



The NextGen in Passive Design:

High Rise, All-Electric:
Seniors enjoy it all at
Terwilliger Plaza



Peter Houseknecht

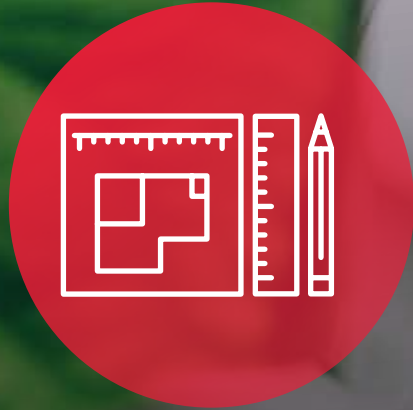
LRS ARCHITECTS | SENIOR ARCHITECT



Dan Luddy

PAE | ASSOCIATE

LEARNING OBJECTIVES



Renaissance of Passive Design

Passive design is seeing a renaissance from single-family housing to larger-scale projects. Participants will learn how this commercial project “penciled out” and give tools for other projects.

LEARNING LEVEL: INTERMEDIATE



Getting to Yes

The ownership buy-in journey in everything from technical aspects to design is essential. We show how to use data-driven analysis to inform design.



Overcoming Roadblocks with Facade Optimization

Learn multiple ways how the design team overcame perceived roadblocks by pivoting engineering design with simplified facade optimization to achieve tangible sustainability goals.



Applying Data to Define Passive Solutions

Understand how energy modeling and life cycle analysis informed the passive requirements in MEP systems, as well as how passive design strategies relate to buildings resiliency goals.



Parkview at Terwilliger Plaza

Terwilliger Plaza empowers members to maintain active and engaged lives within a supportive residential community by providing a stimulating environment and embracing representative self-governance.

- Terwilliger Plaza is a non-profit continuing care senior living facility
- A downtown urban campus consisting of 3 interconnected buildings
- Parkview a new full city block 326,000 sf independent living housing project
- Consists of 127 units, amenity spaces and underground parking
- All electric high rise connected to campus via a sky bridge



TARGETING:
PHIUS + 2018
Certification

PROJECT GOALS

OWNER REQUIREMENTS



**Luxury
Apartments with
Amenities**



**Thermal
Comfort**



**Indoor
Air Quality**



**Lighting
Levels**



**Top of the
Line Appliances**



**Need for
Larger Facility**

An aerial photograph of a winding asphalt road with white dashed lines, curving through a dense, vibrant green forest. A small stream flows through the center of the forest, surrounded by rocks. A single white car is visible on the road in the upper left quadrant. The overall scene is bright and natural.

Stakeholder Buy-in Journey

Why Passive House?

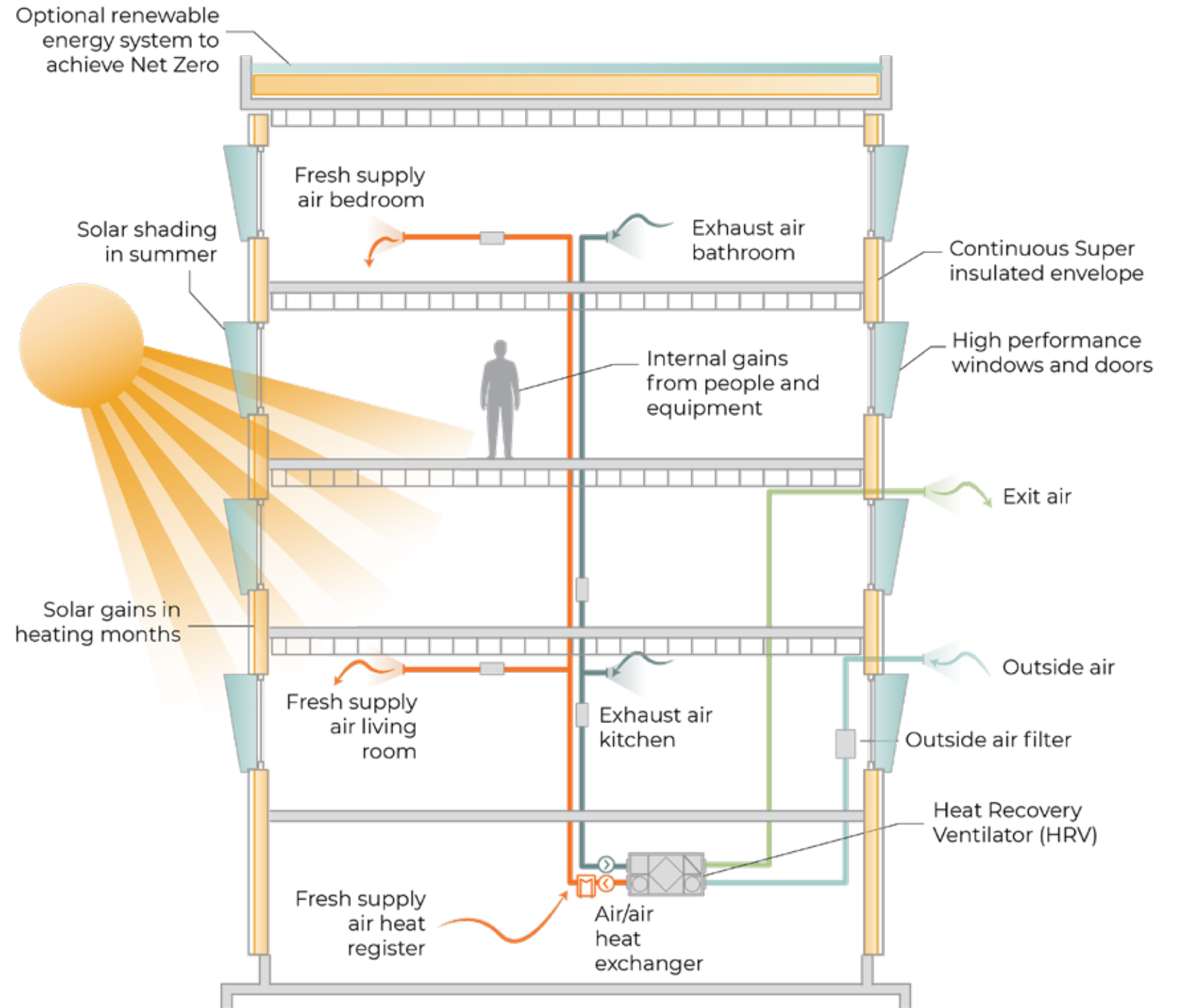
Passive House recommended because:

- Uncertain design budget – conservation became the baseline
- Client wanted cost effective tangible results
- Passive and inherent energy reducing principals
- No added maintenance or operational requirements
- Thermal comfort and quiet interior spaces suited to senior living
- Foundation for higher sustainable design goals



Multifamily Advantages to Passive House

- Less envelope area relative to internal volume
- Internal heat gain offsets envelope heat loss
- Greater HVAC system options at large scale

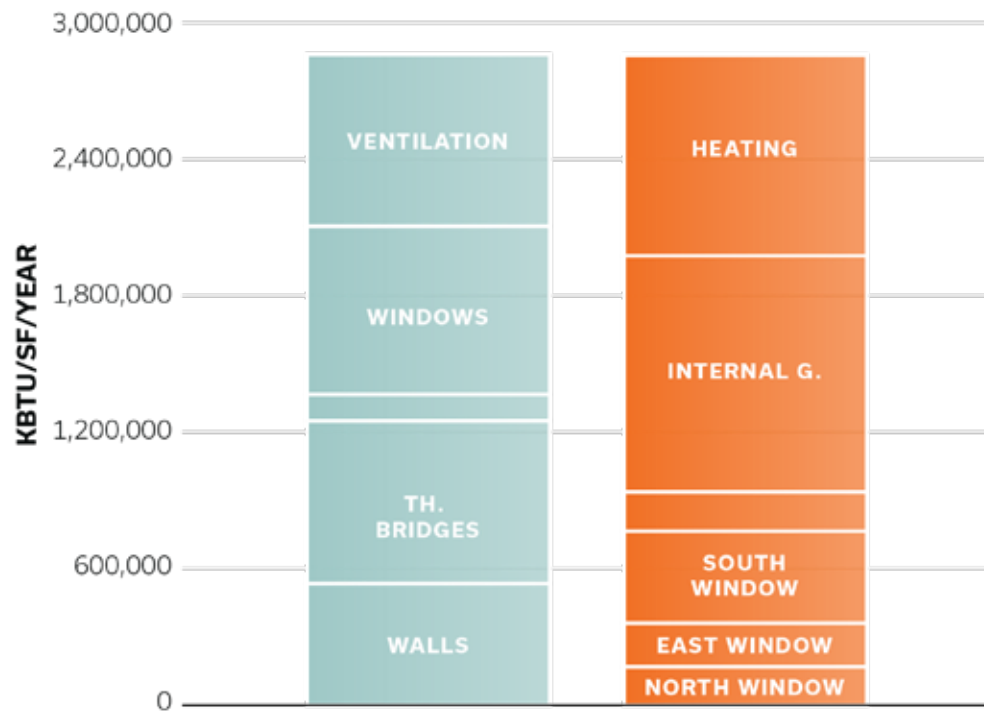


A photograph of two men in a meeting. The man in the foreground, wearing a green sweater and glasses, is writing on a whiteboard with a blue marker. The man in the background, wearing a blue sweater, is also writing on the whiteboard. The whiteboard has some blue lines and text written on it. The background shows a window with a view of a city.

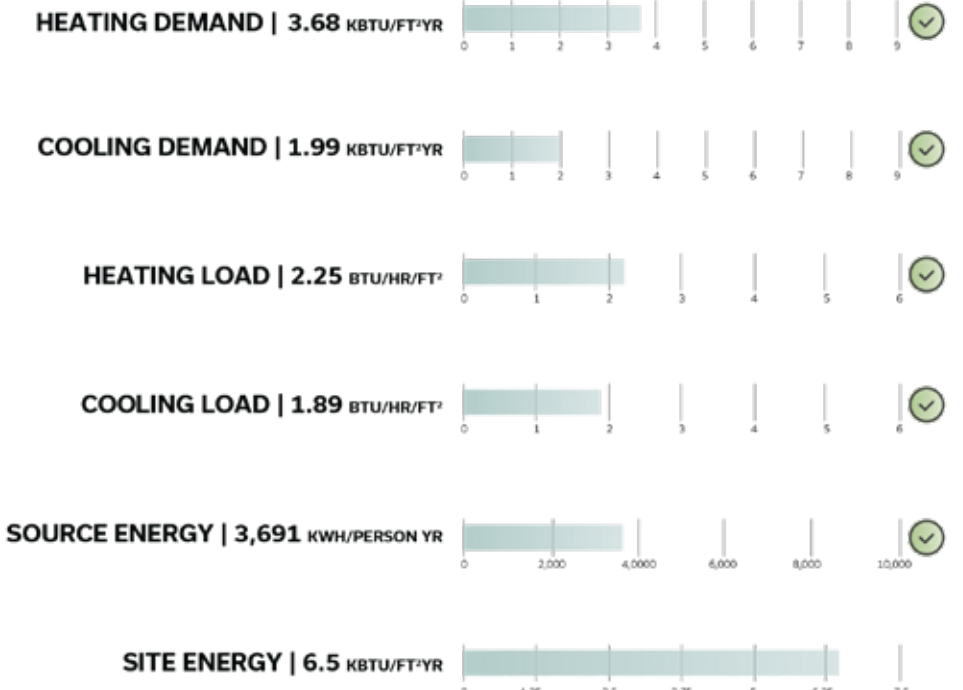
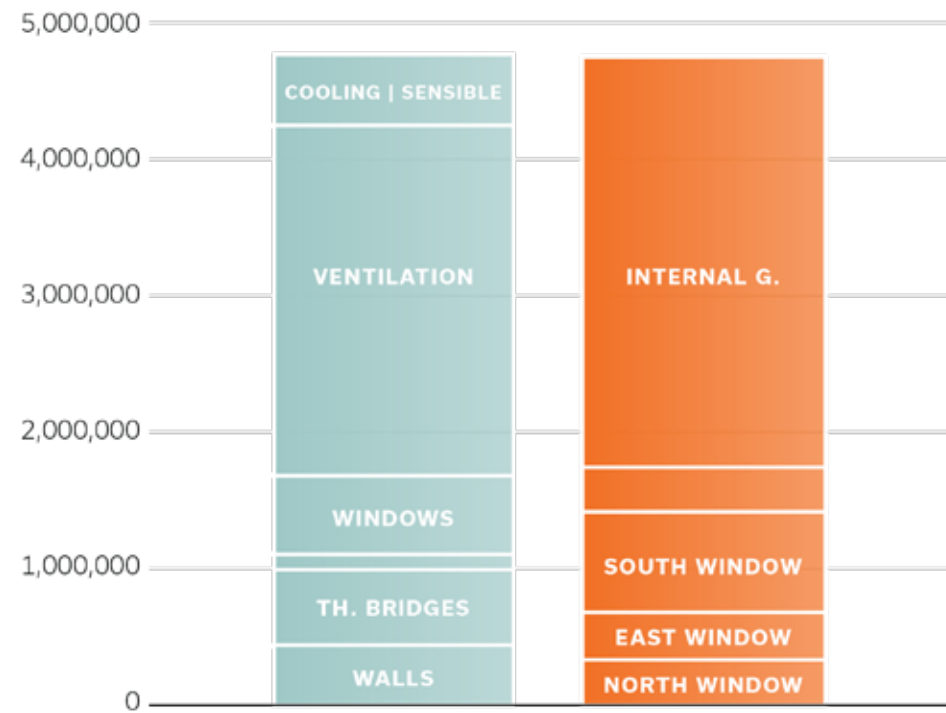
Data-driven Design and Lessons-learned

Early Design Analysis

WINTER ENERGY BALANCE



SUMMER ENERGY BALANCE



30 Year Life Cost Analysis

 **Discount Rate**
(does not include inflation)

 **30 Year Analysis Period**

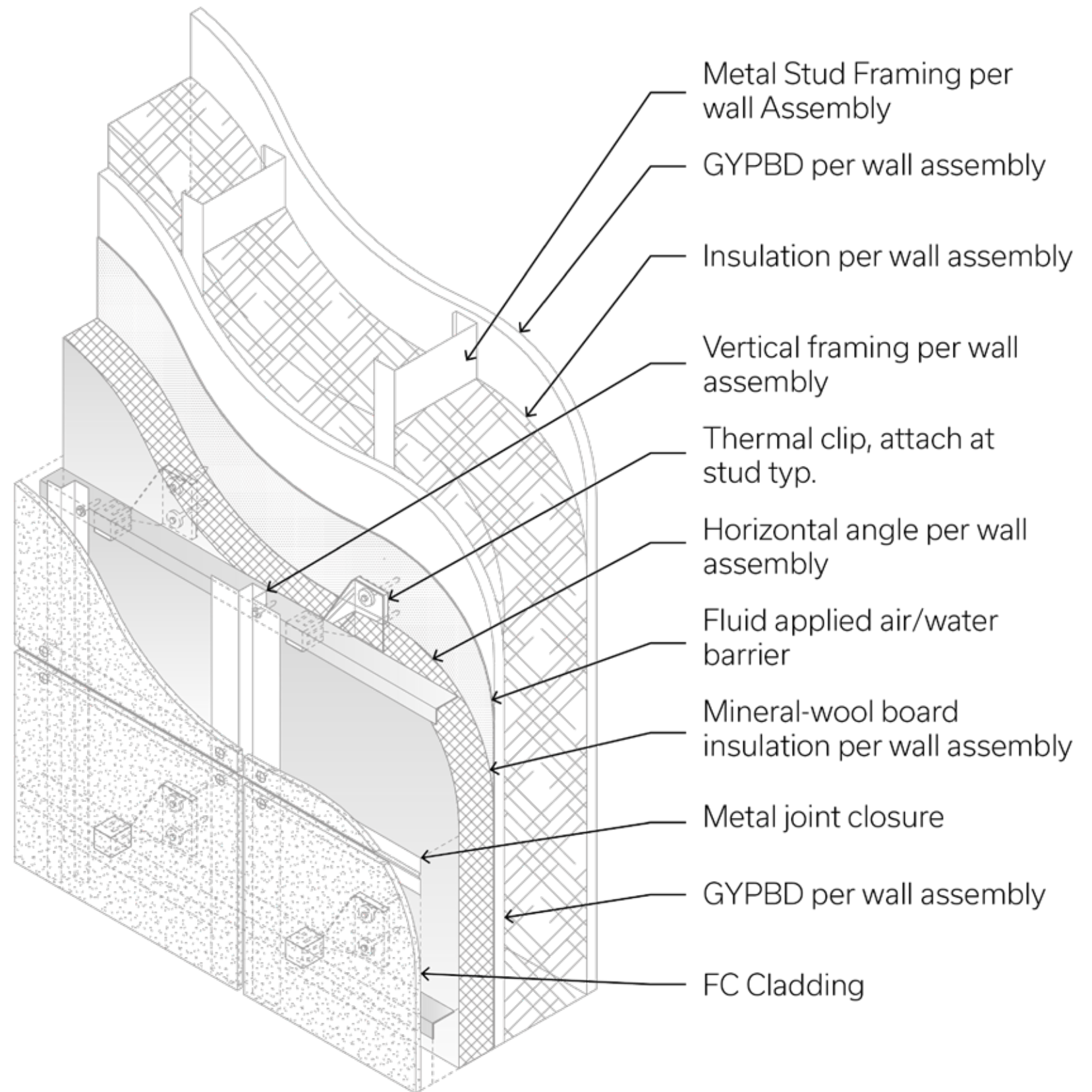
 **5% Utility Rate**
(based on DOE calculator)



A detailed architectural rendering of a modern, multi-story residential building. The building features a mix of light-colored concrete panels and dark brown accents, with large glass windows and balconies. The balconies have glass railings and some have potted plants. In the foreground, there is a well-maintained courtyard with a paved walkway, several large planters containing various green and pink flowering plants, and a few people walking or sitting on benches. A large white patio umbrella is visible on the left side. The overall atmosphere is bright and modern.

Envelope Details

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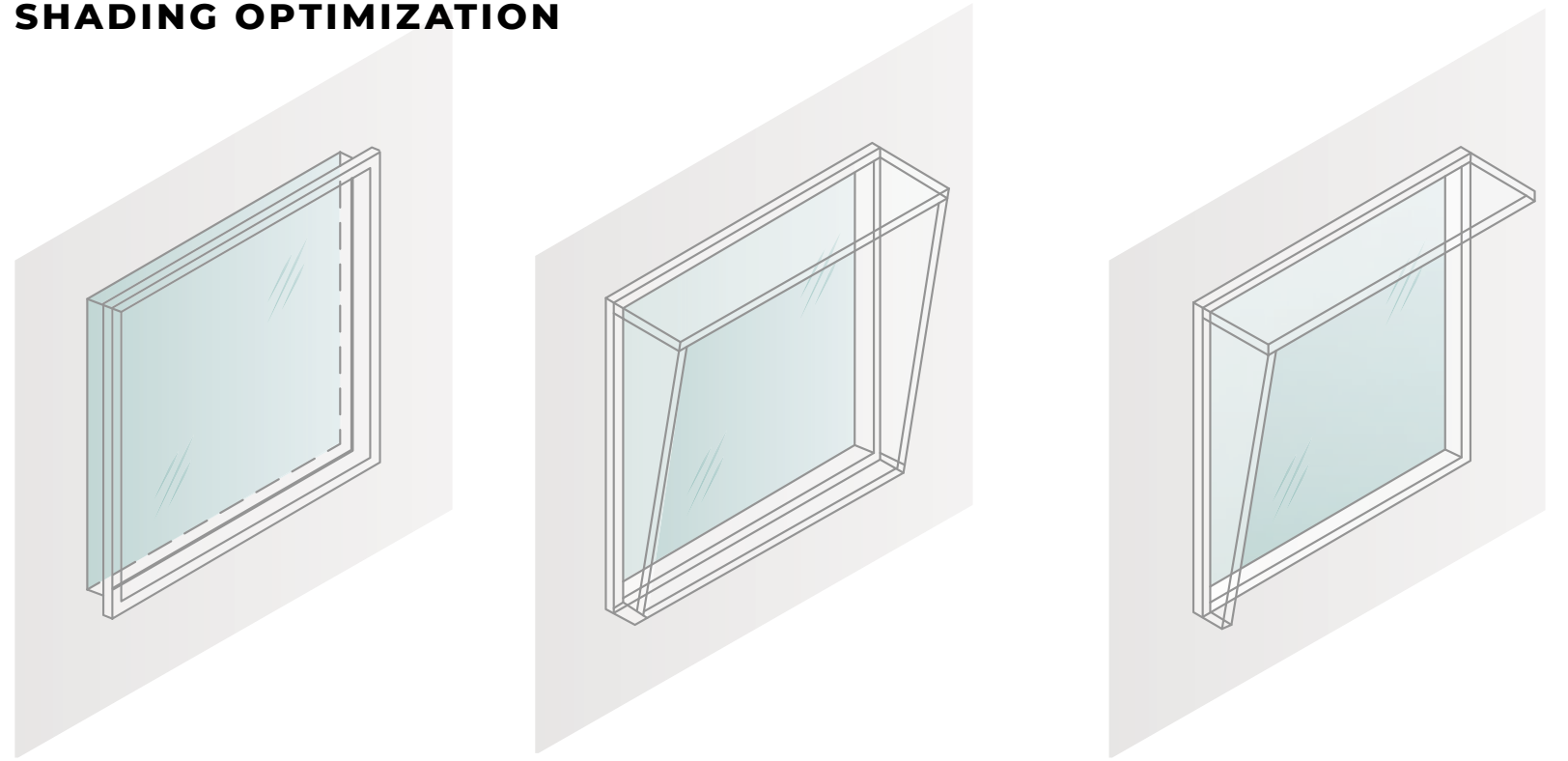


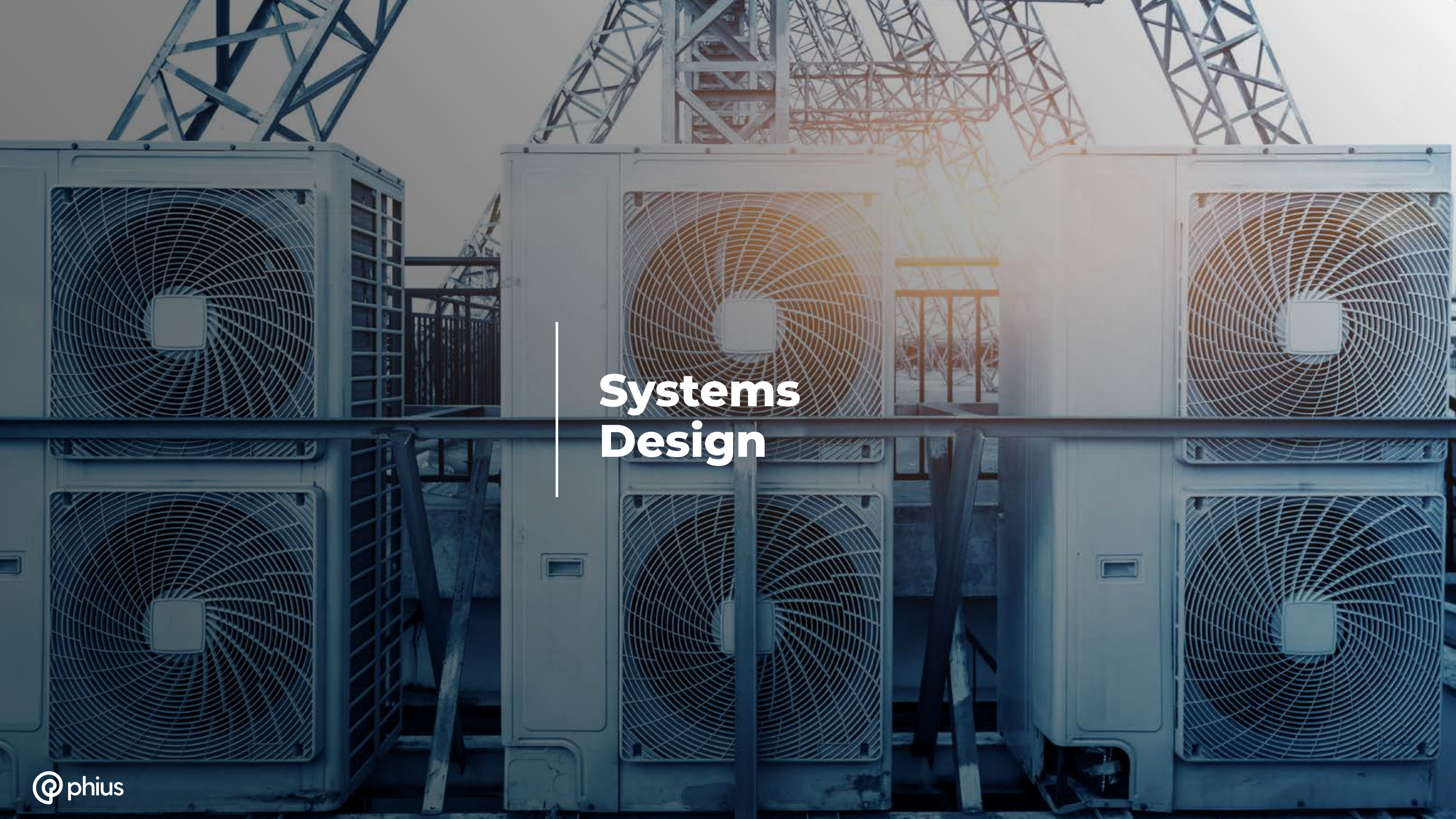
Envelope Details

WINDOW PERFORMANCE



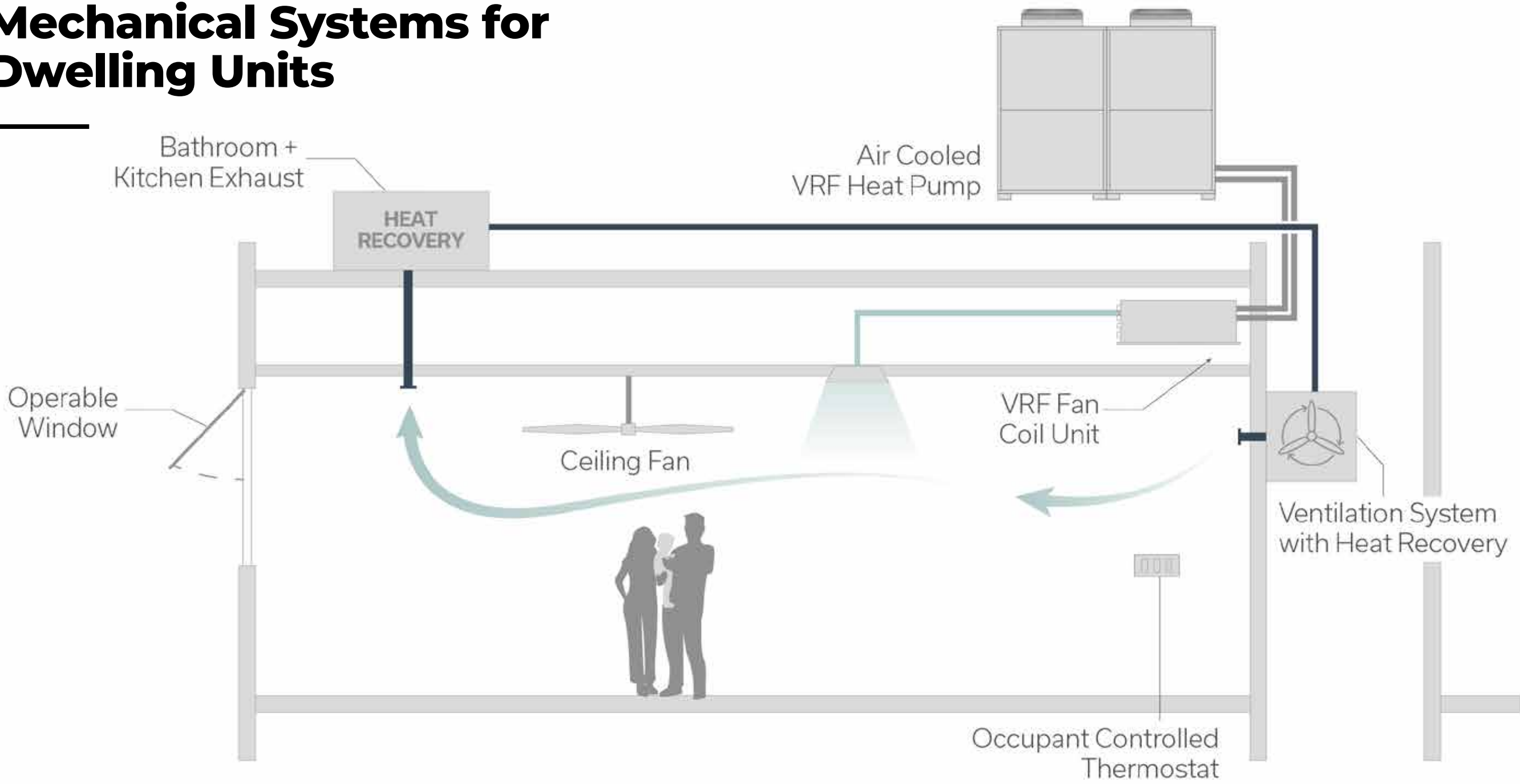
SHADING OPTIMIZATION



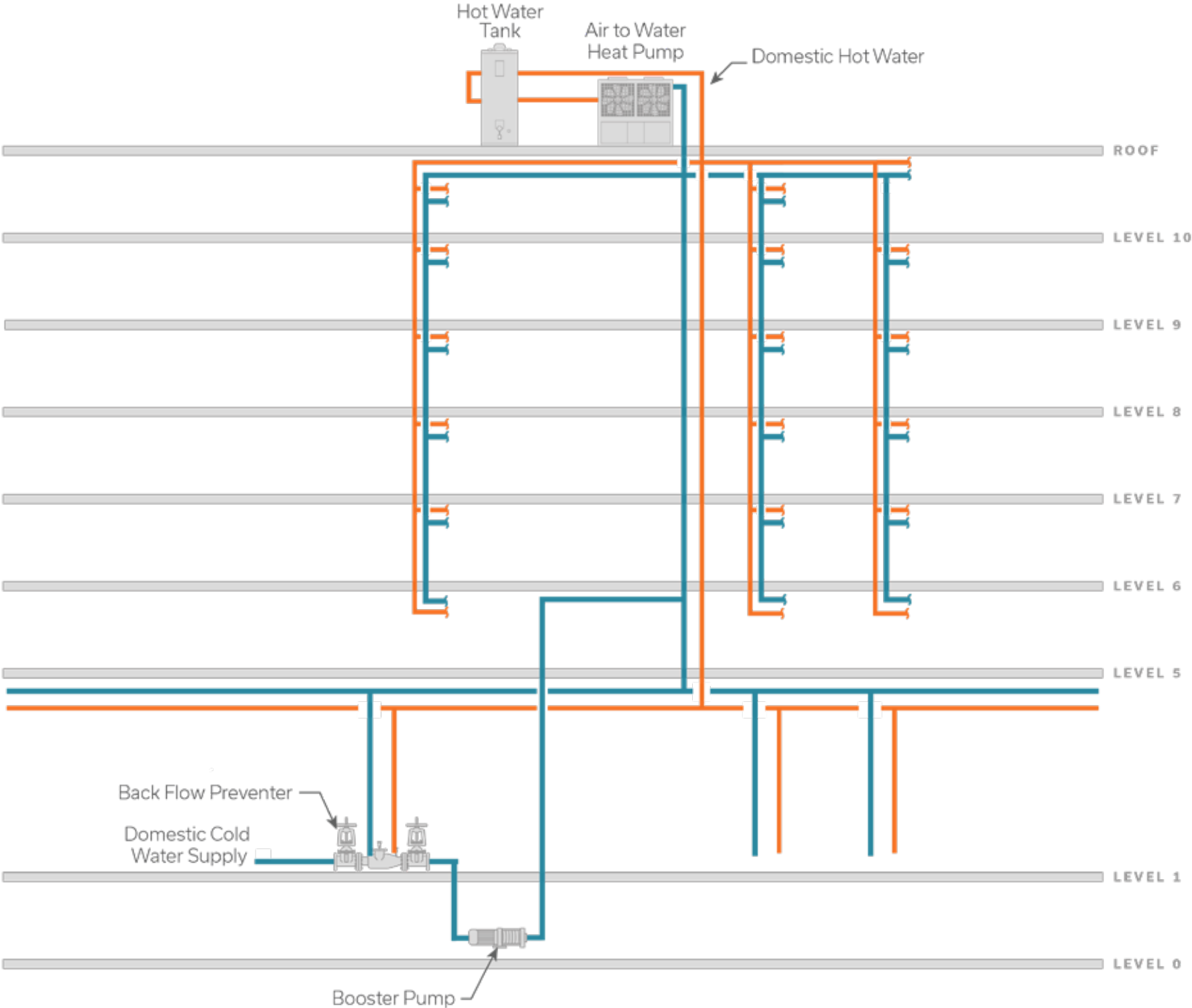


Systems Design

Mechanical Systems for Dwelling Units



Domestic Hot Water Heat Pumps



Appliances

ECO-APPLIANCES



CLOTHES WASHER



CLOTHES DRYER



CEILING FAN



KITCHEN HOOD



RANGE COOKTOP



DISHWASHER



REFRIGERATOR



PV Analysis

Rooftop System = 195.7 kW

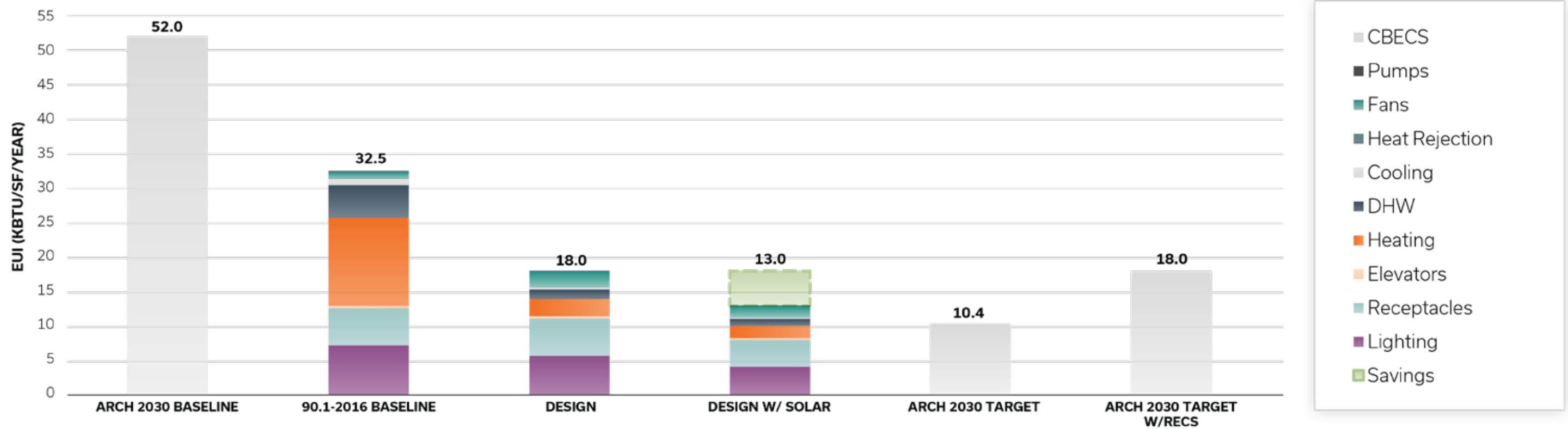
Adjacent Building Systems = 143.3 kW



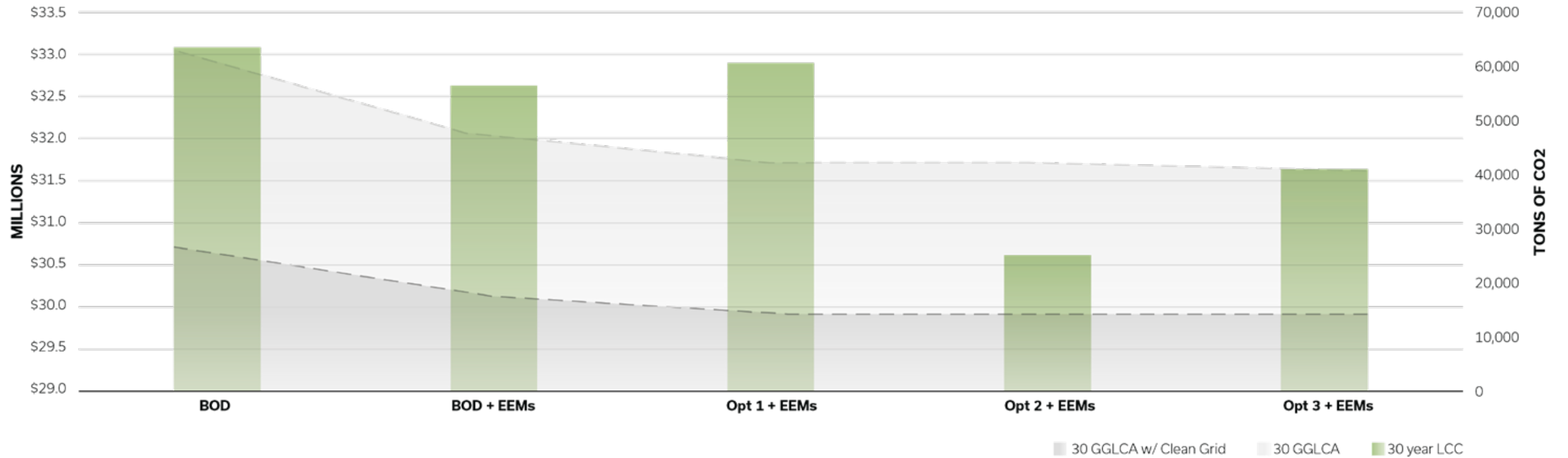


Key Takeaways

EUI | Energy Use Index



30 Year Greenhouse Gas Emissions



Summary



**Passive House
Implementation**



**What appealed
to Owner and
benefited them**



**How was
Passive House
incorporated into
the design**



Thank you!



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