identified product categories)	Identify the **Top 5** product categories to vet using a class-based approach to chemical removal such as The Red List. [LEEDv5]	Vet all finishes in Division 9 using the Red List or a class-based approach	Vet all finishes in Division 9 and include other targeted products that have the largest impact on human and environmental health



Thornton Tomasetti

Sustainability and MEP Systems – Healthfulness, Enhanced Indoor Air Quality

Environmental Literacy

- Green Educational Program
- Outdoor Classrooms
- Occupant Behaviors and Monitoring
- Green Charrette & Workshops
- **Students' Engagement in the Design Process**
- **Vocational Trade Programs integration with Sustainable design/renewable energy trades**





LCCA – Cost Effectiveness

Sustainability and MEP Systems – LCCA Cost Effectiveness

Life Cycle Cost Analysis

MSBA required

- Schematic Design
- Whole Building with 3 HVAC system options
- 50-yr. LCCA

Initial costs, maintenance and energy savings

Incremental Costs and Paybacks

Early discussions with Utility (National Grid):

- Electrification Upgrade
- Solar PV/Interconnection
- Demand Response
- EV Charging Stations
- Utility MassSave Incentives

Renewable Energy Analysis

Preliminary Solar PV / Battery Storage

- Consider as alternative [PDP cost estimate]
- Site capacity (roof/parking) vs. EUI goal
- Preliminary sizing
- Preliminary discussions with National Grid

Sustainability and MEP Systems – LCCA Cost Effectiveness

SAMPLE - Preliminary SD LCCA Analysis Summary

Estimated 50-year LCCA Costs as Net Present Value

HVAC System	Installation Cost	Replacement Cost	Maintenance Cost	Energy Cost	Total 50-year LCCA Costs	Total 50-year LCCA w/ Construction Incentives and Associated Costs
						MassSave
Code Baseline	$69,586,840	$46,041,831	$4,691,113	$38,599,898	$158,920,000	
1-Ground Source HP	$73,789,000	$19,246,00	$4,010,000	$26,267,000	$123,312,000	**$116,131,000**
2-Air Source to Water HP	$54,620,000	$20,157,00	$4,010,000	$27,799,000	$106,586,000	**$104,879,000**
3-Hybrid 1 and 2	$64,241,000	$19,701,000	$4,010,000	$27,089,000	$115,041,000	**$110,852,000**

SAMPLE

SAMPLE Notes:

1. Installation costs are based on the PSR project cost estimates. Replacement costs are specific to each system, based on ASHRAE useful life data and using unit costs for equipment and labor, brought forward as Net Present Value (NPV) costs. Maintenance costs are estimated to include third-party service to systems, but not in-house routine maintenance.
2. Energy costs based on energy modeling analysis, using the 2-yr High School utility bills' average [blended] annual $0.--/kWh (baseline $1.--0/Therm), with a 3% cost escalation rate. The energy costs do not include peak load reductions expected from a project's Solar PV/Battery Storage systems. Peak demand costs are approximately xx% of Medford High School's annual utility costs. The battery storage peak load reduction support utility energy costs benefits. The Total 50 yr. LCCA Cost is the sum of Installation, Replacement, Maintenance and Energy costs. Net Present Value modeled on a 50-year lifecycle cost, 3% cost depreciation.
3. Construction Incentives include MassSave Incentives. Post-occupancy annual incentives (revenues) are not included: Demand Response and peak load reduction utility incentive programs, and potential annual Renewable Energy Certificate (REC) for the GSHP.

Sustainability and MEP Systems – LCCA Cost Effectiveness

SAMPLE - Summary Incremental Costs & Paybacks

Installation Incremental Cost & Payback Summary
Relative to HVAC Systems Code Baseline Costs

HVAC System	Estimated Incremental Costs (Savings)	*Estimated Annual Energy Costs Savings*	*Estimated Payback*
	Incl. MassSave		Vs. Baseline
Code Baseline [ASHRAE system 7]	SAMPLE		
1-Ground Source HP (BOD)	($2,979,340)	$415,234	0 yr.
2-Air Source to Water HP	($16,673,840)	$363,654	0 yr.
3-Hybrid Option 1 and 2	($9,535,590)	$387,580	0 yr.

SAMPLE Notes:
1. Energy Savings: based on total annual kWh savings, using the average 2-yr $0.--/kWh (utility bills). Peak demand savings not included
2. Incremental Costs are based on the PSR Cost Estimates and include materials and labors and are based on a per cost comparison to the analysis system baseline (ASHRAE 90.1-2019 App G).
3. Code Baseline system: Natural gas boilers and water-cooled chillers (VAV) – ASHRAE App G system #7.

Next Steps



1. Listen 12/16
2. Review & Respond 1/15
3. Confirm & Recommend 3/11
4. Reconvene TBD

Next Steps/ What to Expect in Meeting #3

Objective: The Advisory Team will review recommendations as to what sustainability and MEP systems scope elements are to be included in the project (as discussed in Meetings #1 and #2). Scope items will be characterized as givens, items warranting team discussion, or items that are not recommended for inclusion in the project.

When & Where?
March 11th at 4:00 pm
Remote / Hybrid

Thank you.

