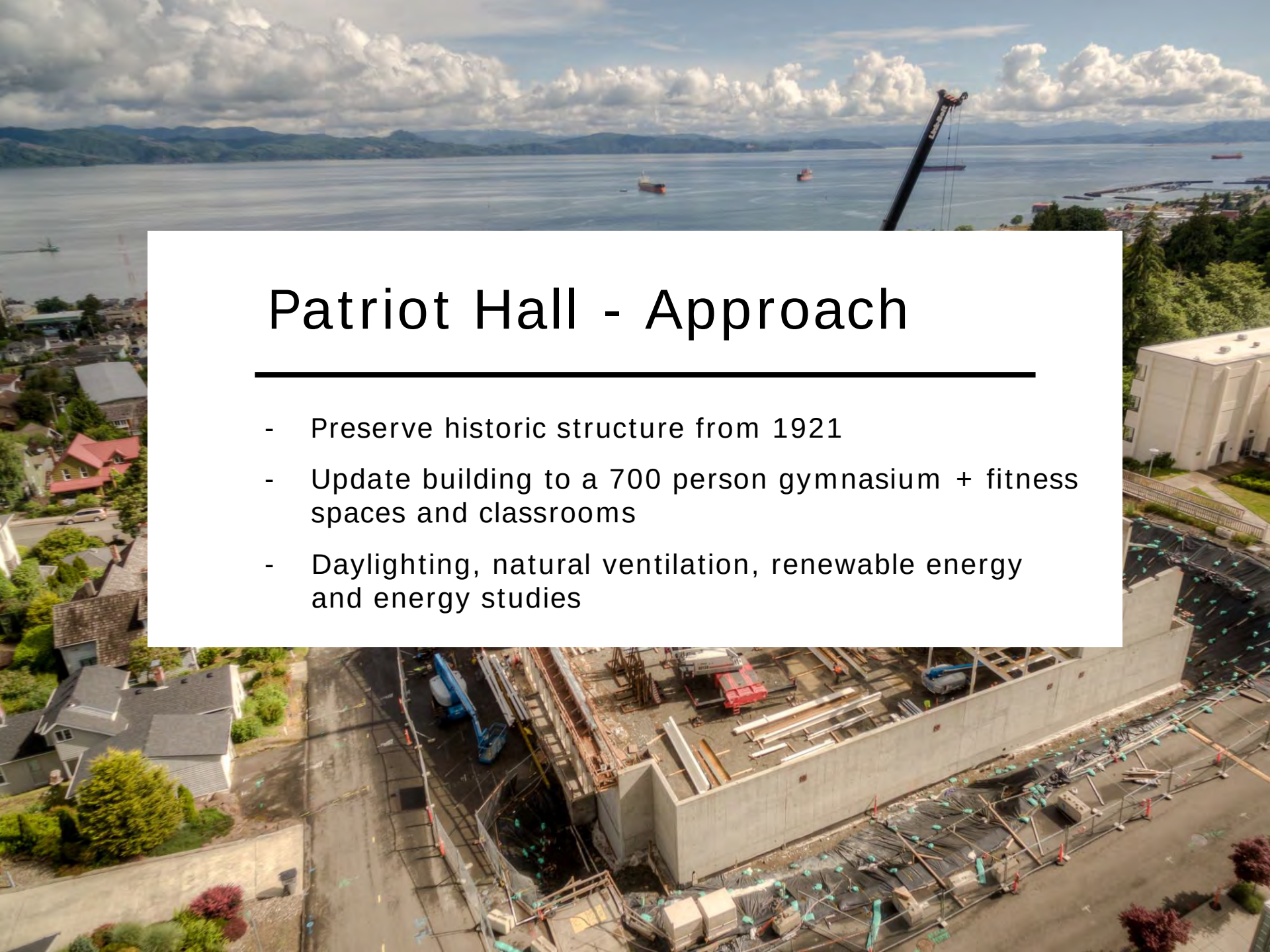
PAE

SRG

Energy Trust of Oregon Panel Discussion

April 16, 2019


Things to Consider



Patriot Hall - Approach

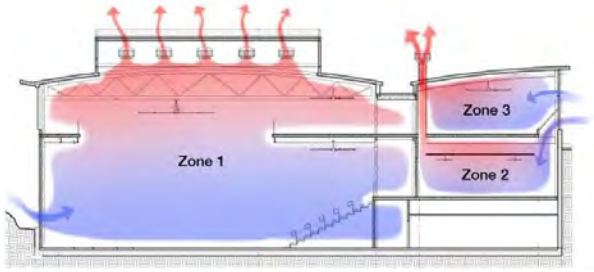
- Preserve historic structure from 1921
- Update building to a 700 person gymnasium + fitness spaces and classrooms
- Daylighting, natural ventilation, renewable energy and energy studies

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


Project Approach



Key

Zone 1

Zone 2

Zone 3

Incoming outside air

Stack exhaust location

Figure 5. Building section illustrates recommended air flow from zone inlets to outlets

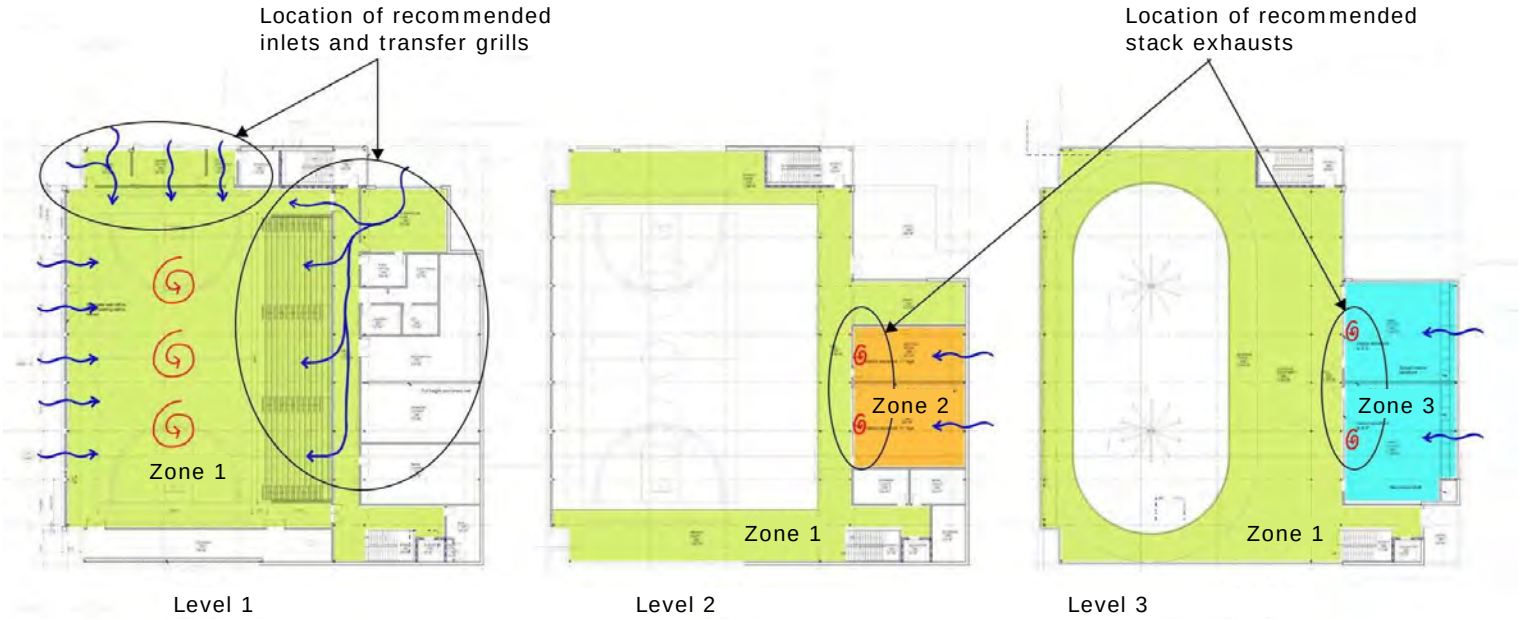
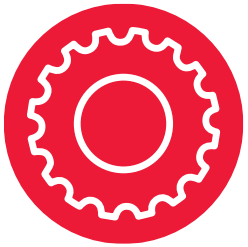


Figure 4. Stack ventilation zones and recommended air flow

Best Project Approach

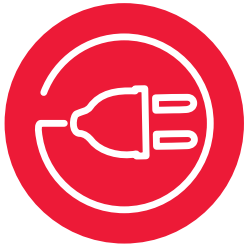
Set Aggressive Goals



Choose Efficient Systems

Analyze the Climate

Opt for Renewables



Reduce Loads

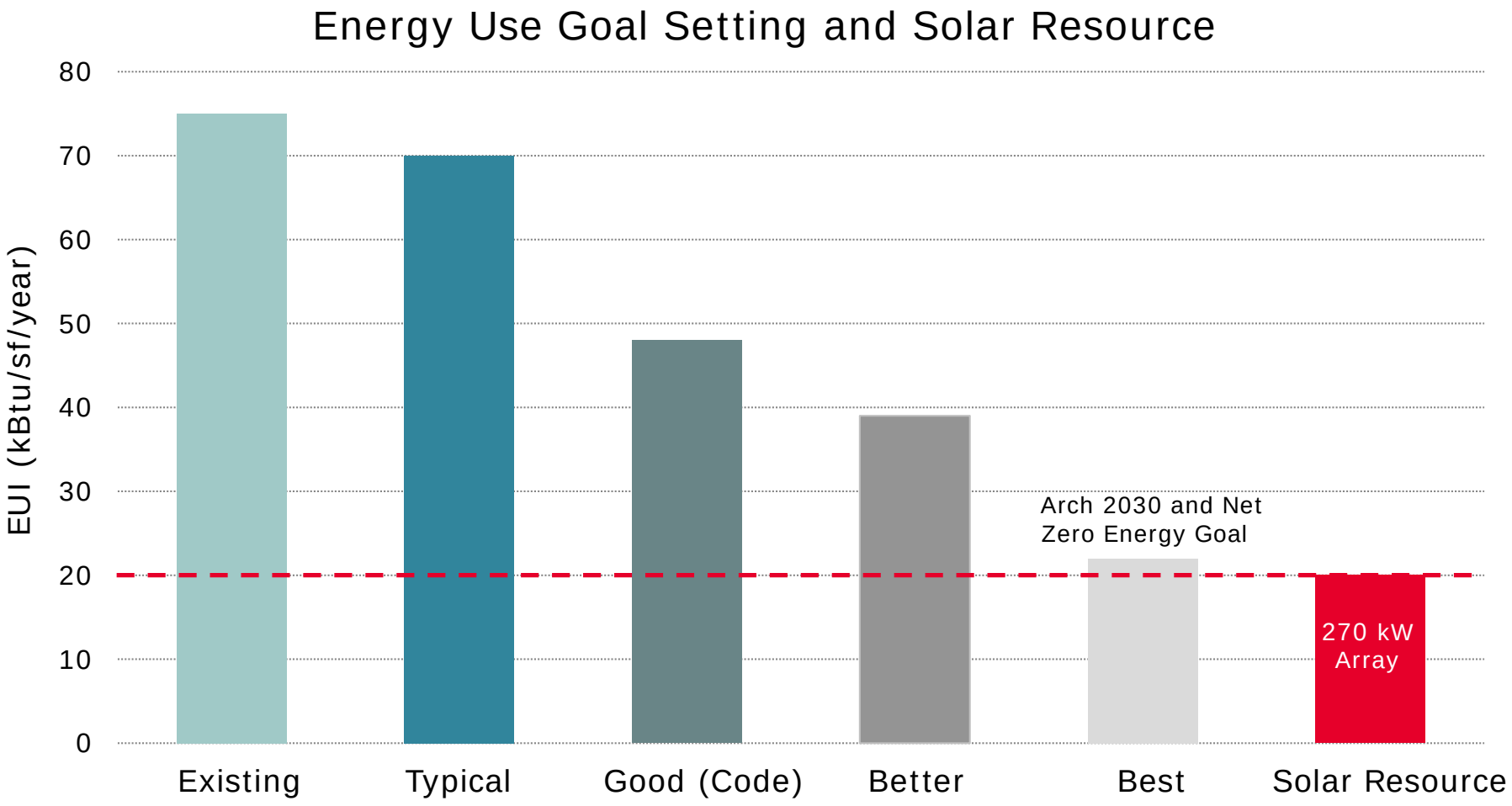
Verify Performance

Set Aggressive Goals

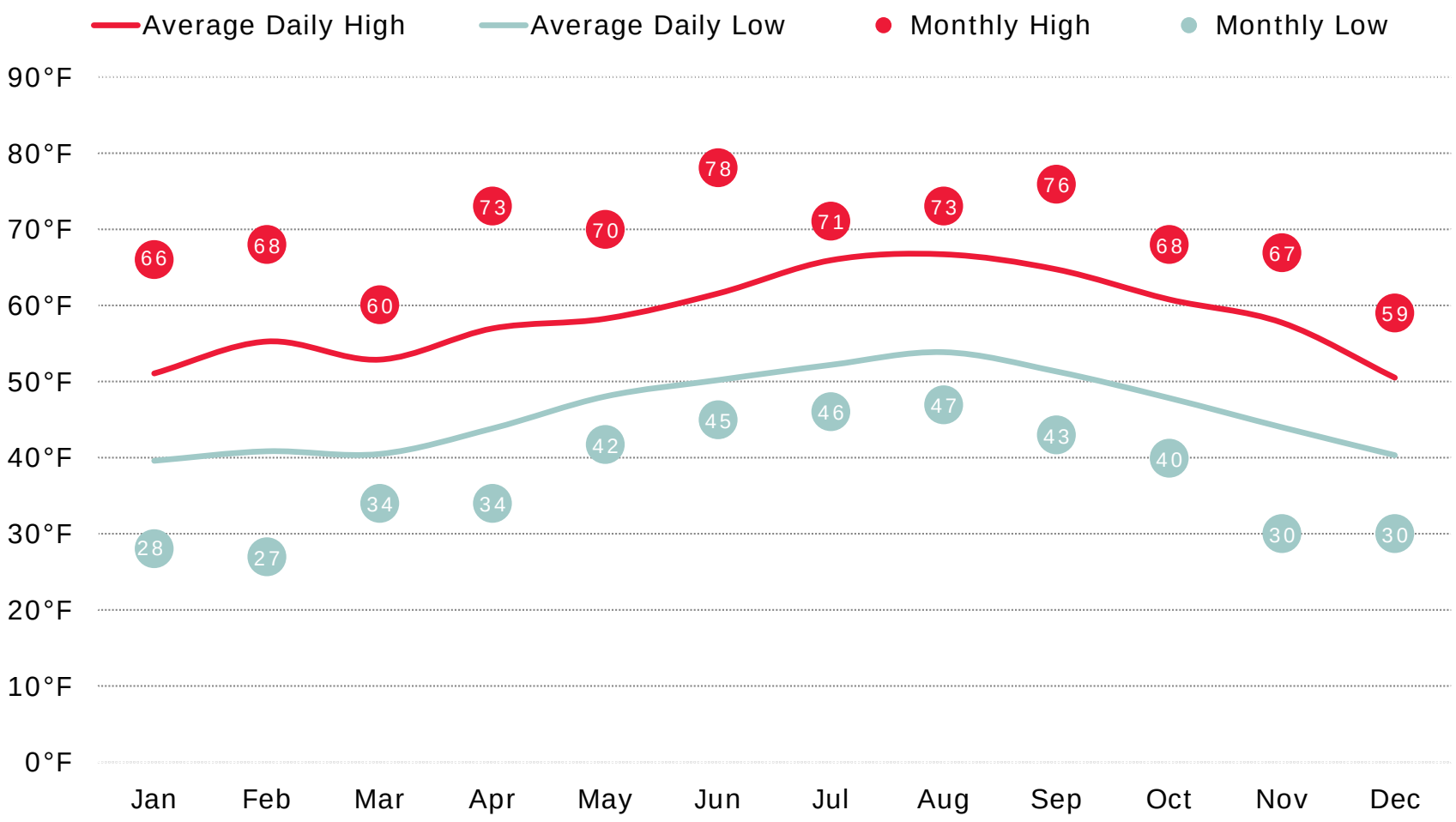
LIVING
BUILDING
CHALLENGE℠

MINERGIE-P®

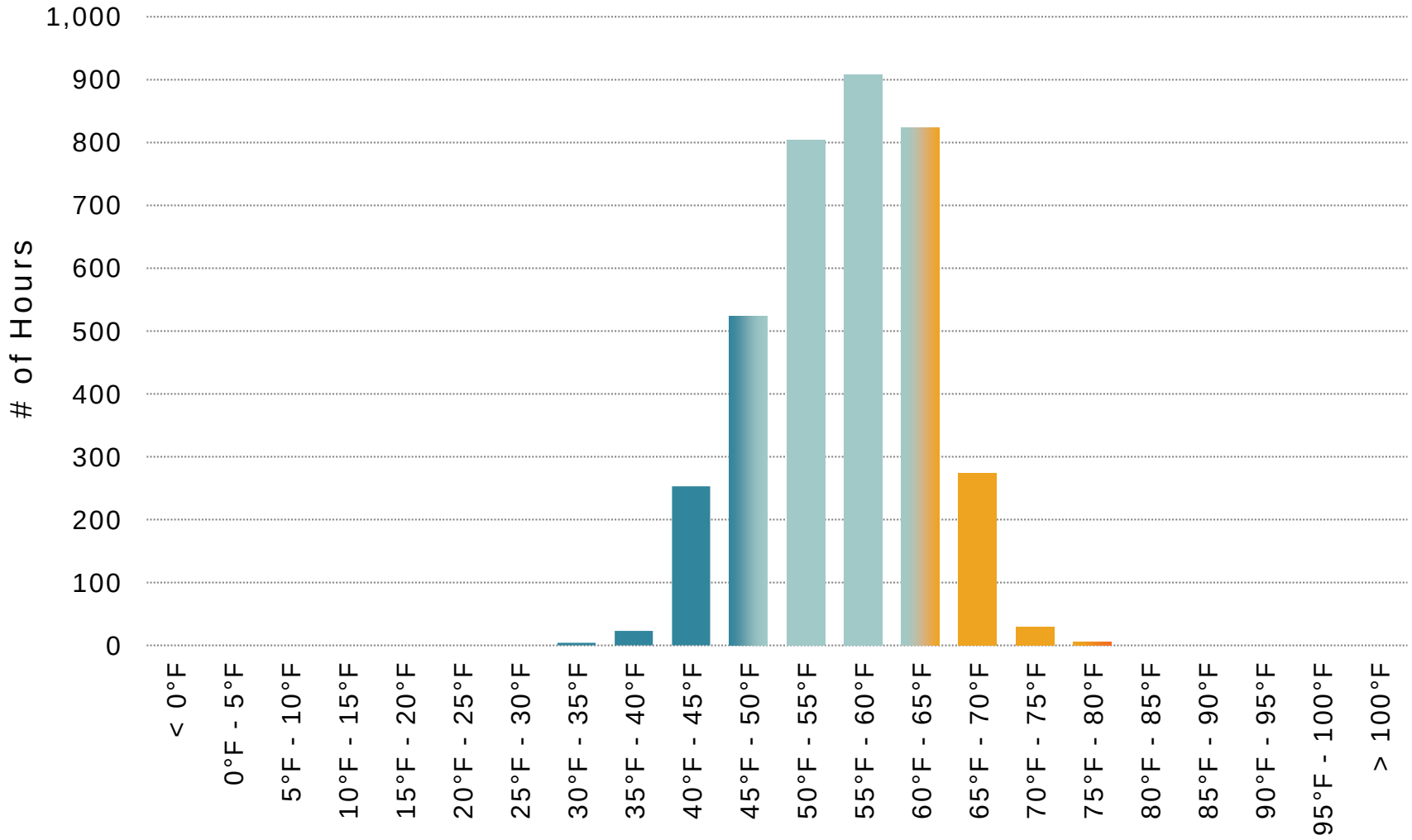
Goal Setting



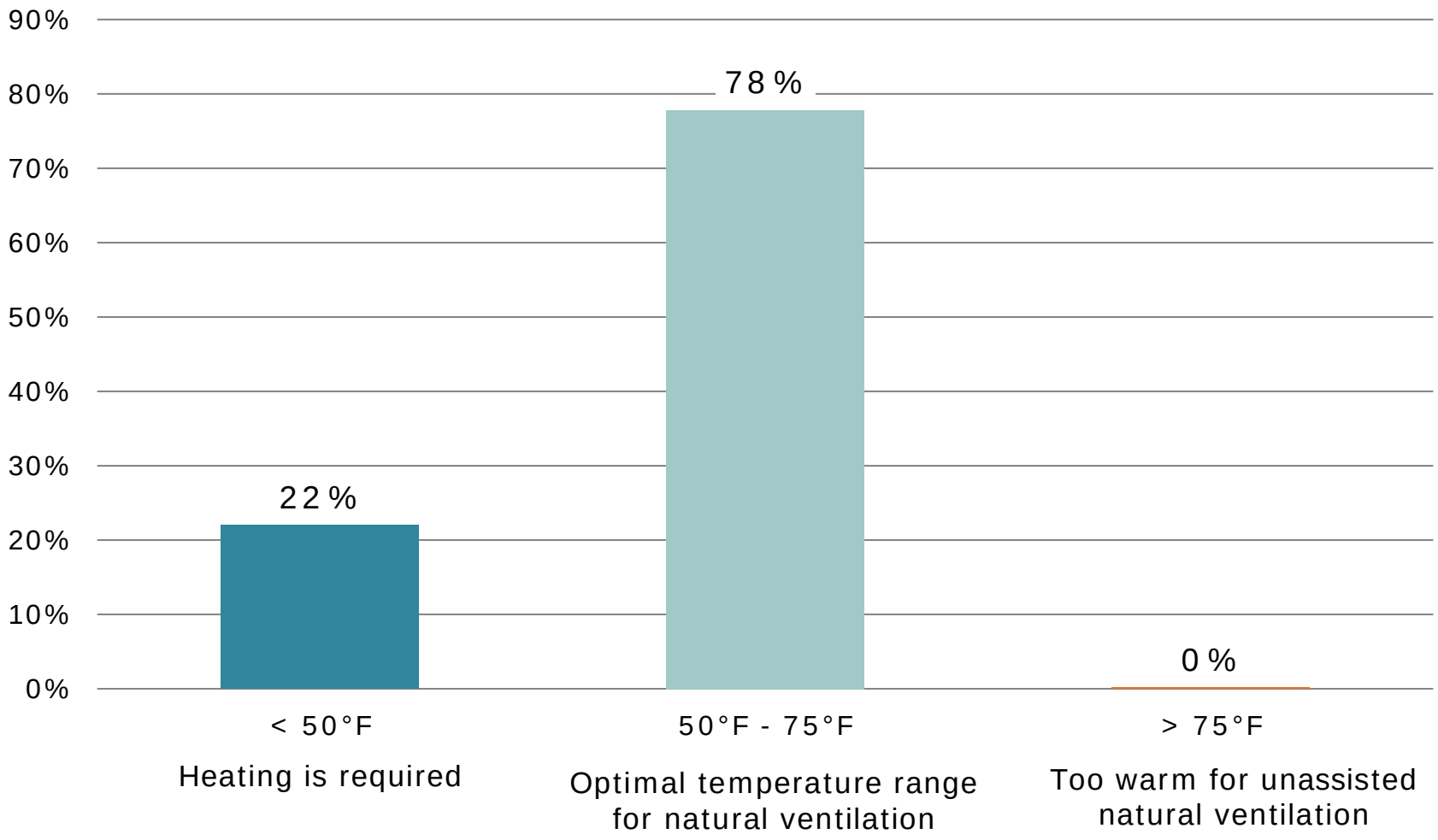
Climate Analysis – Average Monthly Temps



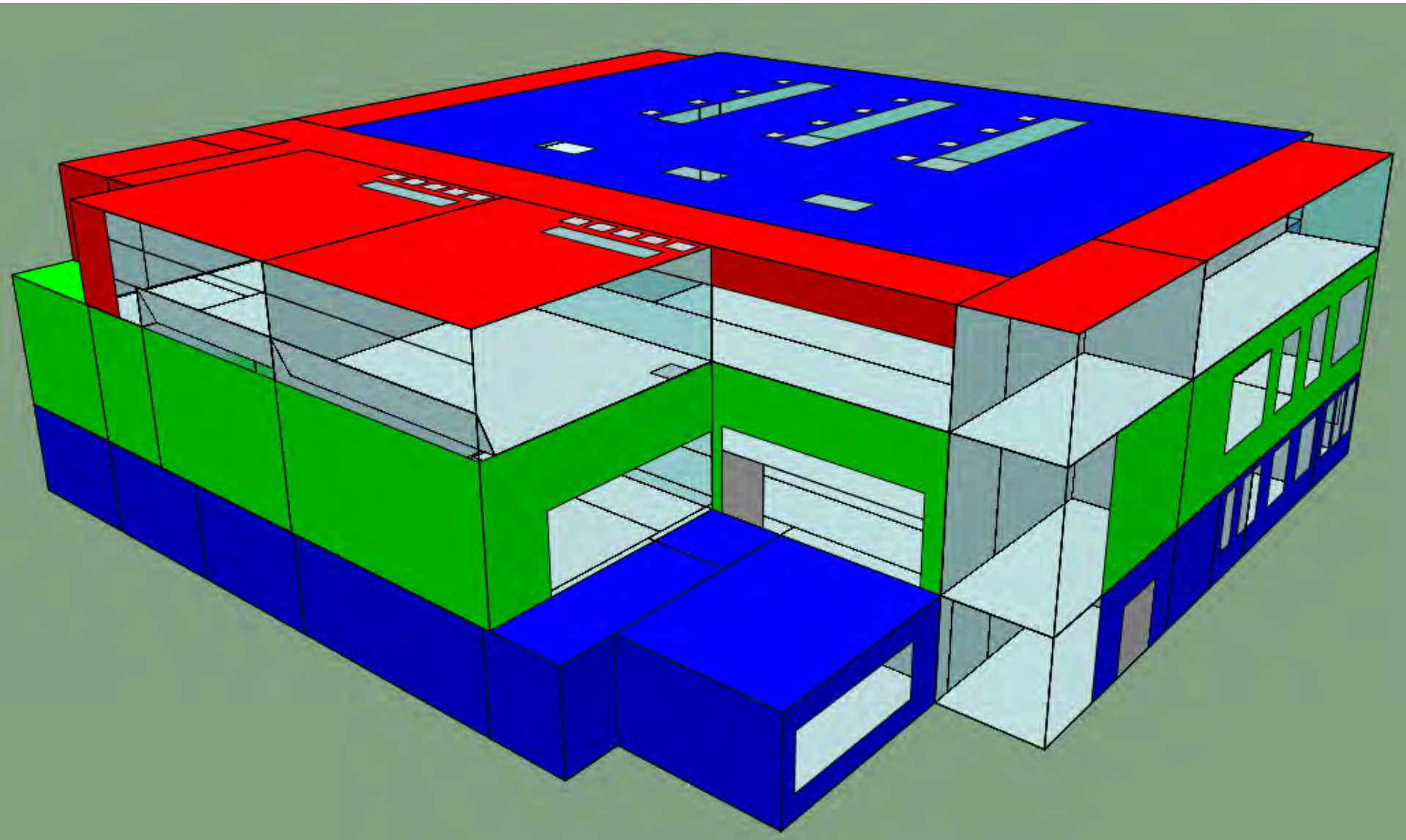
Climate Analysis – Daytime Temperature BINS



Climate Analysis – Passive Cooling Effectiveness



Energy Efficiency Measures

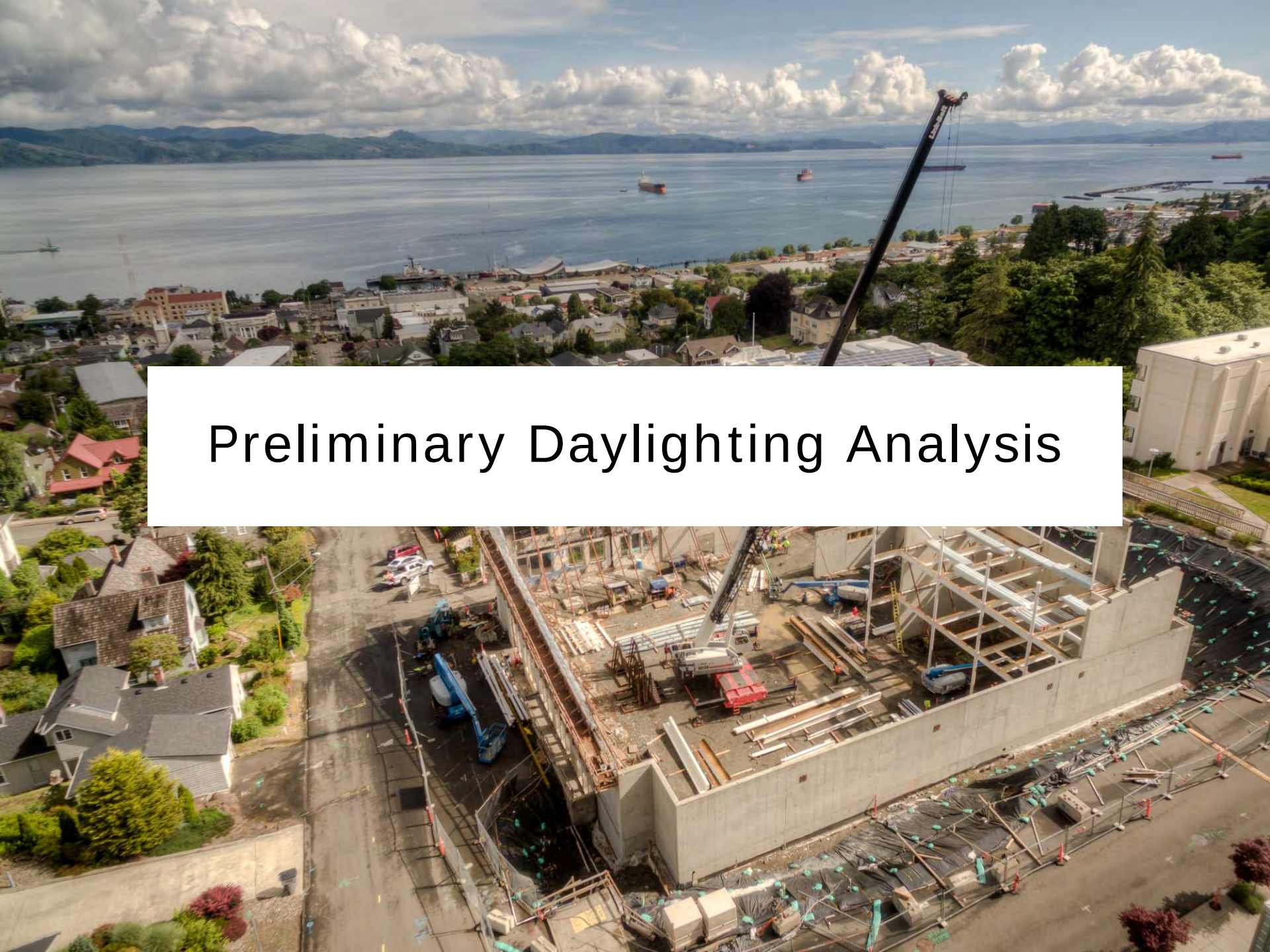


Energy Modeling

- Used to develop and test design
- Evolved in step with design
- Used sounding board to push for design revision as needed
- Used to understand the heating and cooling loads
- Used to iteratively test design strategies that reduce loads to validate passive design solutions (insulation, mass, natural ventilation, daylighting)

Efficiency Measures

- Ventilation via dedicated outside air system, assisted by operable windows/ceiling fans
- Radiant heating system
- LED lighting with daylight and occupancy control
- Tinted glazing to reduce solar gains
- Solar thermal system for service hot water



Preliminary Daylighting Analysis

Figure 1. Level 1. Court level. Daylight factor measurements taken at the equivalent of a 16 by 16 ft. grid offset by 8 ft. from the east-west grid lines as drawn to provide readings at the center of each bay.

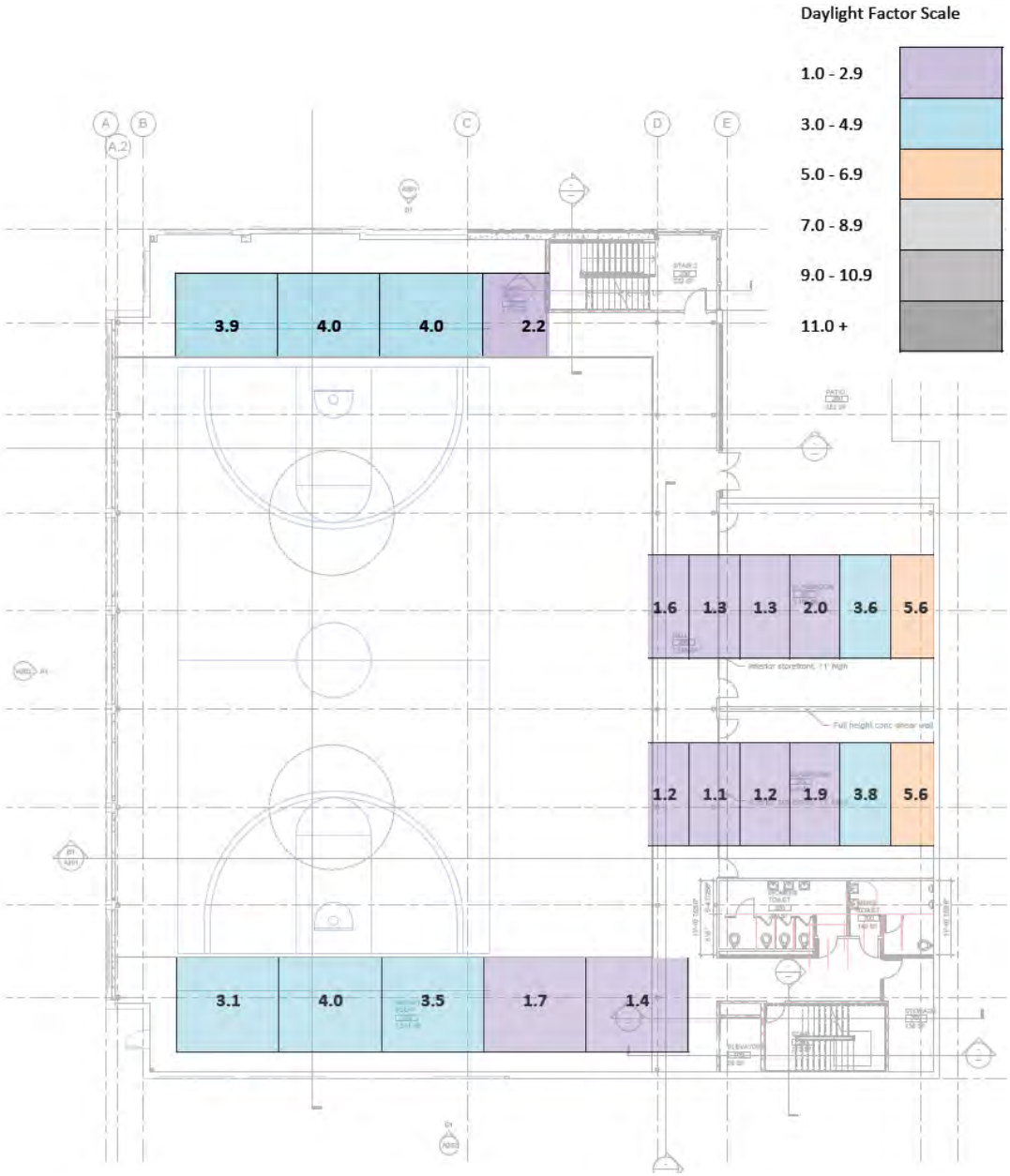


Figure 2. Level 2. Daylight factor measurements taken along the north and south areas overlooking the court at the equivalent distance of 5 1/2 ft. from the railing, and at an interval of 16 ft. between measurements. Readings were also made along the center line of each classroom extending out into the gym at 8 ft. intervals.

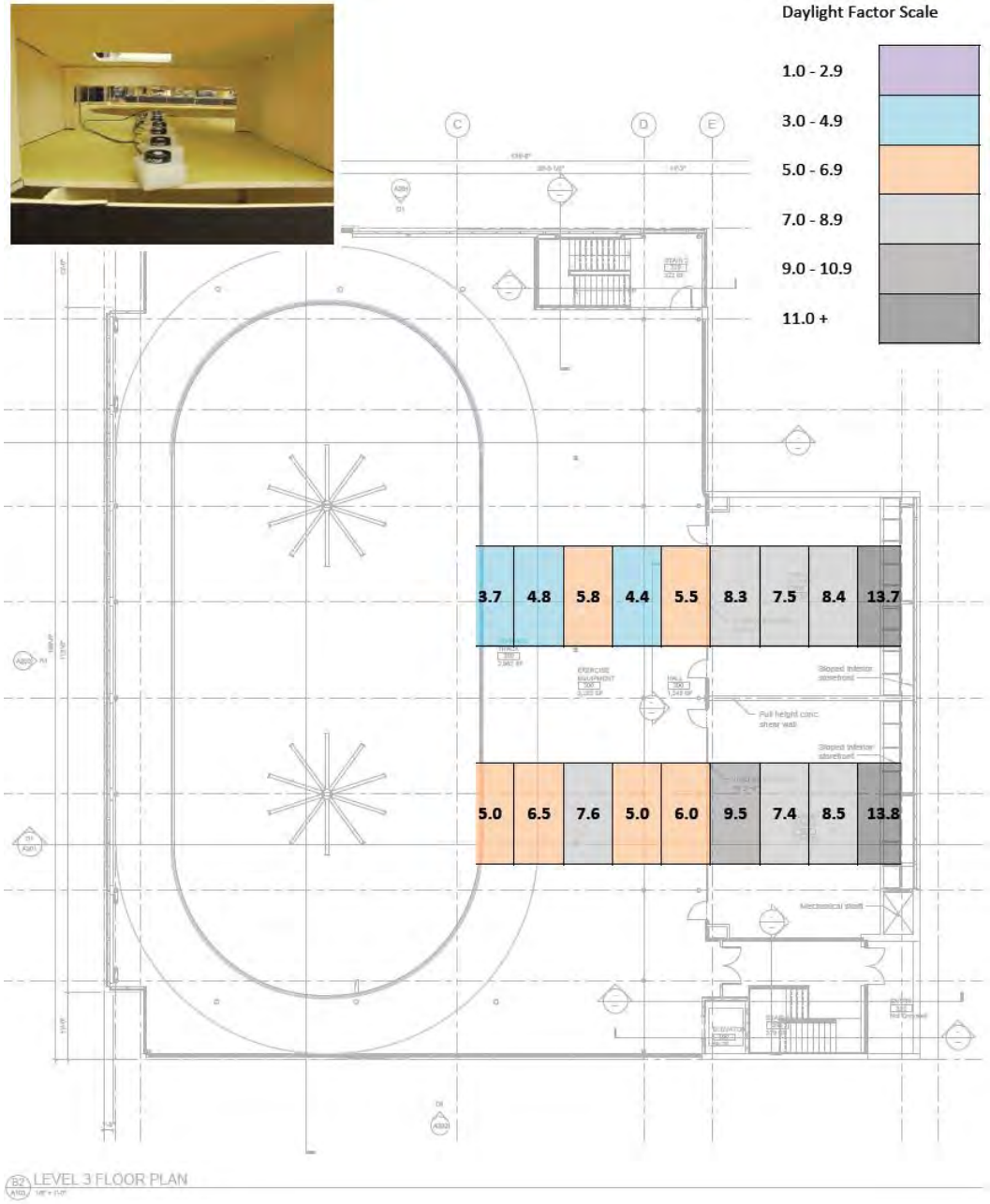


Figure 3. Level 3. Daylight factor measurements taken along the center line of each studio space at the equivalent of 8 ft. intervals from the window wall and extending out to the track.

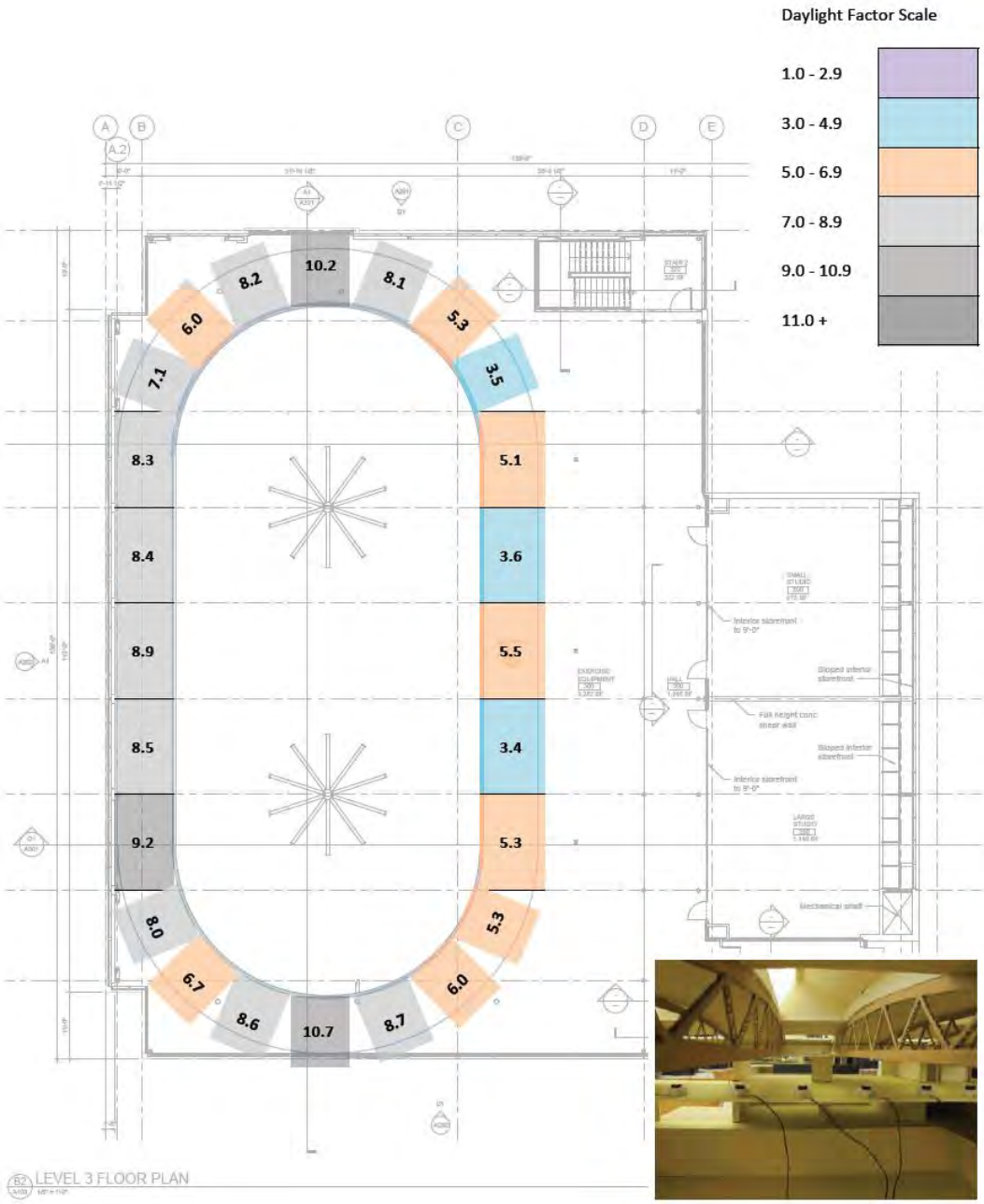


Figure 4. Level 3. Daylight factor measurements taken around the track at the equivalent of 5 1/2 ft. from the railing, or half the distance between the railing and the west wall. The interval between measurements along the straightaways is the equivalent of 16 ft.

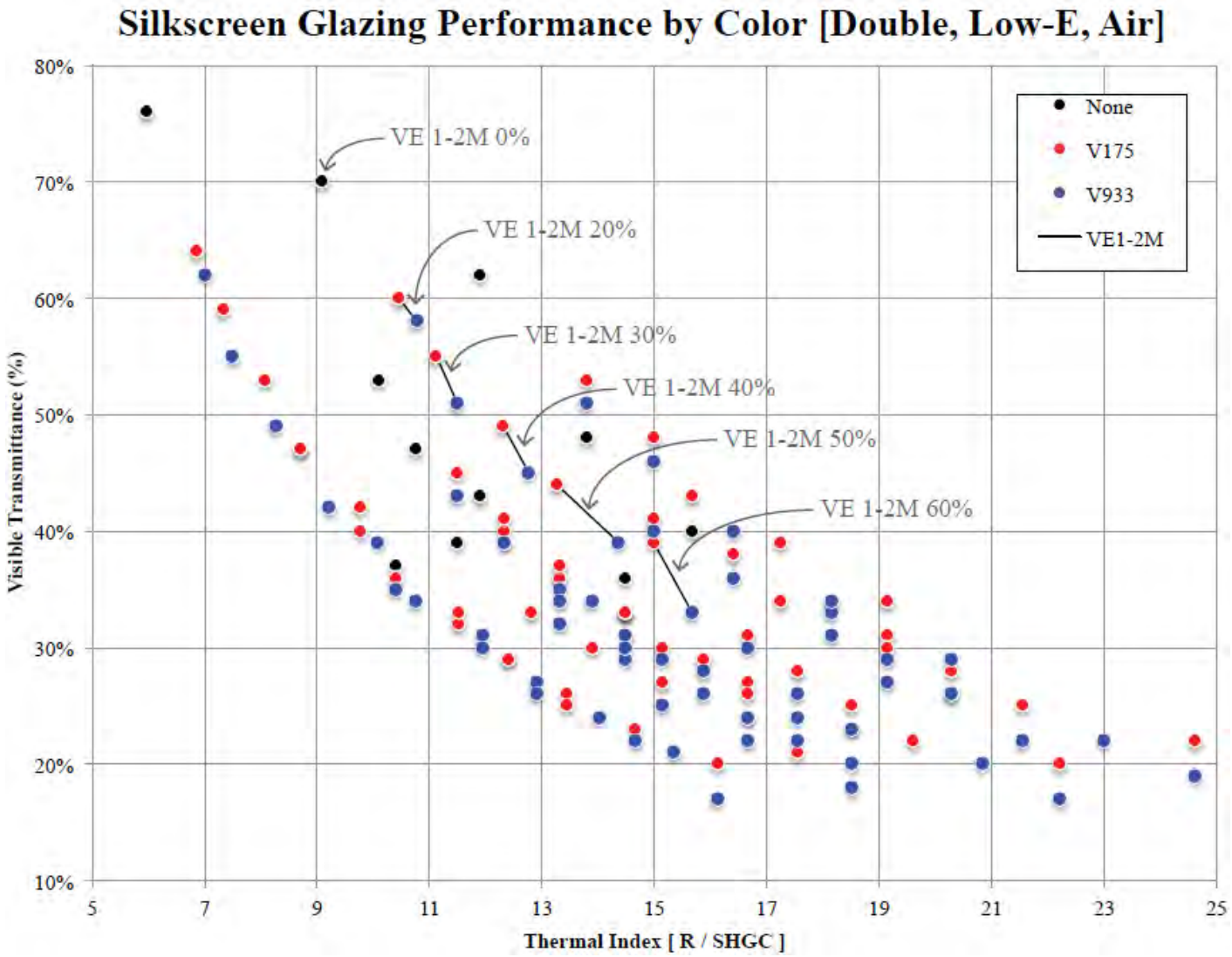


Figure 1. Silk-screen glazing performance displayed by ceramic frit color: white - V175, warm gray - V933, and no frit.

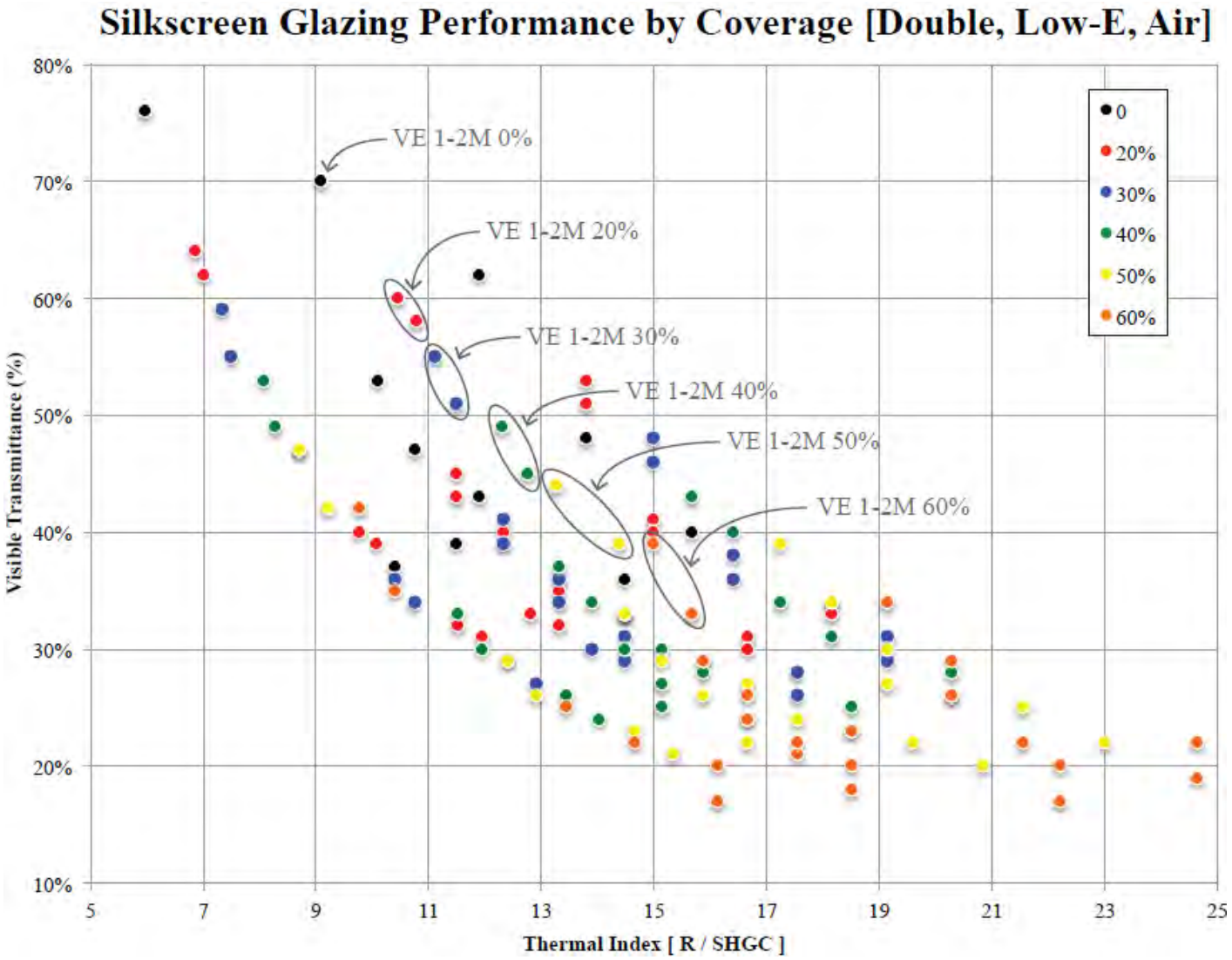


Figure 2. Silk-screen glazing performance displayed by ceramic frit coverage percentage.

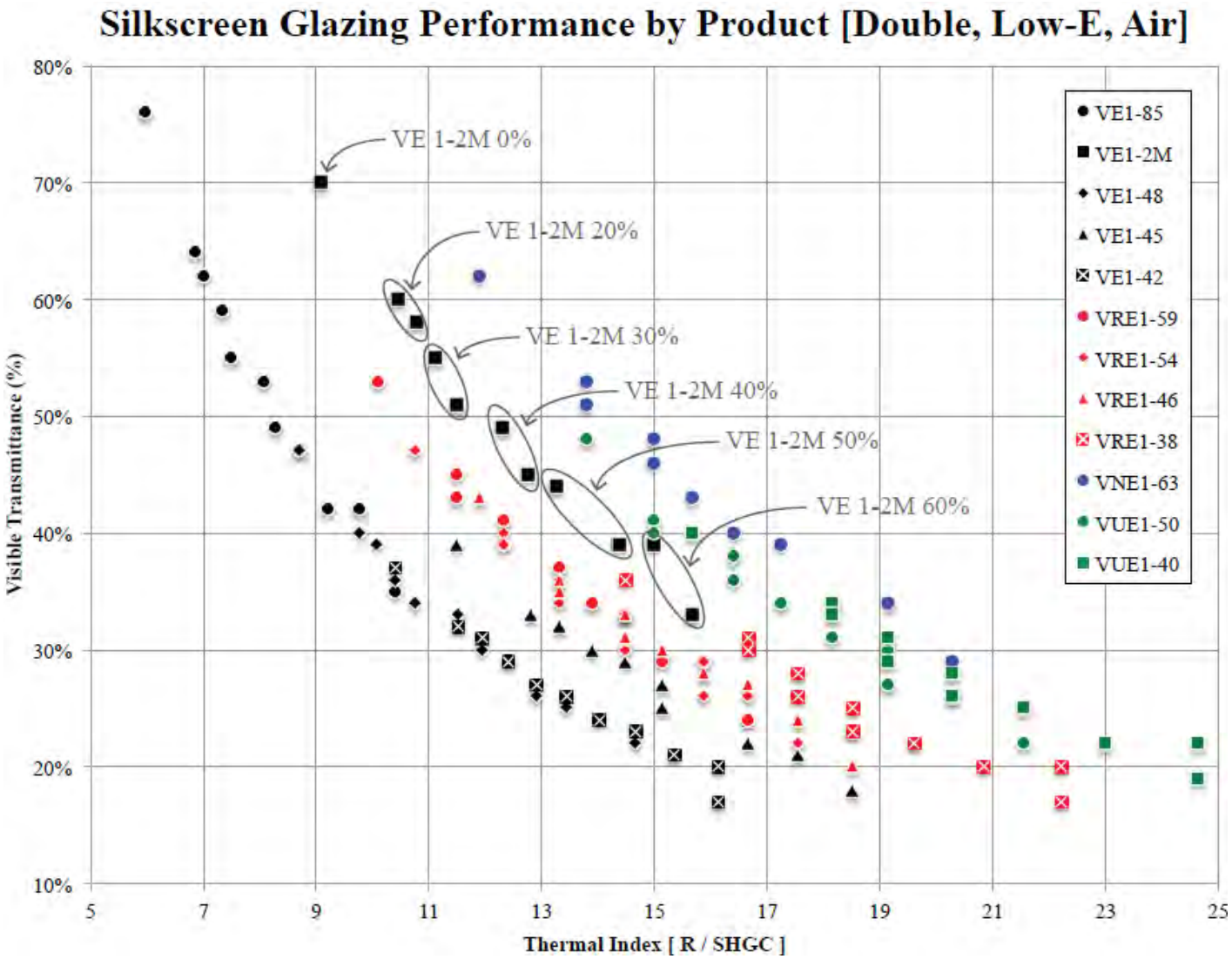
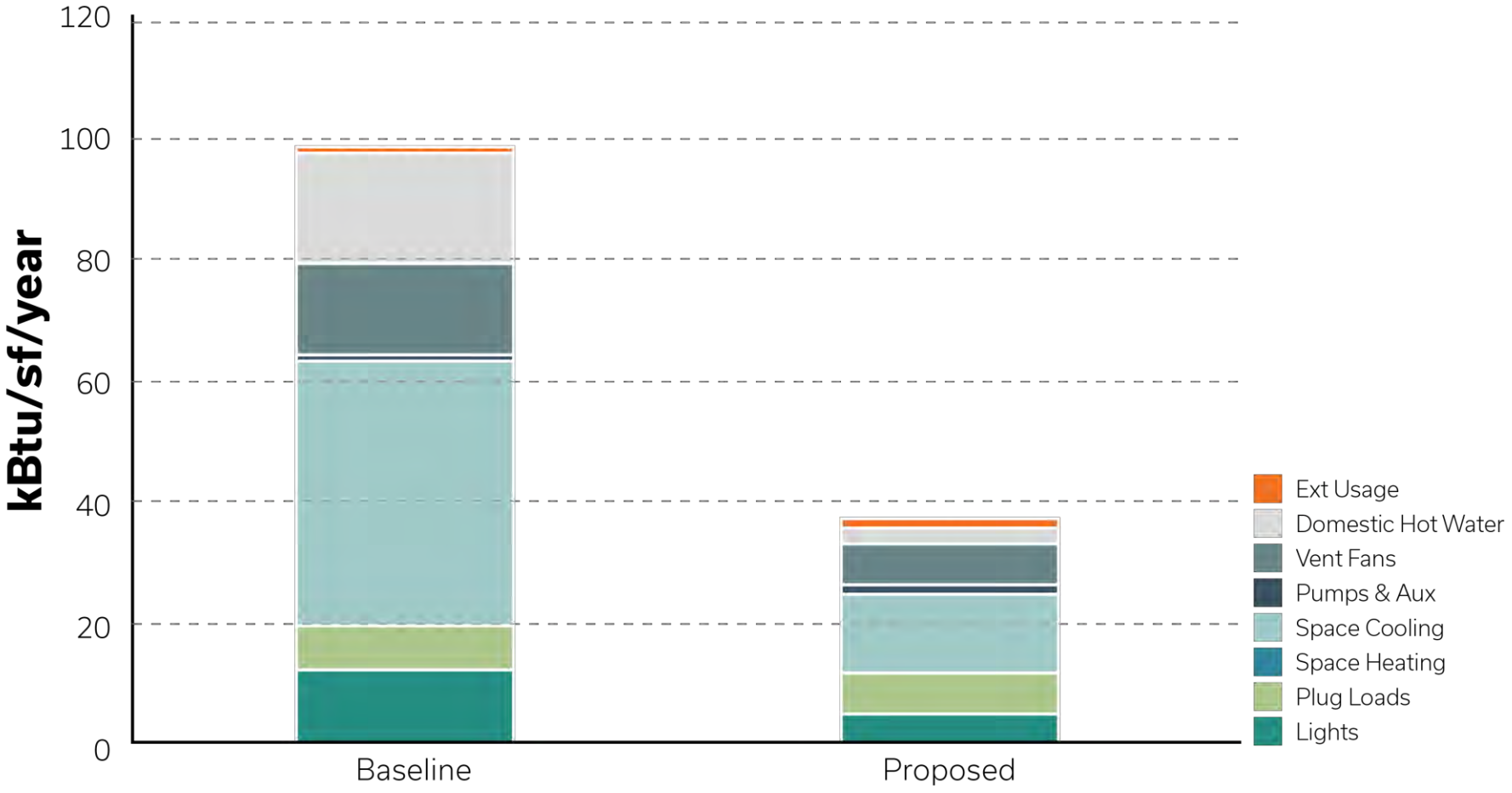
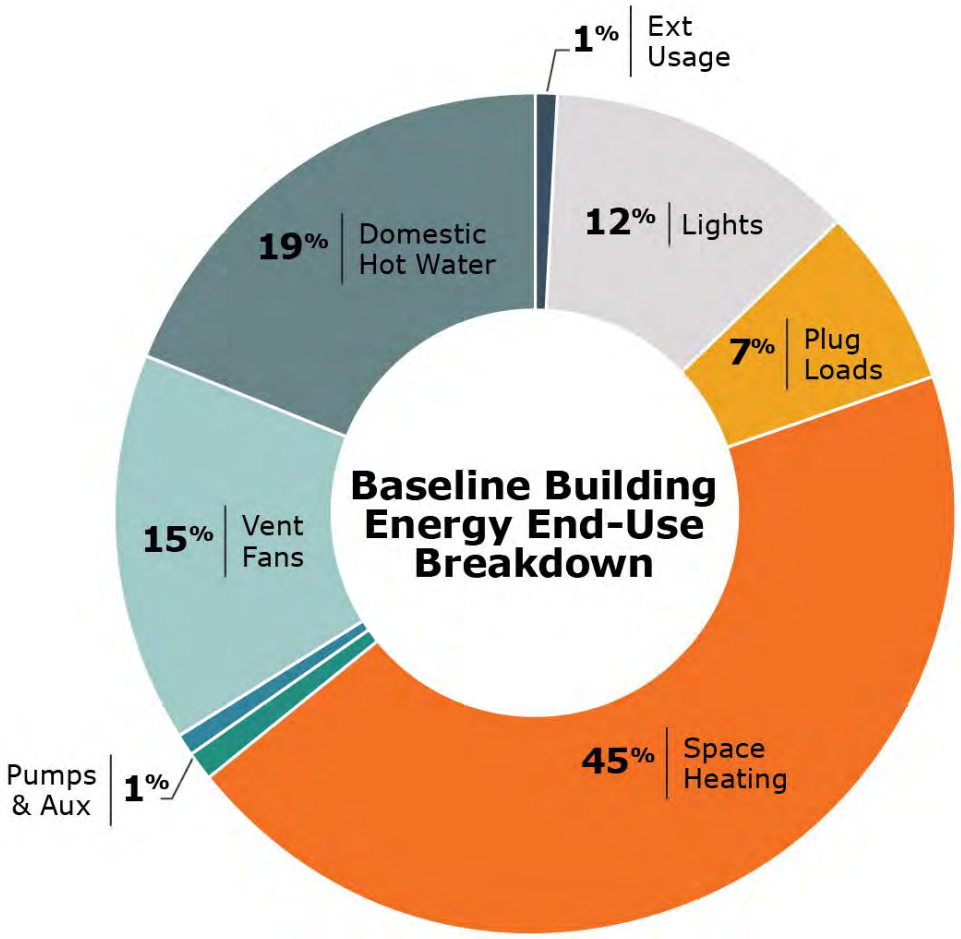


Figure 3. Silk-screen glazing performance displayed by four glazing series (marker color) and twelve glazing products (marker color & symbol).

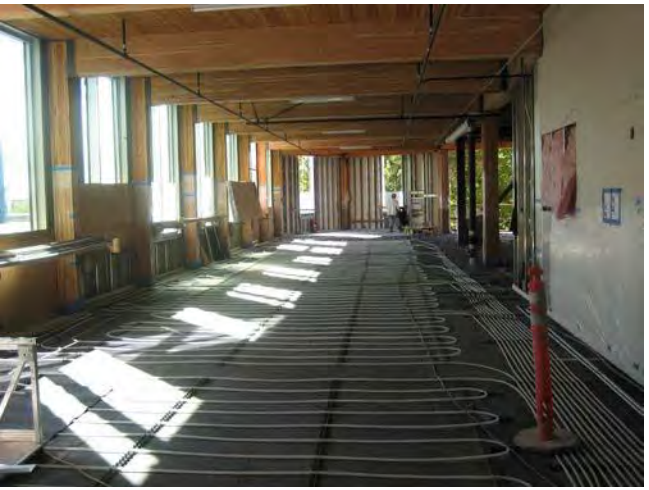
Energy Modeled Performance



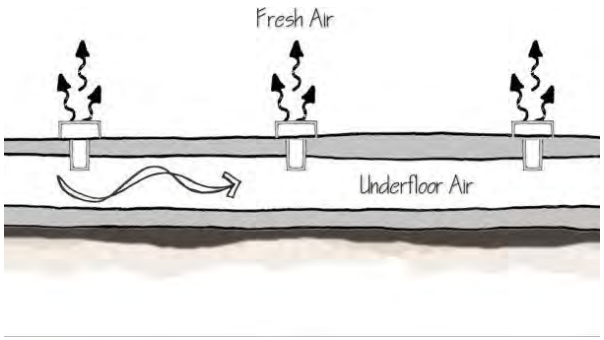
Baseline Building Energy Use



Choose Efficient Systems

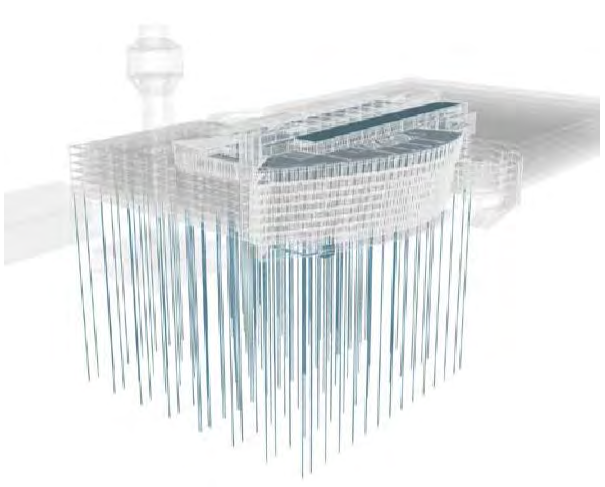


Radiant Floor

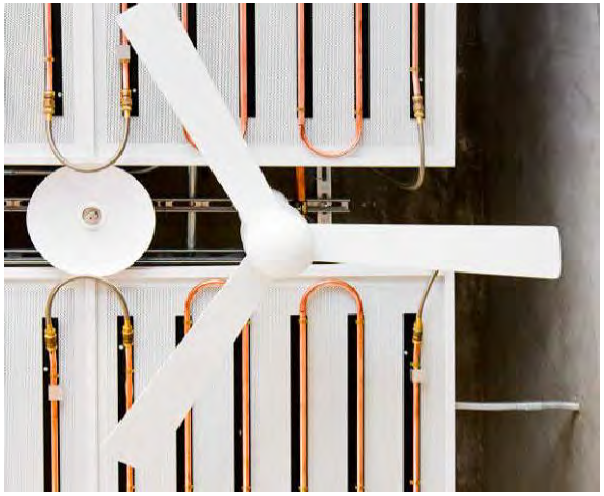


Underfloor Air

Natural Ventilation



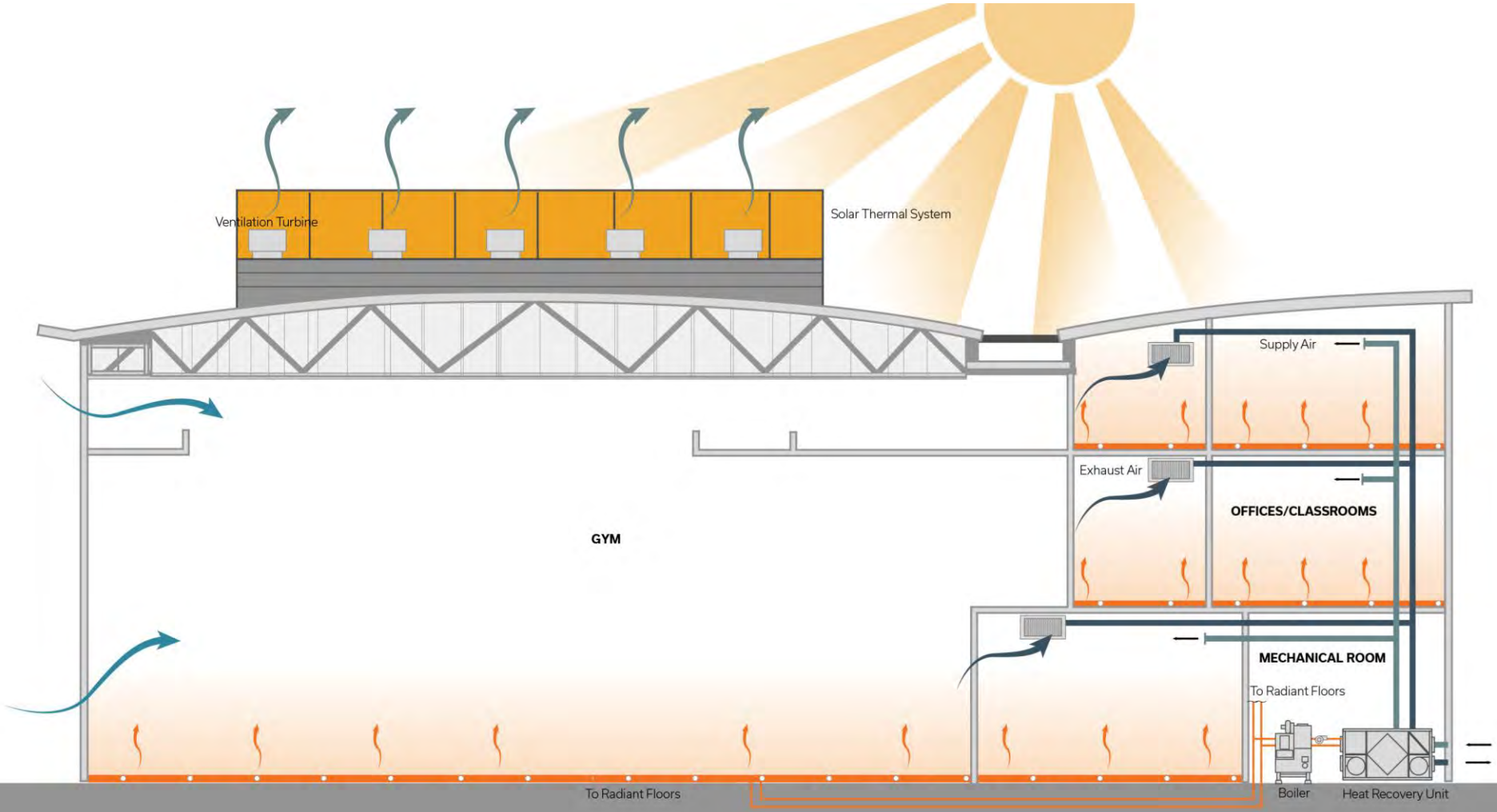
Geothermal



Radiant Ceilings

VRF

Opt for Renewables



Verify Performance