Energy Trust of Oregon Panel Discussion

June 4, 2018

Outline

- Things to Consider
- Project Approach
- Coastal Climate
- Case study: Clatsop CC
- Case Study: OES
- Case Study: RMI

Sustainable Schools

Issues to Consider

- Simplicity
- Maintainability
- Lower operating expenses
- Acoustics
- Comfortable learning
- Early design collaboration
- Early modeling and costing
- Passive classrooms
- Fully conditioned other areas
- Occupant control

Best Project Approach

Set Aggressive Goals

Choose Efficient Systems

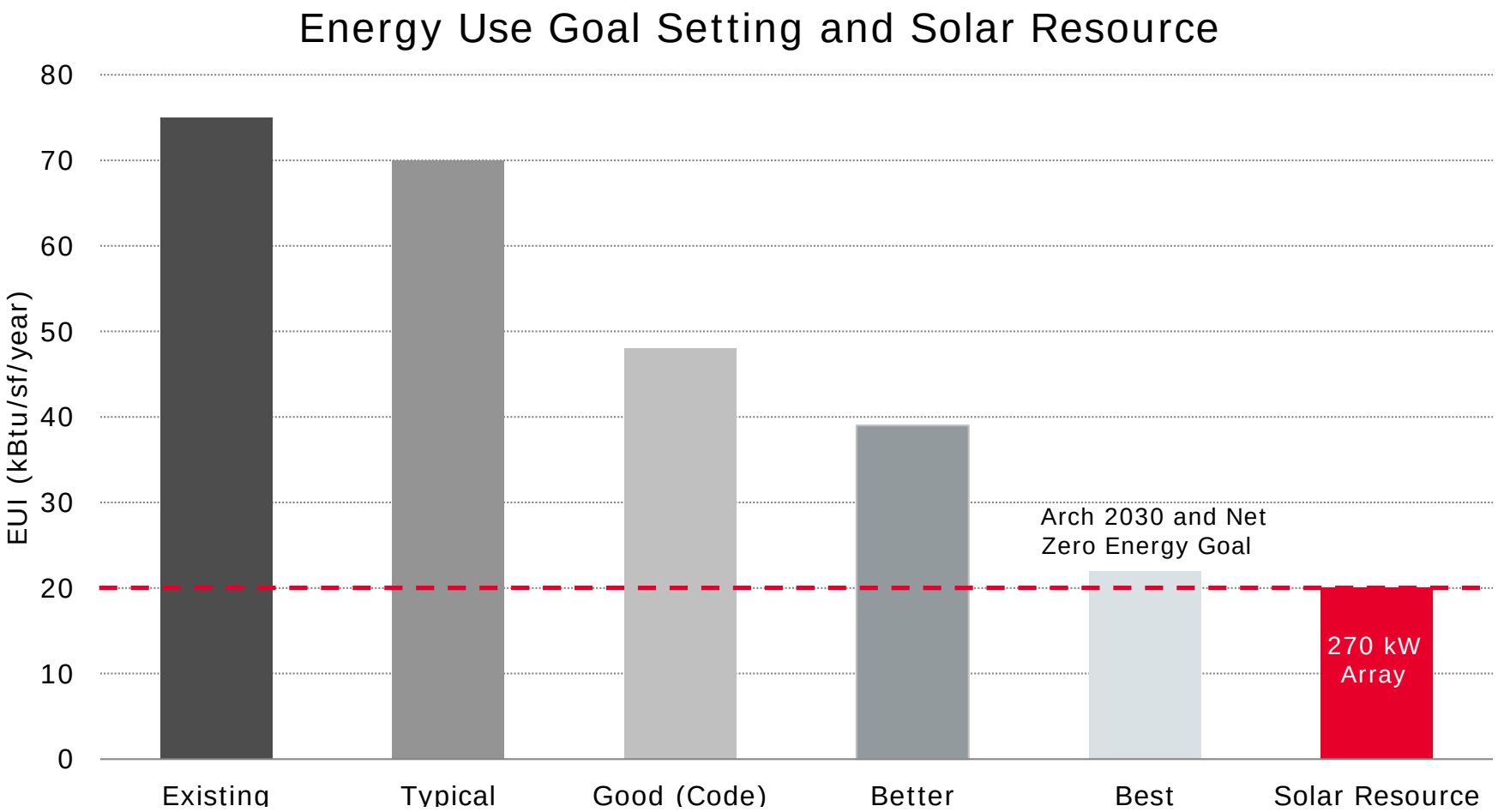
Analyze the Climate

Opt for Renewables

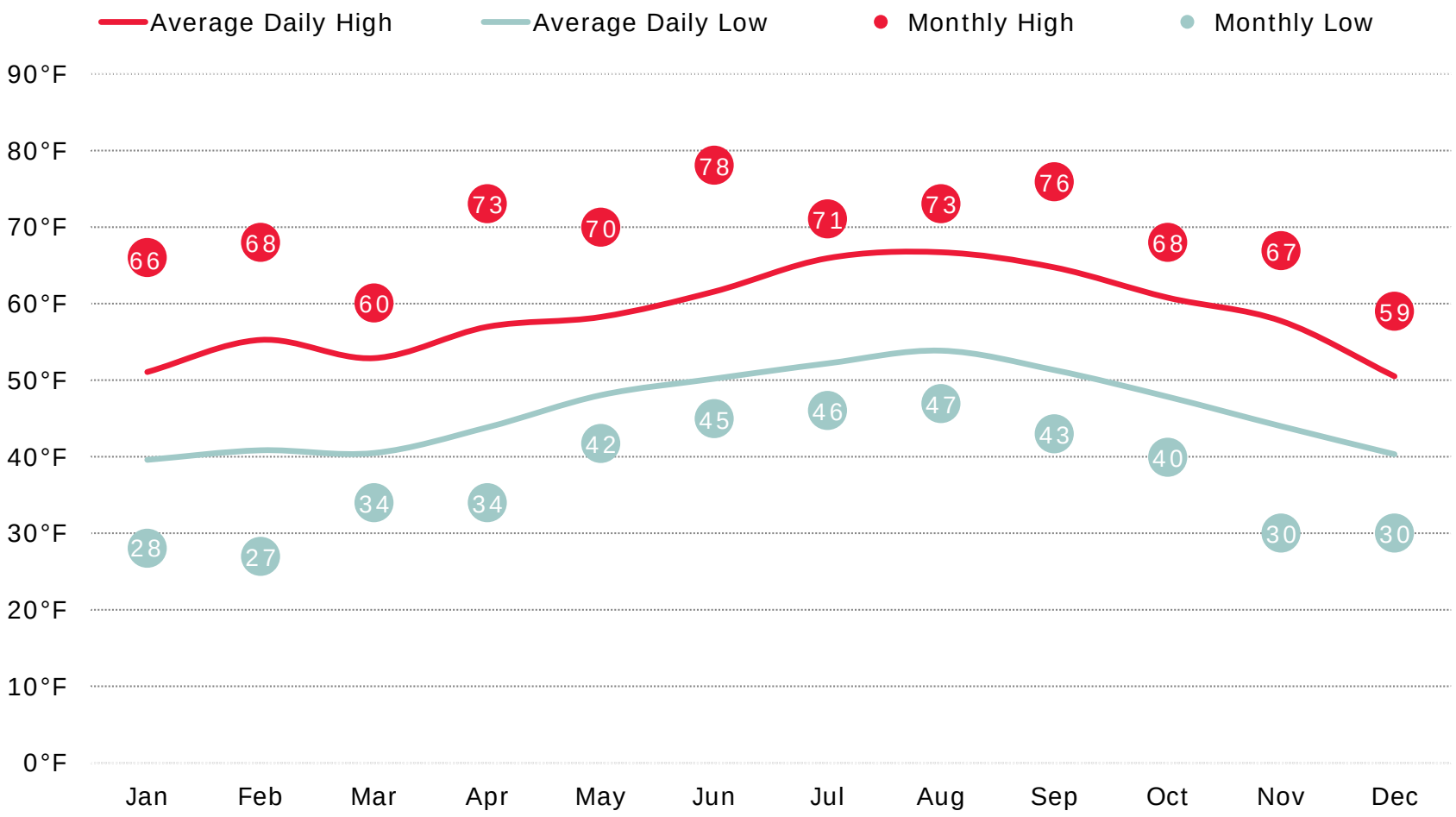
Reduce Loads

Verify Performance

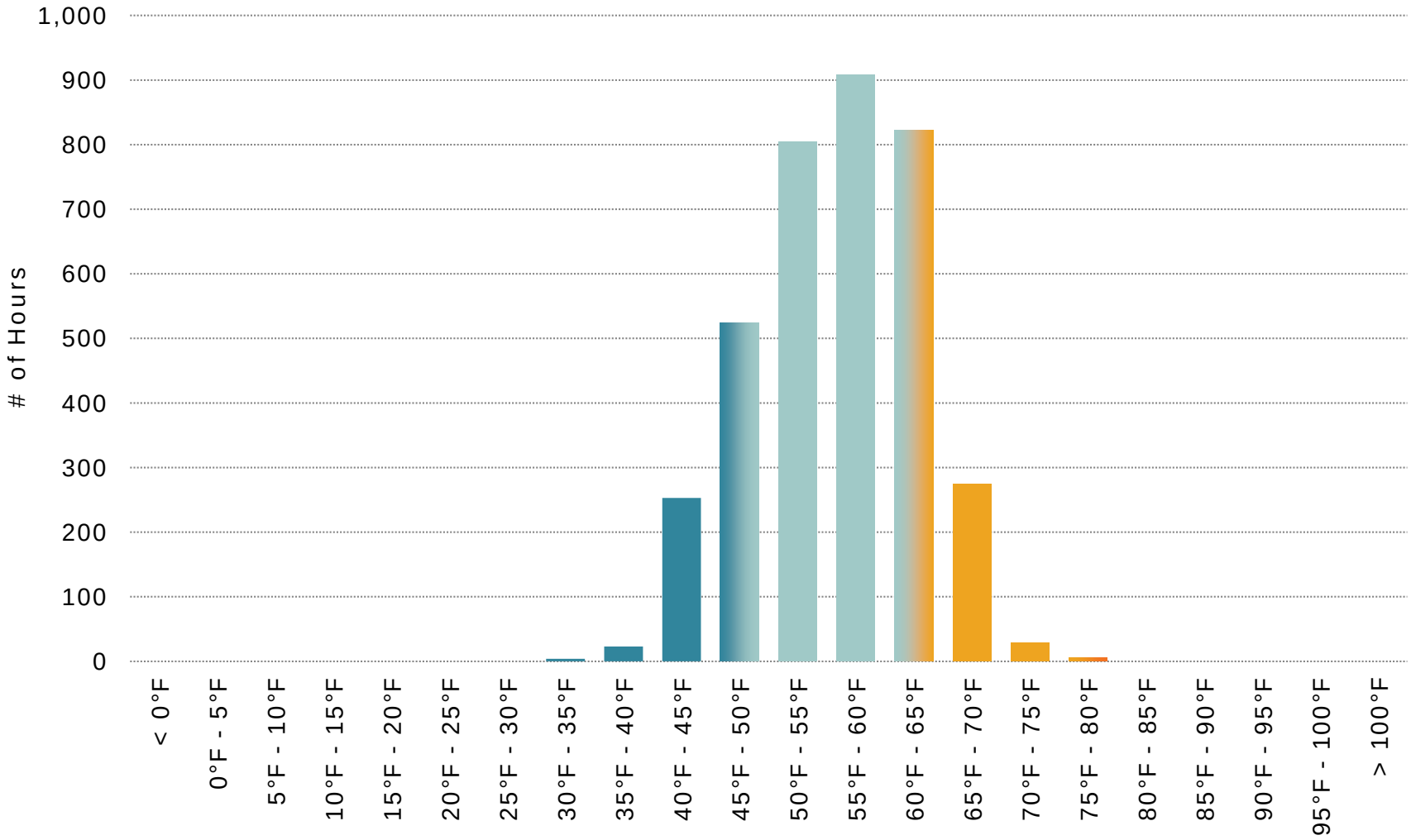
Goal Setting



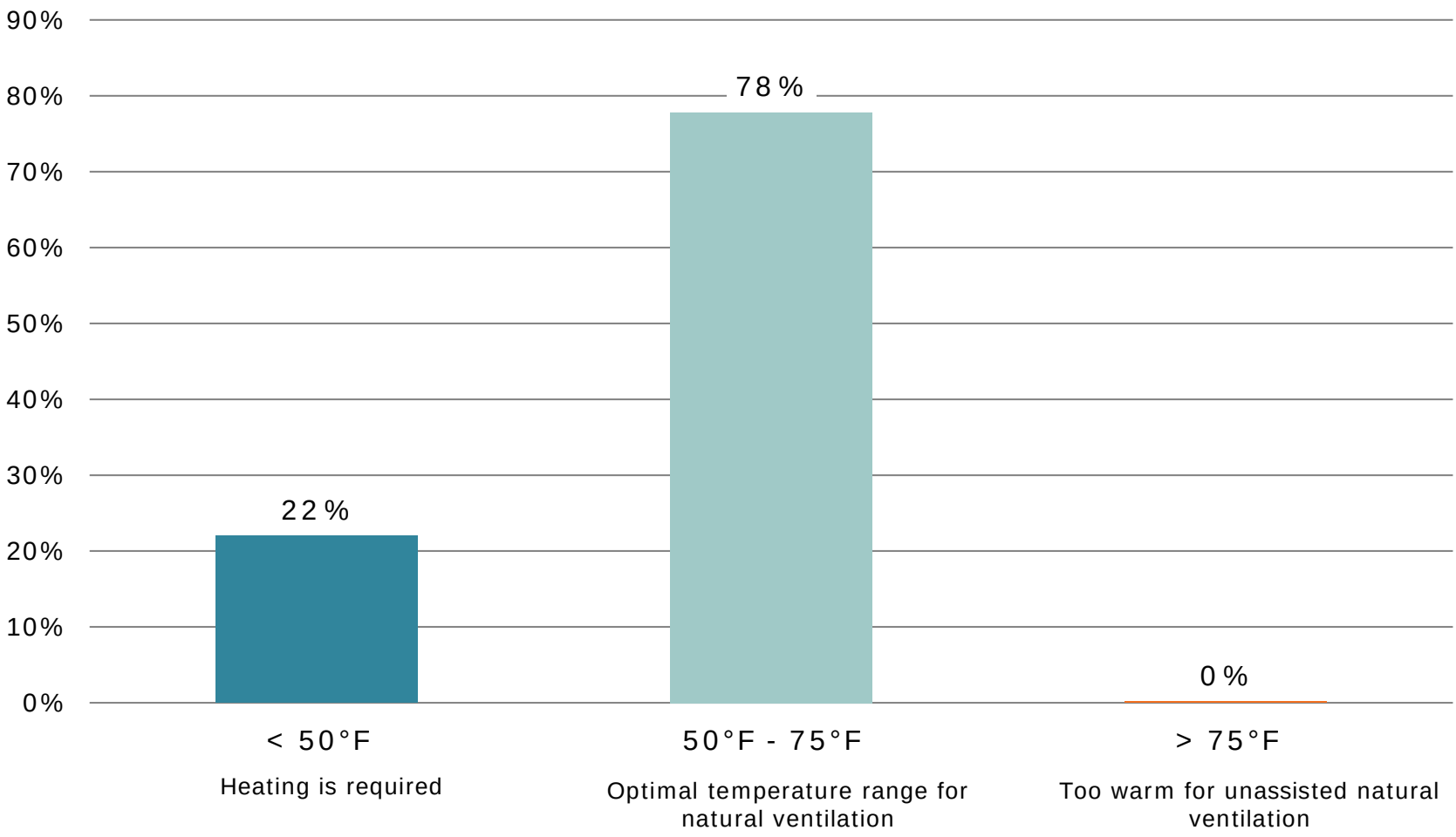
Climate Analysis – Average Monthly Temps



Climate Analysis – Daytime Temperature BINS



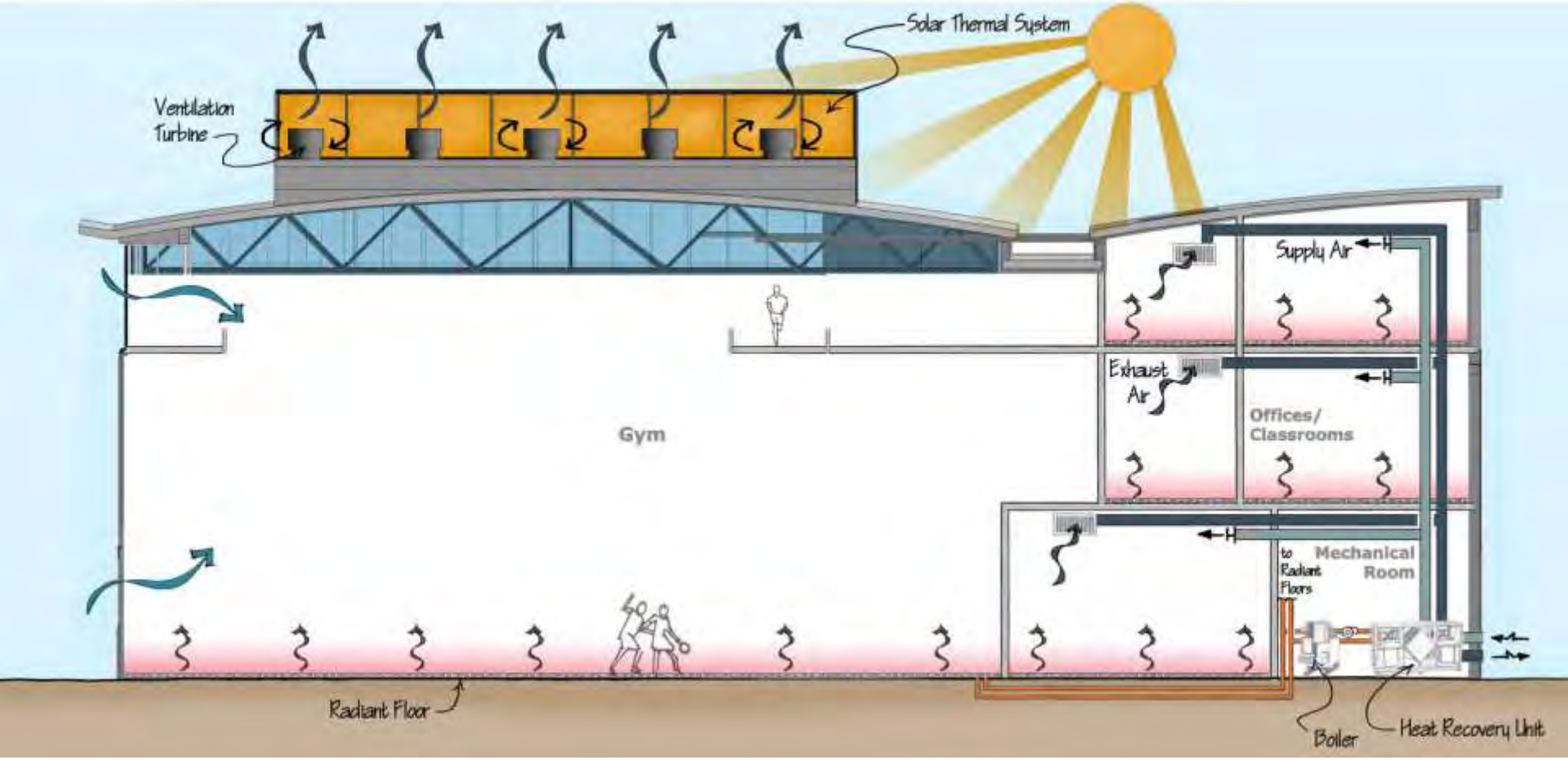
Climate Analysis – Passive Cooling Effectiveness



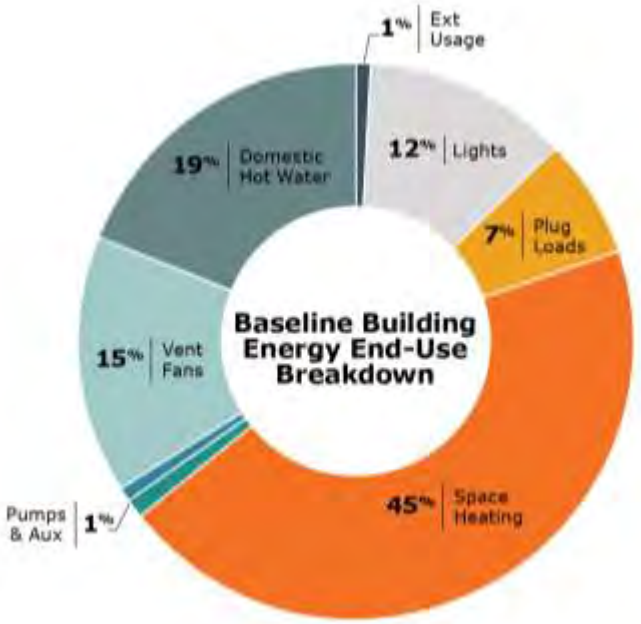
Clatsop Community College Patriot Hall

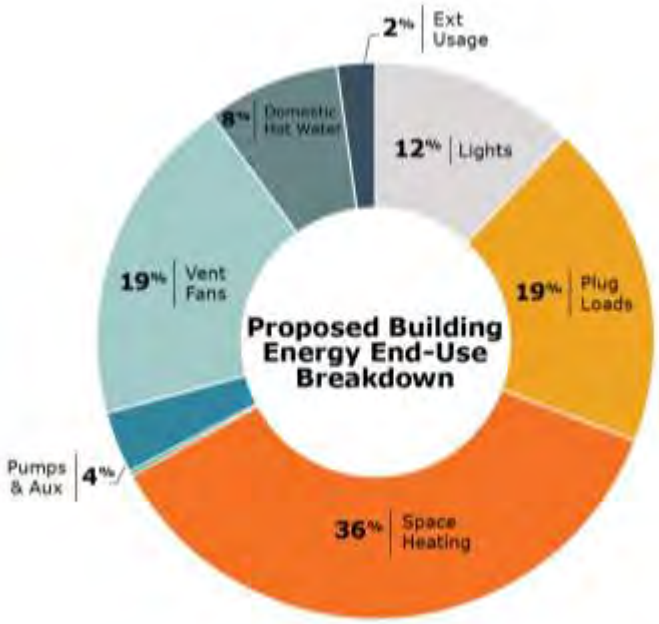
Astoria, OR | Architect: SRG Partnership
36,400 sf | $10.9 M | $299/sf | 37 EUI

CCC Patriot Hall

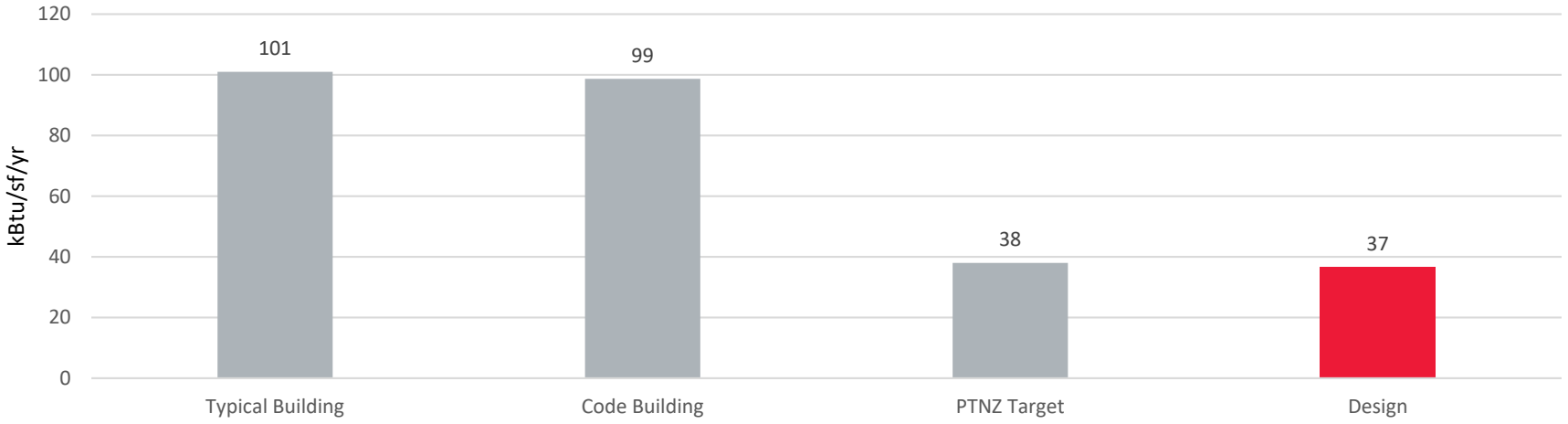


CCC Patriot Hall





Clatsop CC Patriot Hall - EUI Benchmarking



Oregon Episcopal School Lower School

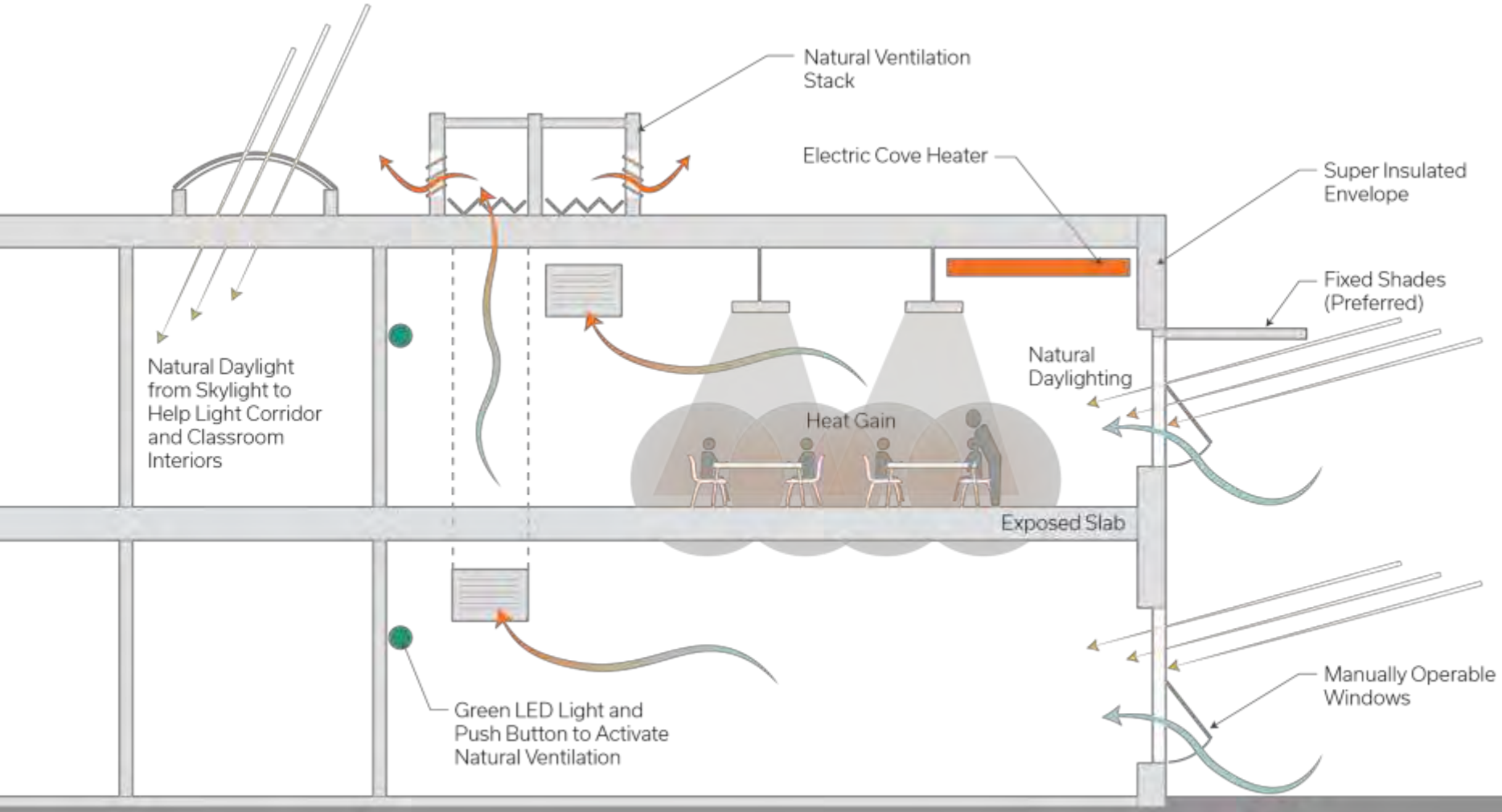
Portland, OR | Architect: Hacker
45,000 sf | $11.8 M | $257/sf | 22 EUI

OES Summary

- 45,665 sf
- 2-Story Wing & 3-Story Wing
- K-5 Classrooms
- Media Center
- Commons/Cafeteria
- Administration
- EUI = 22
- Architecture 2030
- Energy Trust of Oregon Path to Net Zero Energy project

Area	Cost
TOTAL	$270/sf
Shell	$60/sf
Interiors	$40/sf
Natural Ventilation Shafts	$2.50/sf
HVAC	$17/sf
Electrical	$20/sf

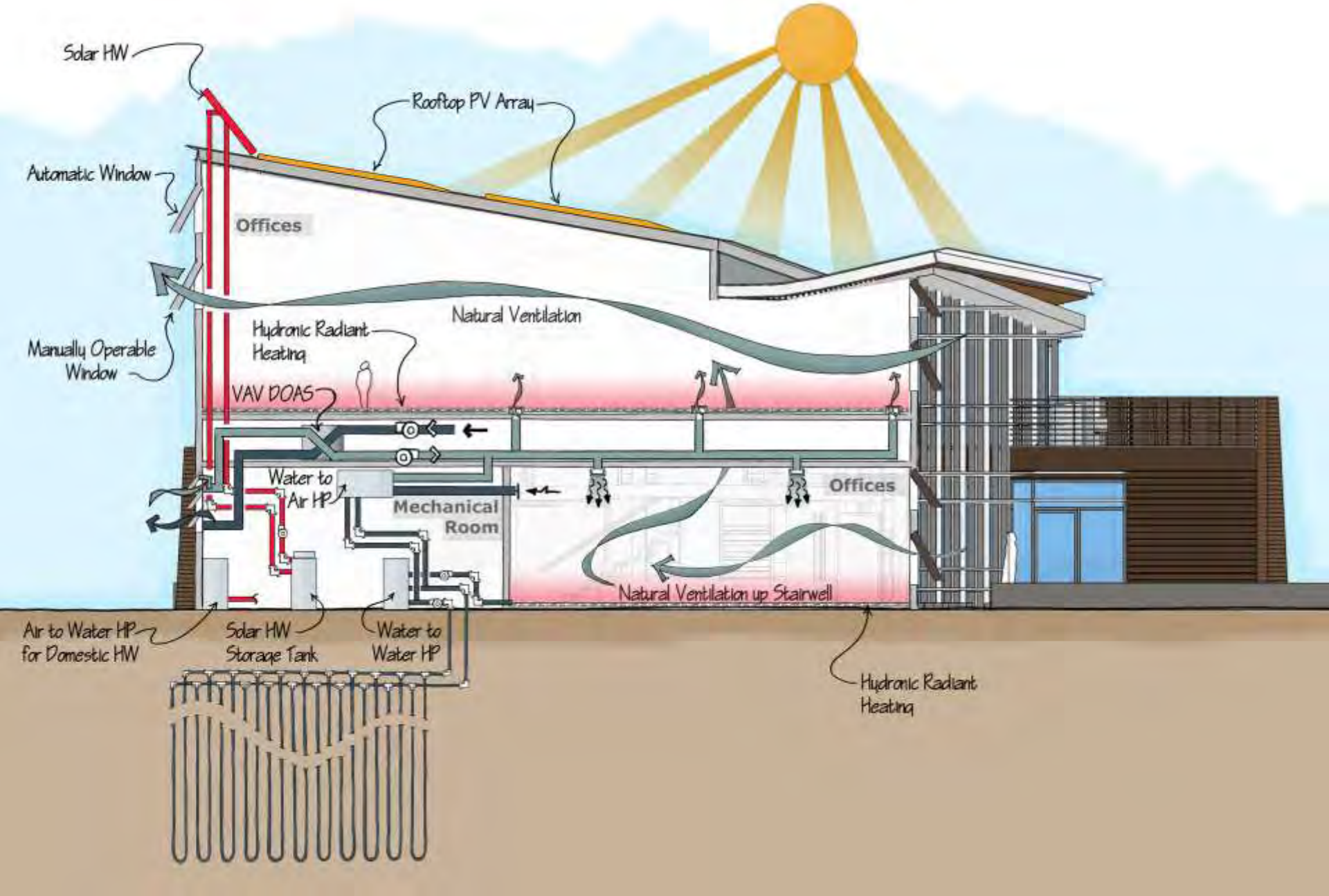
OES

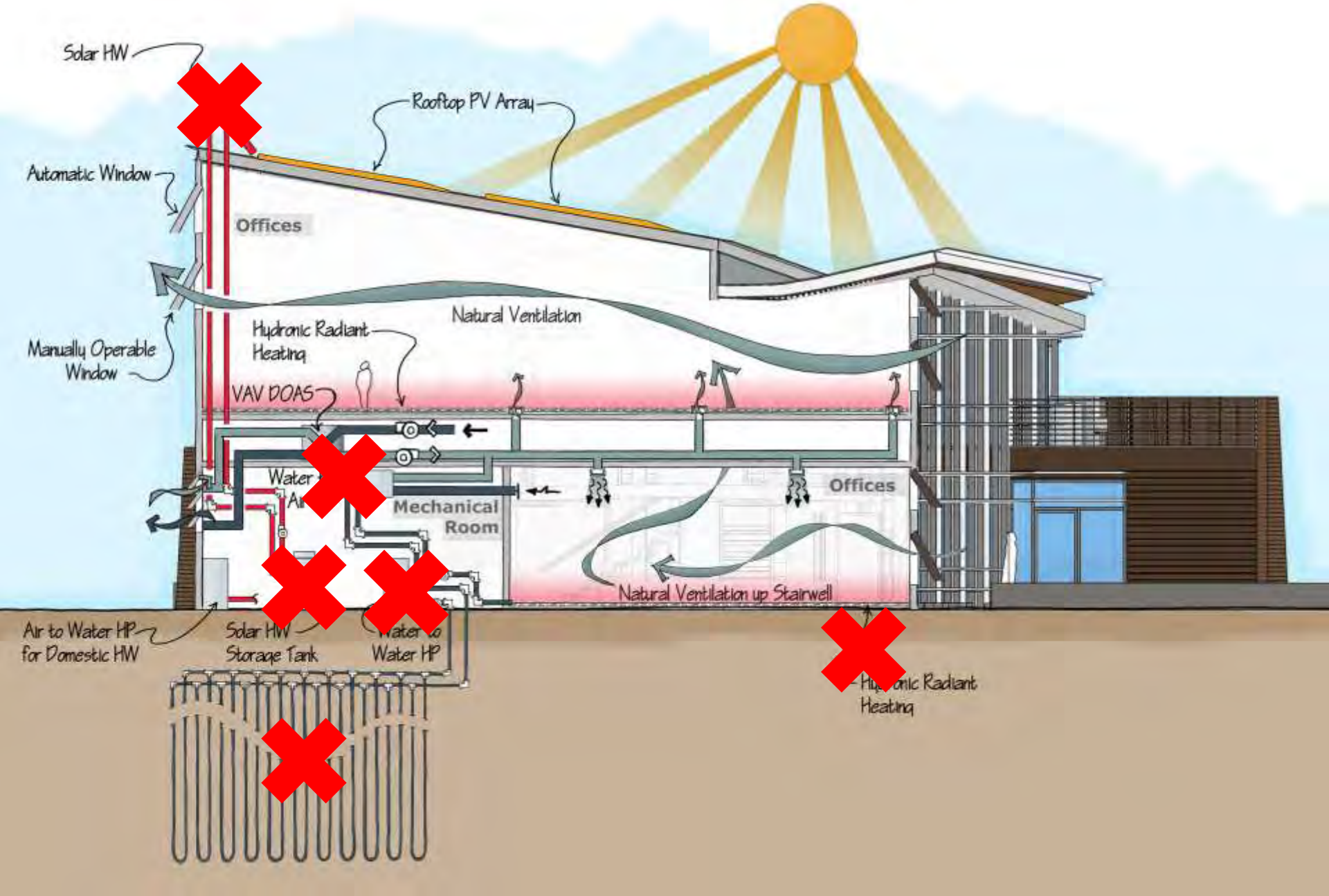

Natural Ventilation Stack
Electric Cove Heater
Super Insulated Envelope
Fixed Shades (Preferred)
Natural Daylighting
Natural Daylight from Skylight to Help Light Corridor and Classroom Interiors
Heat Gain
Exposed Slab
Green LED Light and Push Button to Activate Natural Ventilation
Manually Operable Windows

OES

Rocky Mountain Institute Innovation Center

Basalt, CO | Architect: ZGF Architects
15,600 sf | $8.9 M | $570/sf | 17.2 EUI - Net Zero


Solar HW
Rooftop PV Array
Automatic Window
Offices
Natural Ventilation
Hydronic Radiant Heating
Manually Operable Window
VAV DOAS
Water to Air HP
Mechanical Room
Offices
Natural Ventilation up Stairwell
Air to Water HP for Domestic HW
Solar HW Storage Tank
Water to Water HP
Hydronic Radiant Heating


Solar HW
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Air to Water HP for Domestic HW
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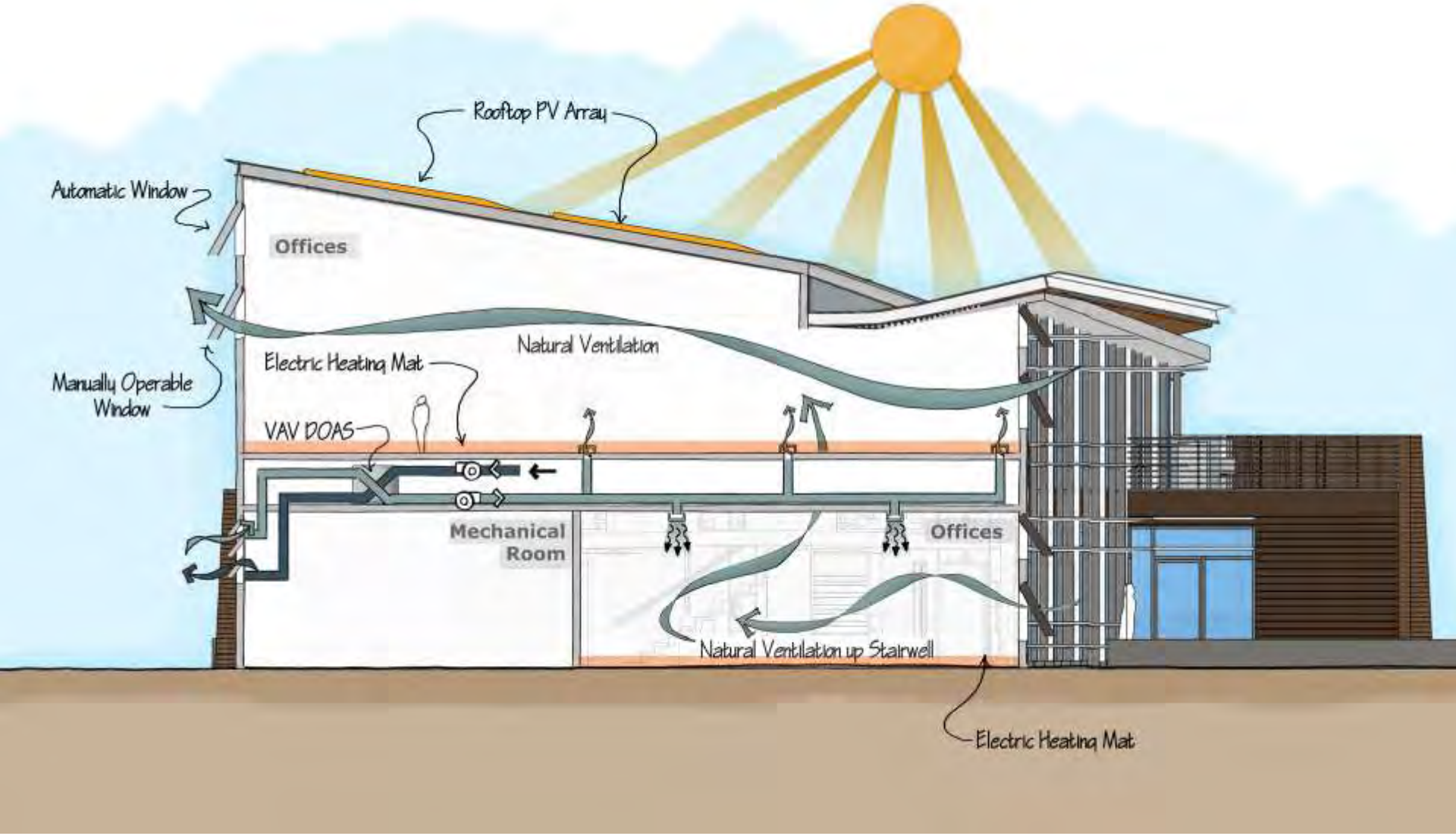
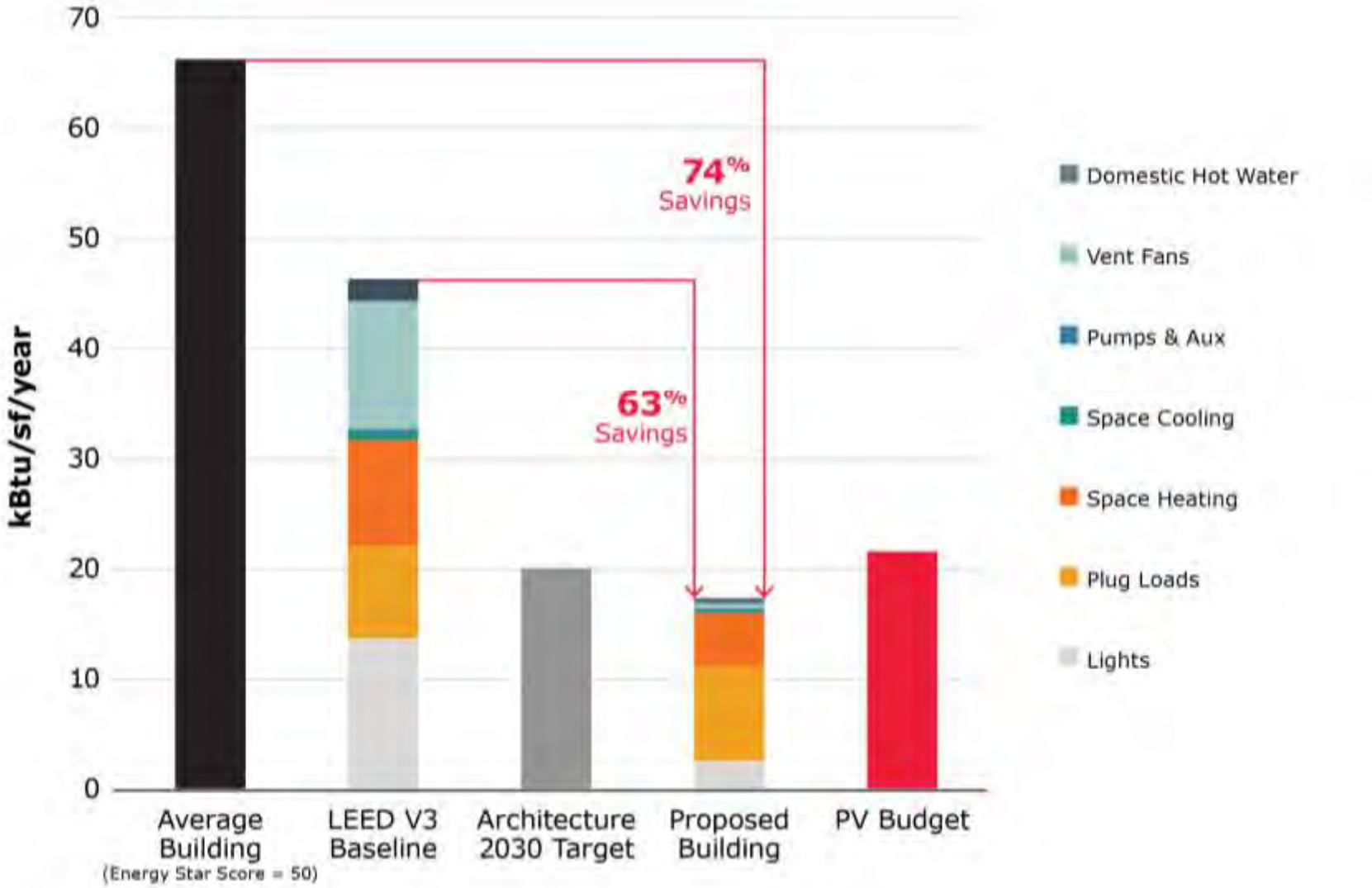
Hydronic Radiant Heating


Rooftop PV Array
Automatic Window
Offices
Natural Ventilation
Electric Heating Mat
Manually Operable Window
VAV DOAS
Mechanical Room
Offices
Natural Ventilation up Stairwell
Electric Heating Mat

Results: Zero Energy



Creating a Better Environment

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Owner’s Project Managers

Building a Successful Project

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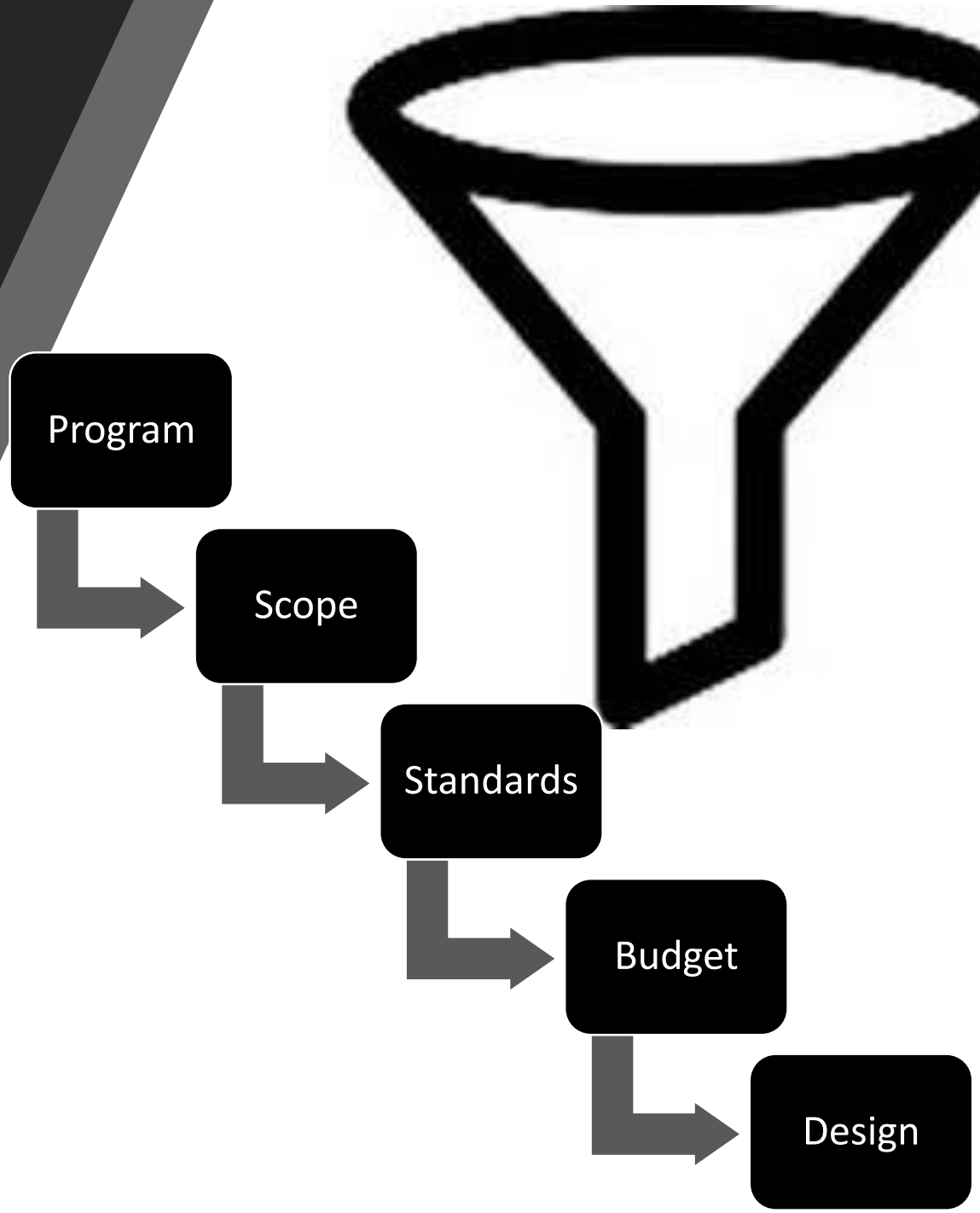
Defining Projects

Case Study: Lafayette Elementary School



Program

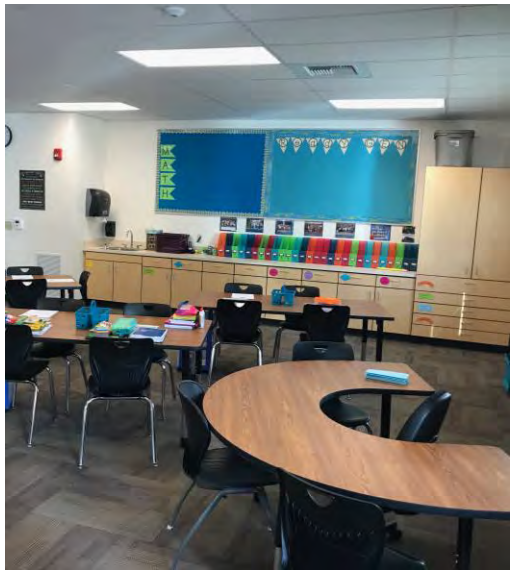
- Program defines the use of the space. It drives every aspect of the project. Throughout design, Program determines the direction of the project.
- What problem is the project going to solve and what function does the space have?
- In this case, six classrooms were needed. The district has defined the size of each classroom and the components of each room.
- At each phase of design, project team should confirm design meets program.

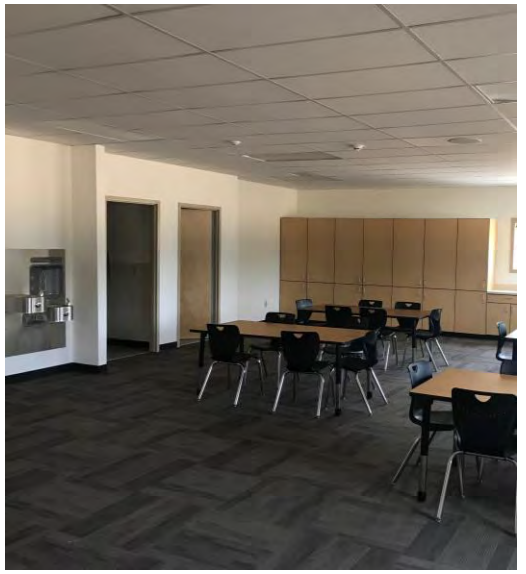
Scope

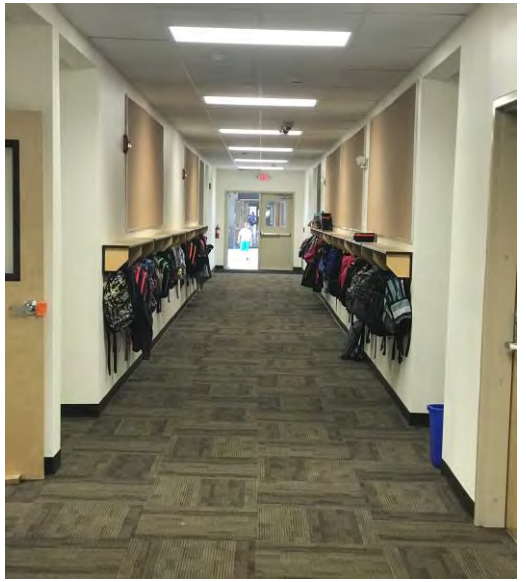
- Scope is defining the need:
  - New classrooms are required to meet this school's program.
  - The added space needed to accommodate large flexible space, custodial closets, traditional restrooms, staff and single user restrooms.
- Scope must meet program.

Standards

- Standards are the specific products, methods or systems that an owner has defined for use throughout buildings.
- Standards shall meet the scope and program.







For this project, we began with cost models for a traditional stick-framed building vs. a factory built building.

- “Hard Cost” & ”Soft Cost”
- Our goal is to limit the soft costs on every project.
- Defining budget items: various hard costs & soft costs
- Estimates at conclusion of each phase of design. This ensures that design is in-line with budget.
- Healthy contingencies based on risk (level of design)

Design

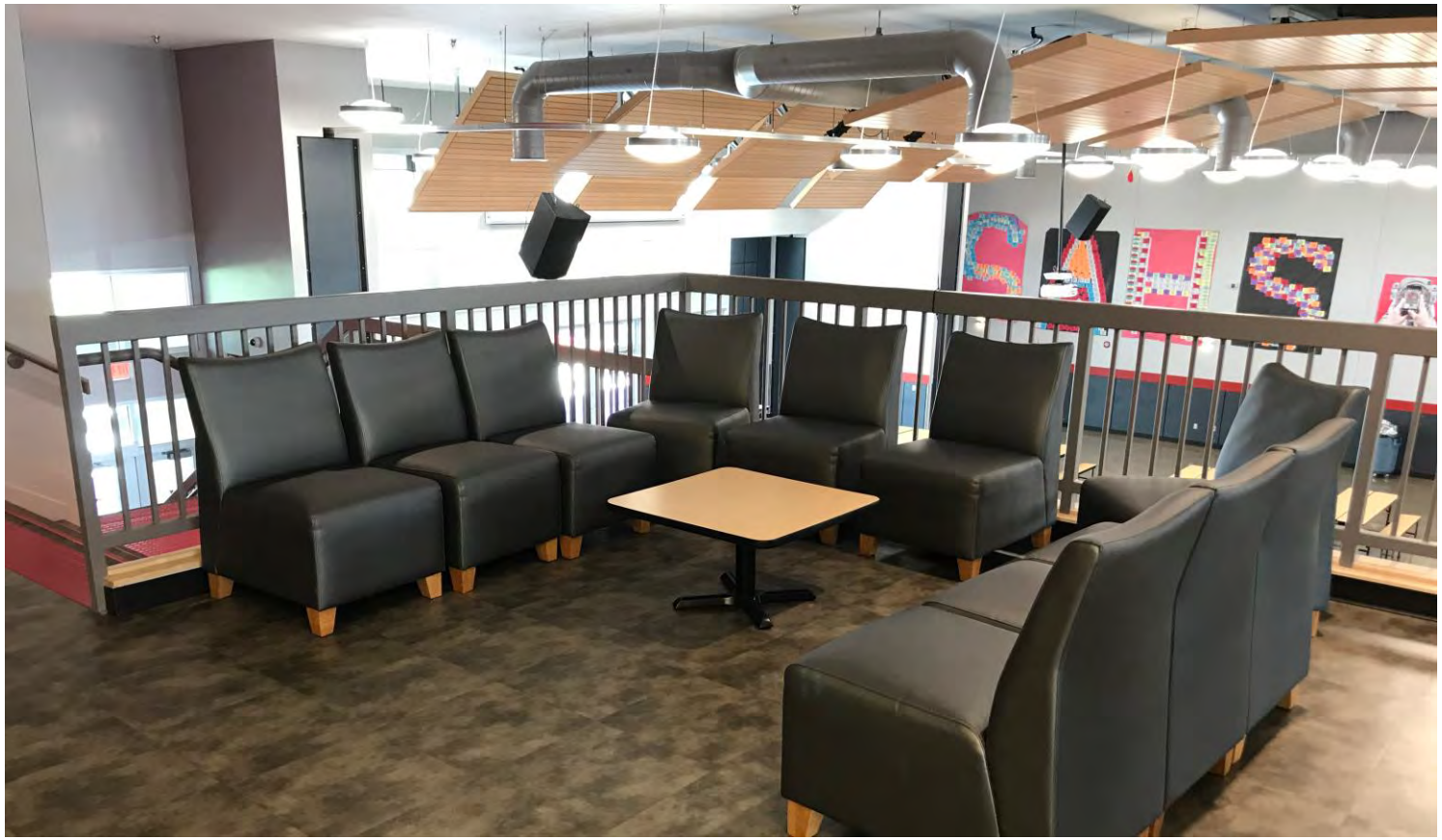
- Design is the process of implementing the program, scope and standards into a solution that meets the needs and budget of the owner.
- Intentional design will encompass the owner's needs. Additionally, it will implement best practices and attain energy efficiencies.
- In this project we spec'd LED lights, utilized gas split-systems, which were connected to the district's DDC system.
- The return air was designed to relief into the attic space. Louvers, connected to the DDC system, relieved the building to maintain building pressure. Relieving the conditioned air into the attic space acts as insulation for the below classroom spaces.

Delivering the Project

- ORS279C defines two delivery methods: Design-Bid-Build and ESPC
- Other common delivery methods:
  - CM/GC
  - Design-Build
  - Two Step – RFQ-ITB
    - This was used at Lafayette

Value Added Services

- Constructability
- Commissioning
  - HVAC
  - DDC Controls
  - Lighting
  - PV
  - Etc.
- Window Testing – Moisture/Air Test
- Building Envelope Consultants
  - Design Review/Input
  - Onsite Inspections



Incentives

- Seismic Grants
- Early Design Meeting
- Building Commissioning
- OCSIM Grant

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Thank you

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