

Scaling Passive House

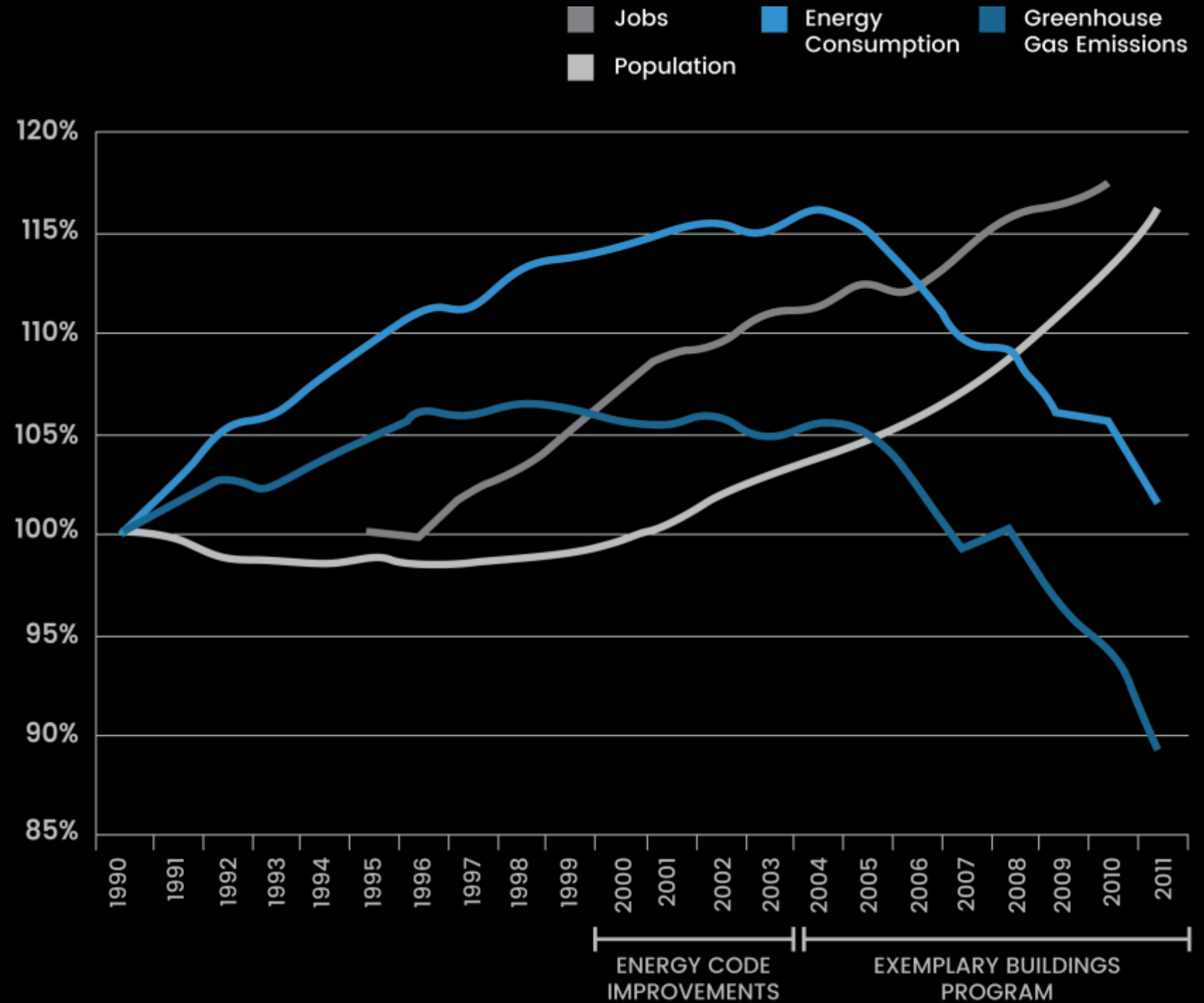


Brandon Nicholson, AIA, CPHD, LEED AP BD+C
Founding Principal, Nicholson Kovalchick (NK) Architects

PASSIVE HOUSE

Brussels

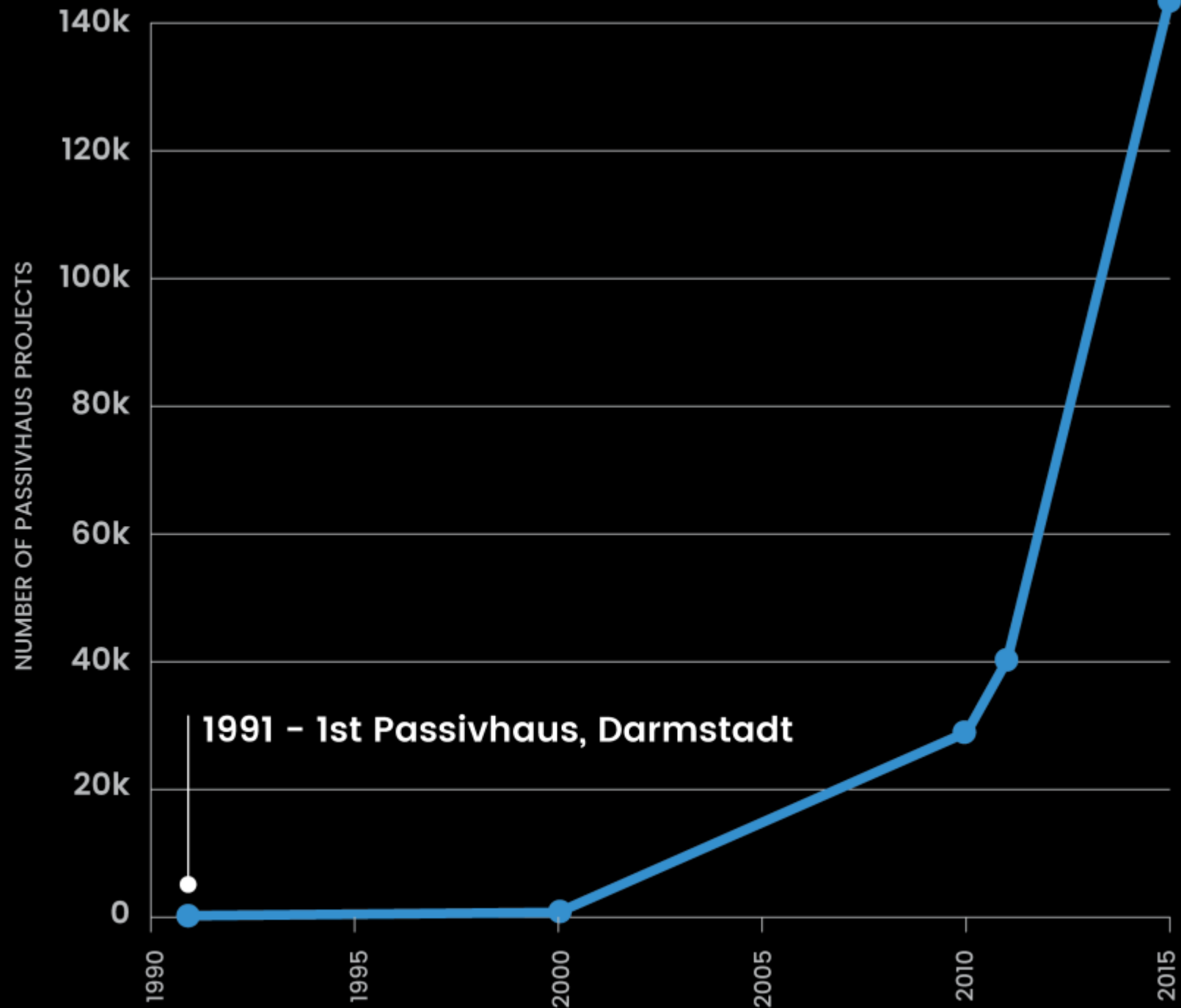
Energy Use and Greenhouse Gas Emissions in Brussels since 1990 with climate correction.



PASSIVE HOUSE

Growth in Europe

Growth of Passive House in Europe.



PASSIVE HOUSE

NK Architects Design Staff

Most CPHCs and CPHDs in North America.



PASSIVE HOUSE

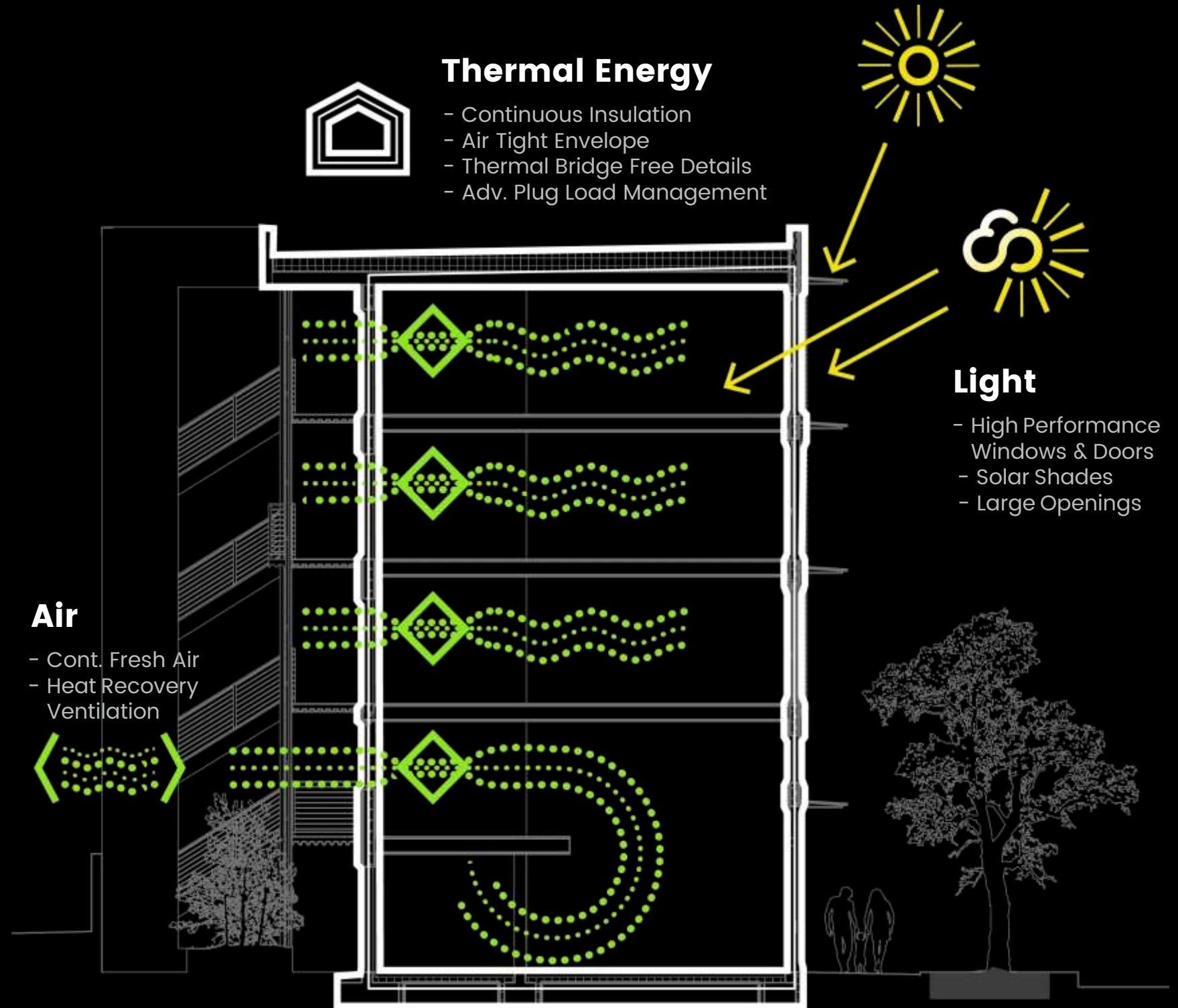
What is it?

- 1. A Science-Based Building Philosophy**
- 2. A Means to Hit the Target**

PASSIVE HOUSE

Science Based

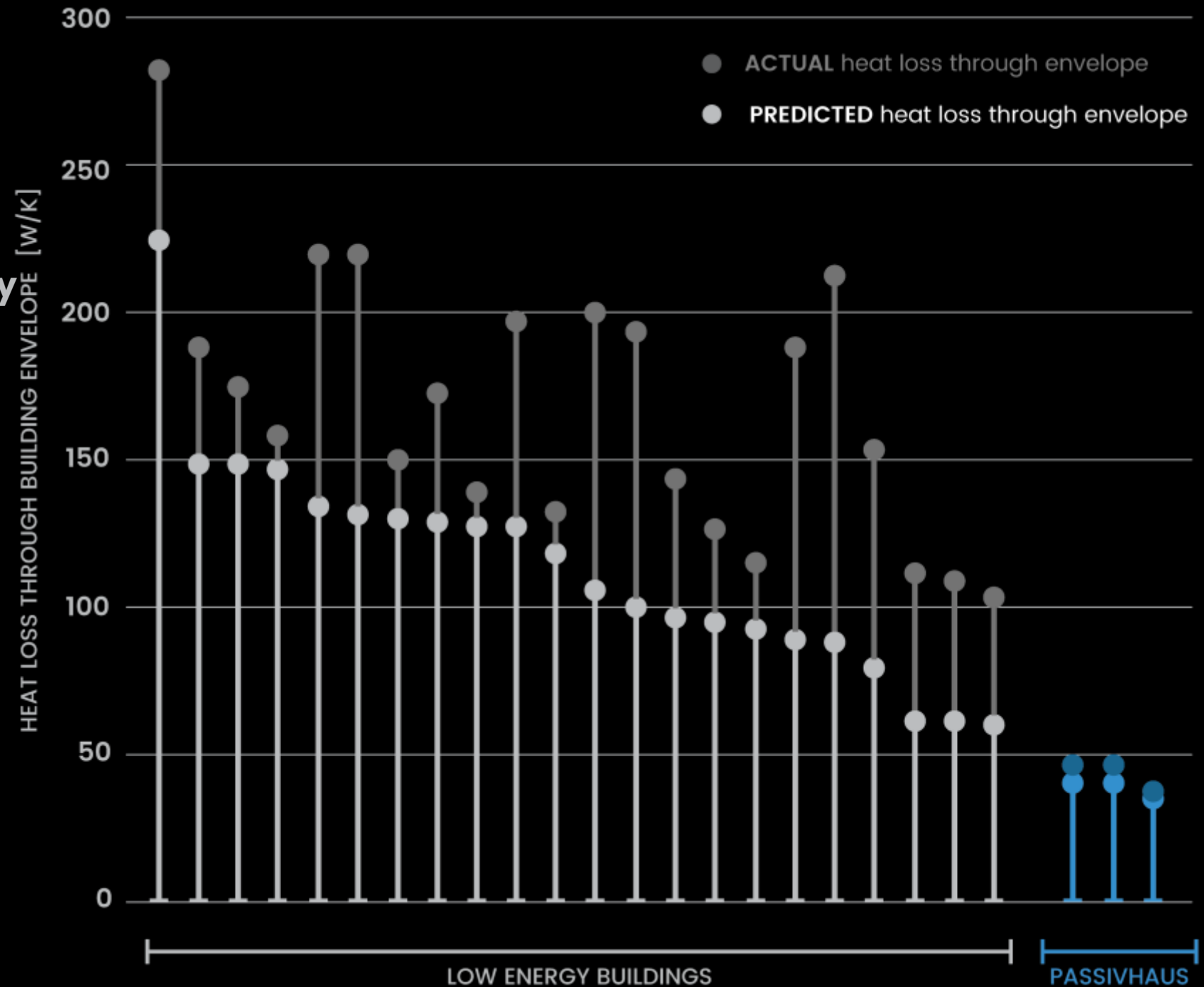
Passive House is Building Physics



PASSIVE HOUSE

Model Matches Performance

Predictable Results
Non-Passivhaus vs. Passivhaus Energy Consumption



PASSIVE HOUSE PORTFOLIO

Park Passive



PASSIVE HOUSE PORTFOLIO

Pax Futura



PASSIVE HOUSE PORTFOLIO

320 Queen Anne



PASSIVE HOUSE PORTFOLIO

11th & Republican



PASSIVE HOUSE PORTFOLIO

Morningside Crossing



MORNINGSIDE
COMMUNITY
CENTER

PASSIVE HOUSE PORTFOLIO

Carrick Library

With Thoughtful Balance



PASSIVE HOUSE PORTFOLIO

Hillandale

With Torti Gallas



PASSIVE HOUSE DESIGN: VANCOUVER

1400 Alberni

Landa Global and Asia Standard Americas
Robert A.M. Stern Architects
Musson Cattell Mackey Partnership



PASSIVE HOUSE DESIGN: NYC

Cornell Tech

Morphosis Architects, Handel Architects



PASSIVE HOUSE DESIGN: BROOKLYN

Sendero Verde

Jonathan Rose Companies
Handel Architects



PASSIVE HOUSE DESIGN: BOSTON

Winthrop Center

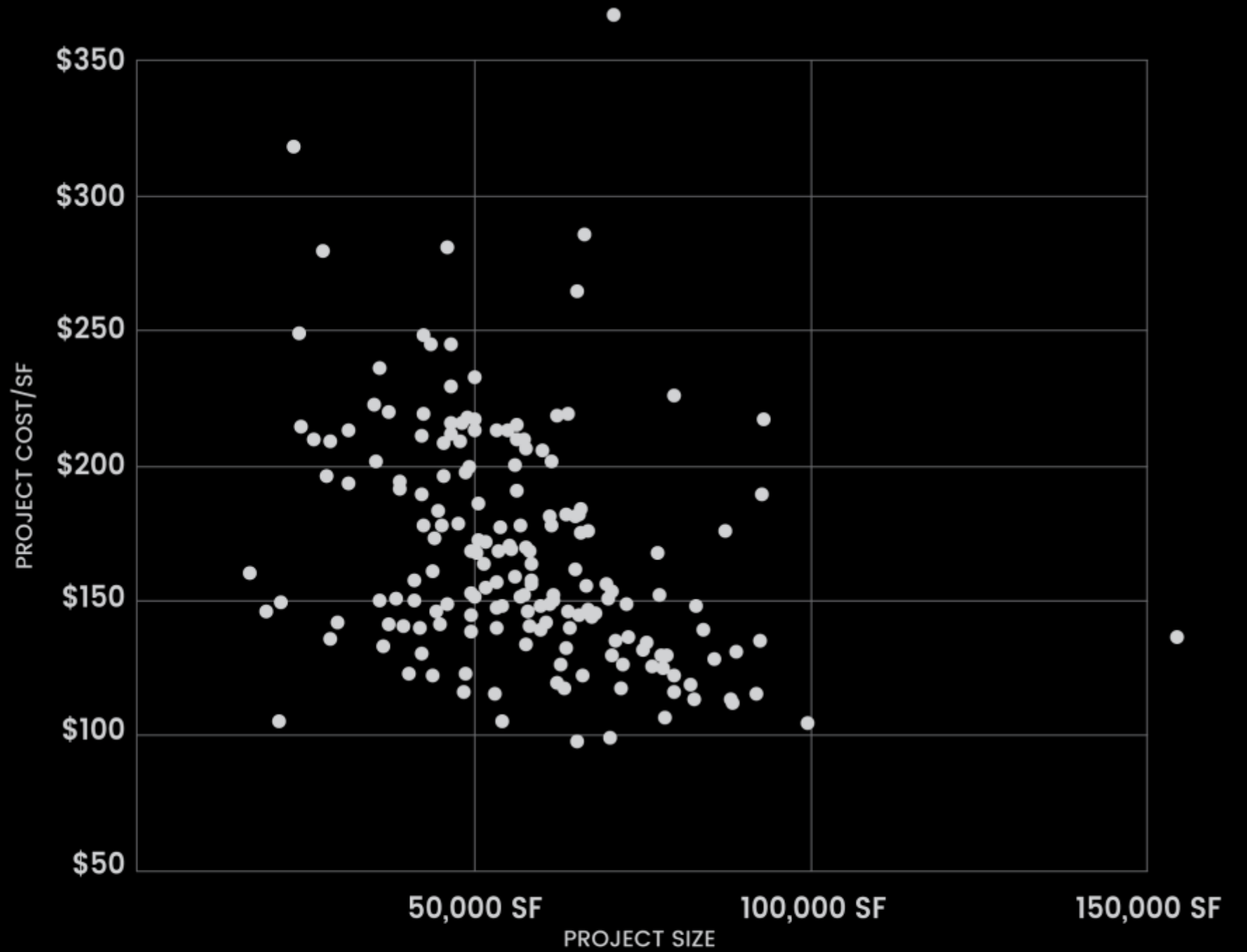
MP Boston, Handel Architects



PASSIVE HOUSE

Cost Comparable

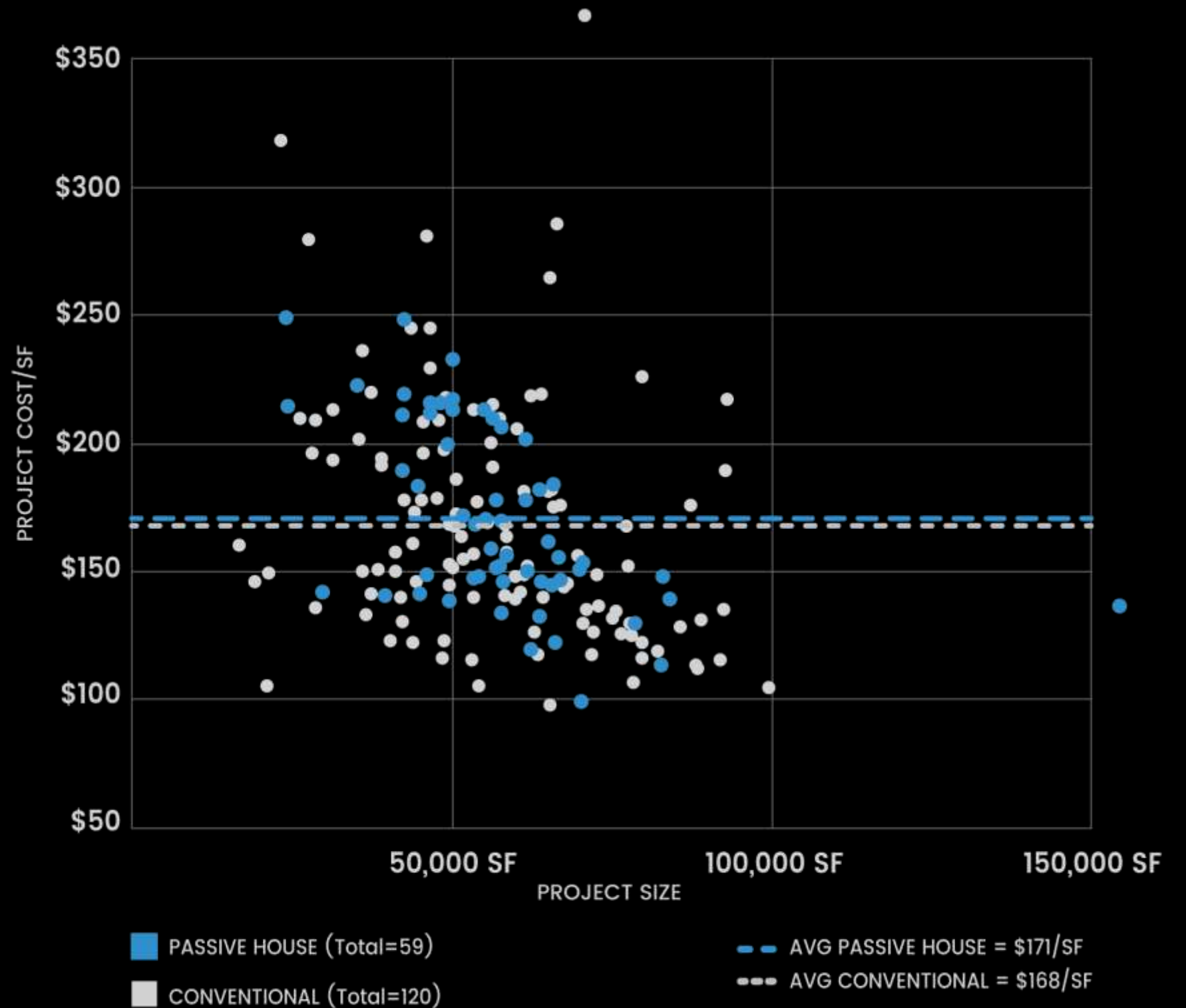
Proposed PHFA Project
2015-2016 Construction Cost (Projected)



PASSIVE HOUSE

Cost Comparable

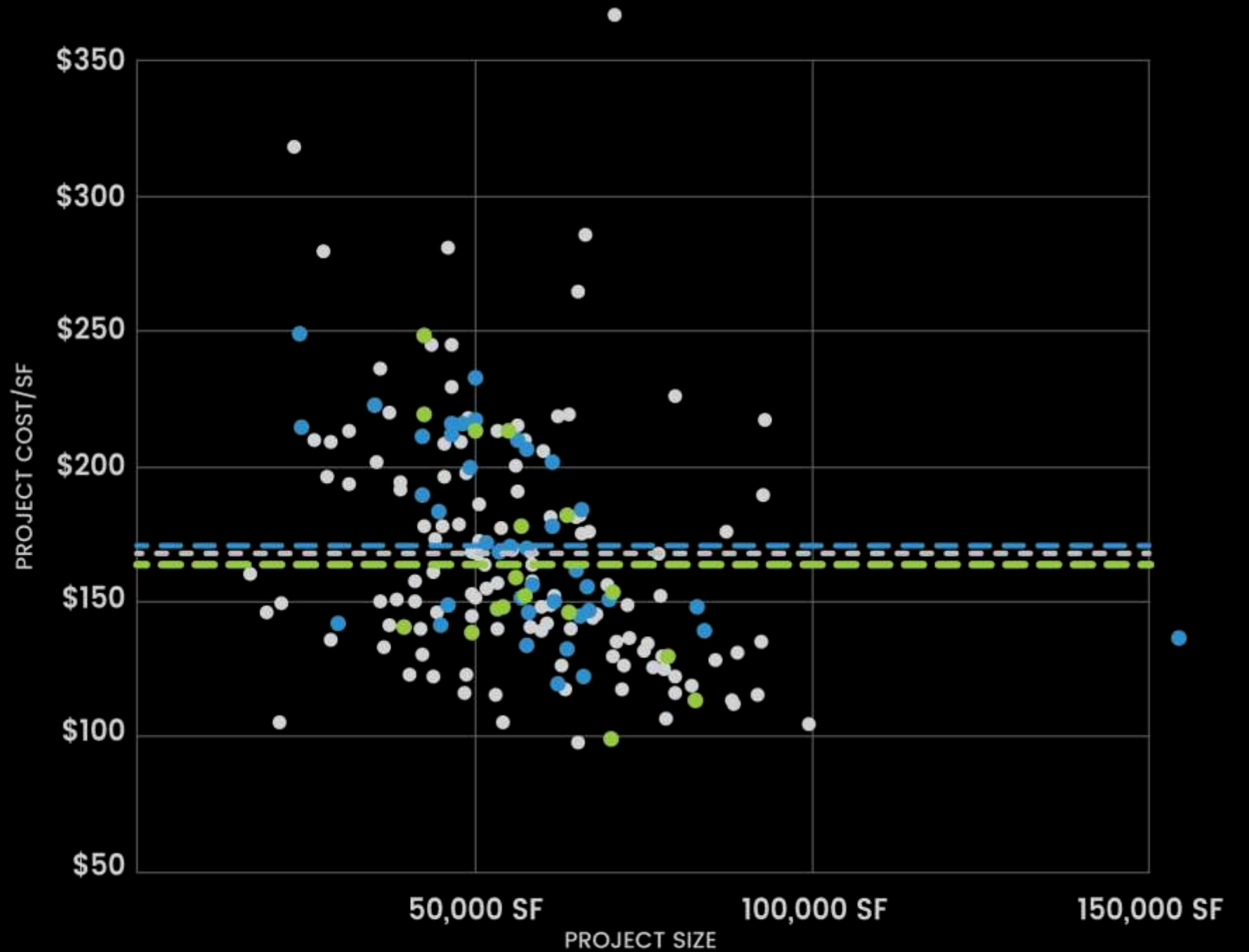
Proposed PHFA Project
2015-2016 Construction Cost (Projected)
Passive House vs Conventional –
Less than 2% cost difference.



PASSIVE HOUSE

Cost Comparable

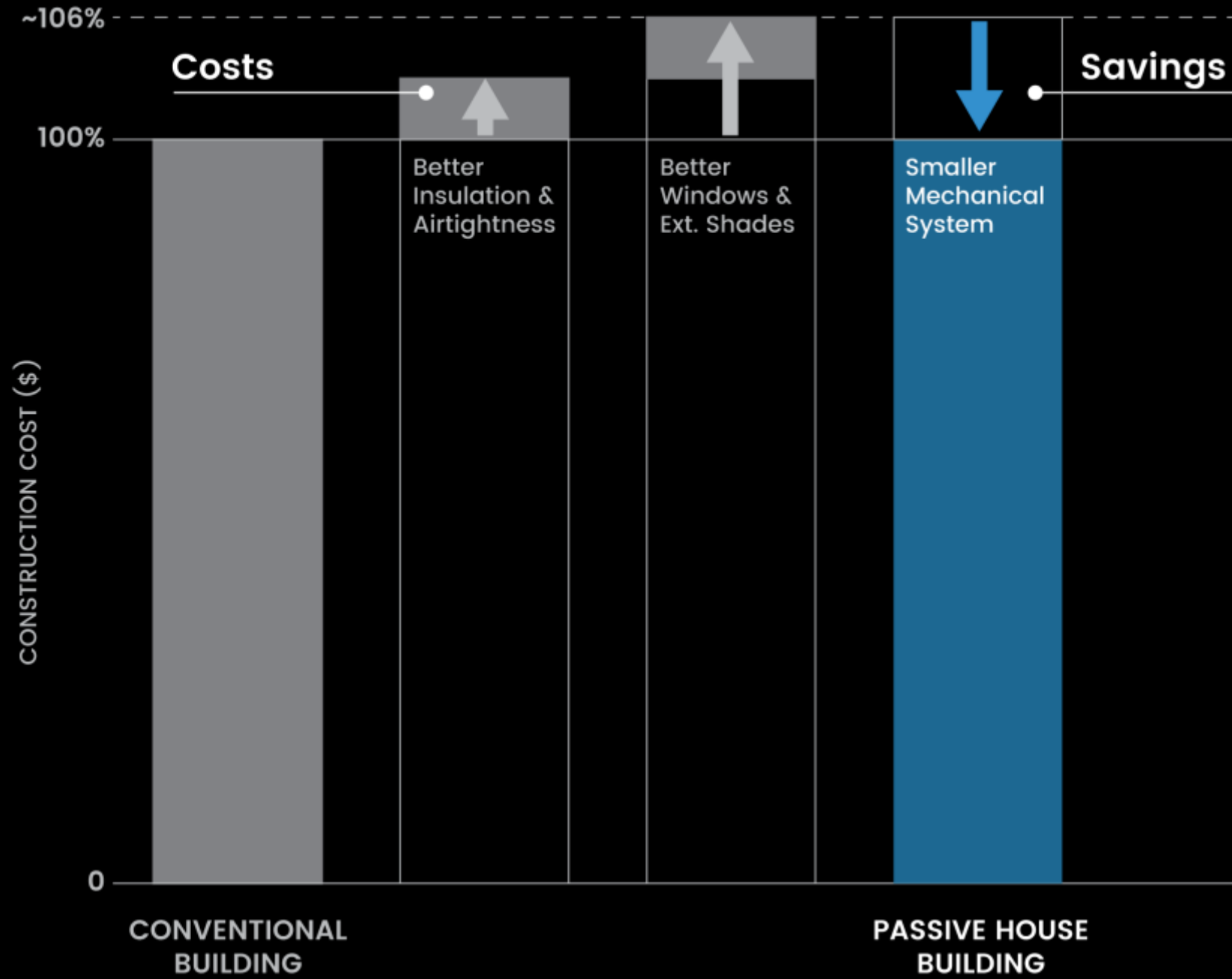
Proposed PHFA Project
2015-2016 Construction Cost (Projected)
Awarded Passive House Projects in Green.



- PASSIVE HOUSE (Total=59)
- AWARDED (Total=18)
- CONVENTIONAL (Total=120)
- AVG PASSIVE HOUSE = \$171/SF
- AVG CONVENTIONAL = \$168/SF
- AVG AWARDED = \$163.50/SF

Savings Offset Costs

Ideally...

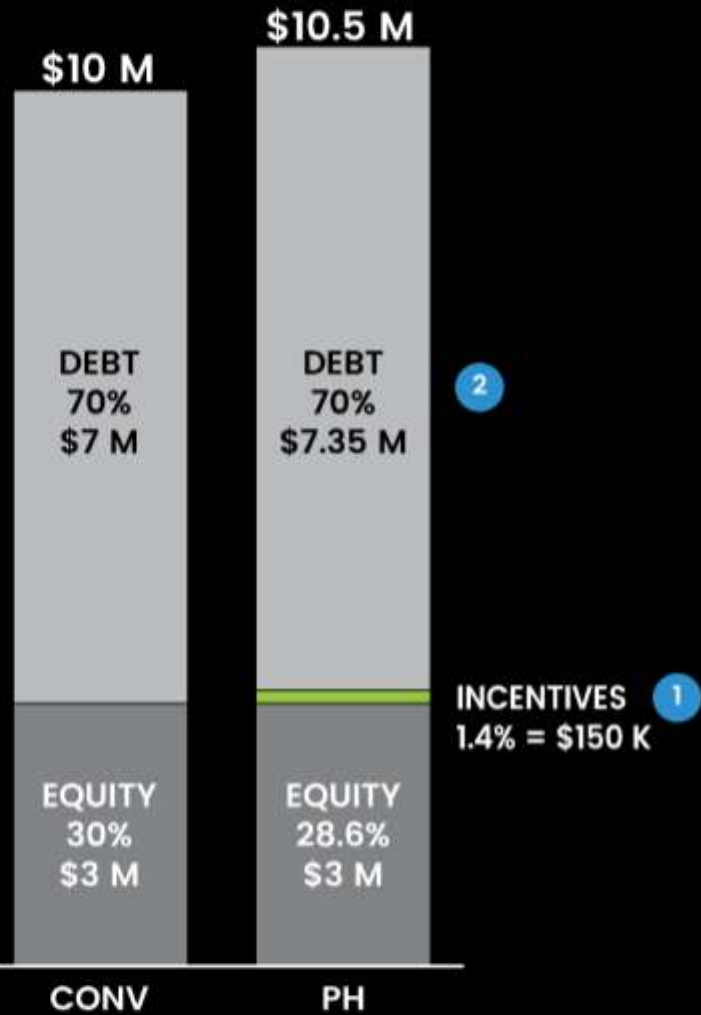


EcoProforma

DEVELOPMENT COSTS



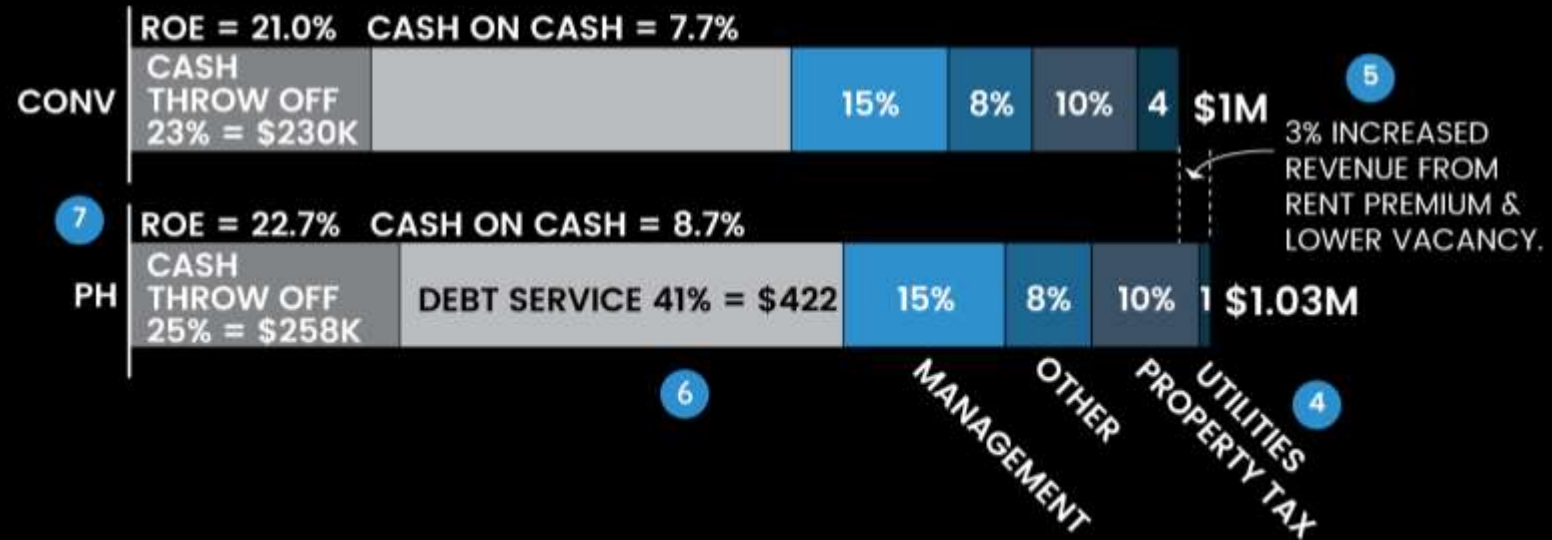
CAPITAL SOURCES



EcoProforma STEPS

- 1 IDENTIFY LOCAL INCENTIVES.
- 2 DETERMINE MAXIMUM LTV RATIO.
- 3 MINIMIZE CONSTRUCTION COST PREMIUM.
- 4 CALCULATE UTILITY SAVINGS.
- 5 ESTIMATE RENT & VACANCY PREMIUMS.
- 6 EXPLORE GREEN LOAN RATE REDUCTION.
- 7 CALCULATE NEW RETURN ON EQUITY (ROE).

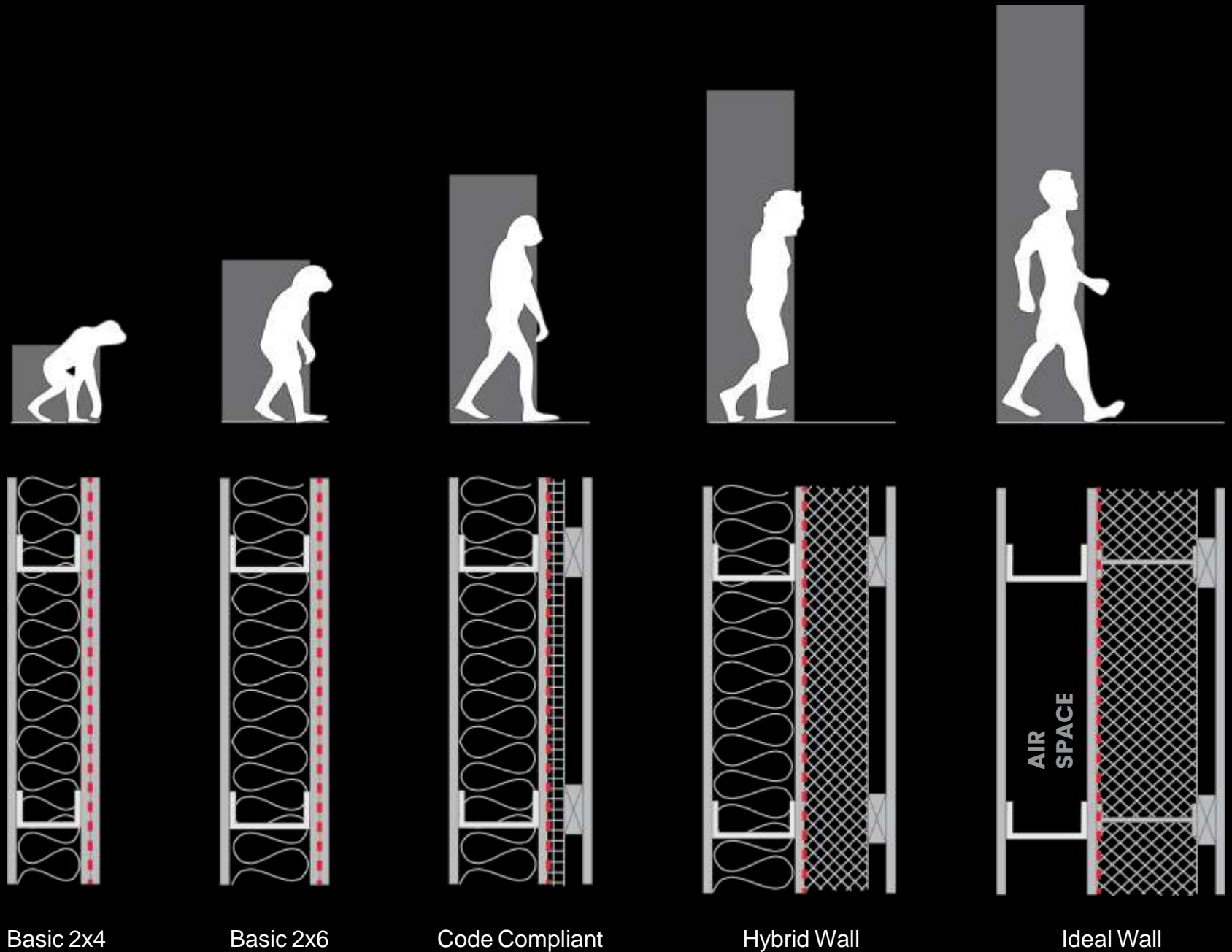
REVENUE ALLOCATION



WALLS

Evolution of a Wall

Understanding the ideal wall



THERMAL BREAKS

Steel to Steel

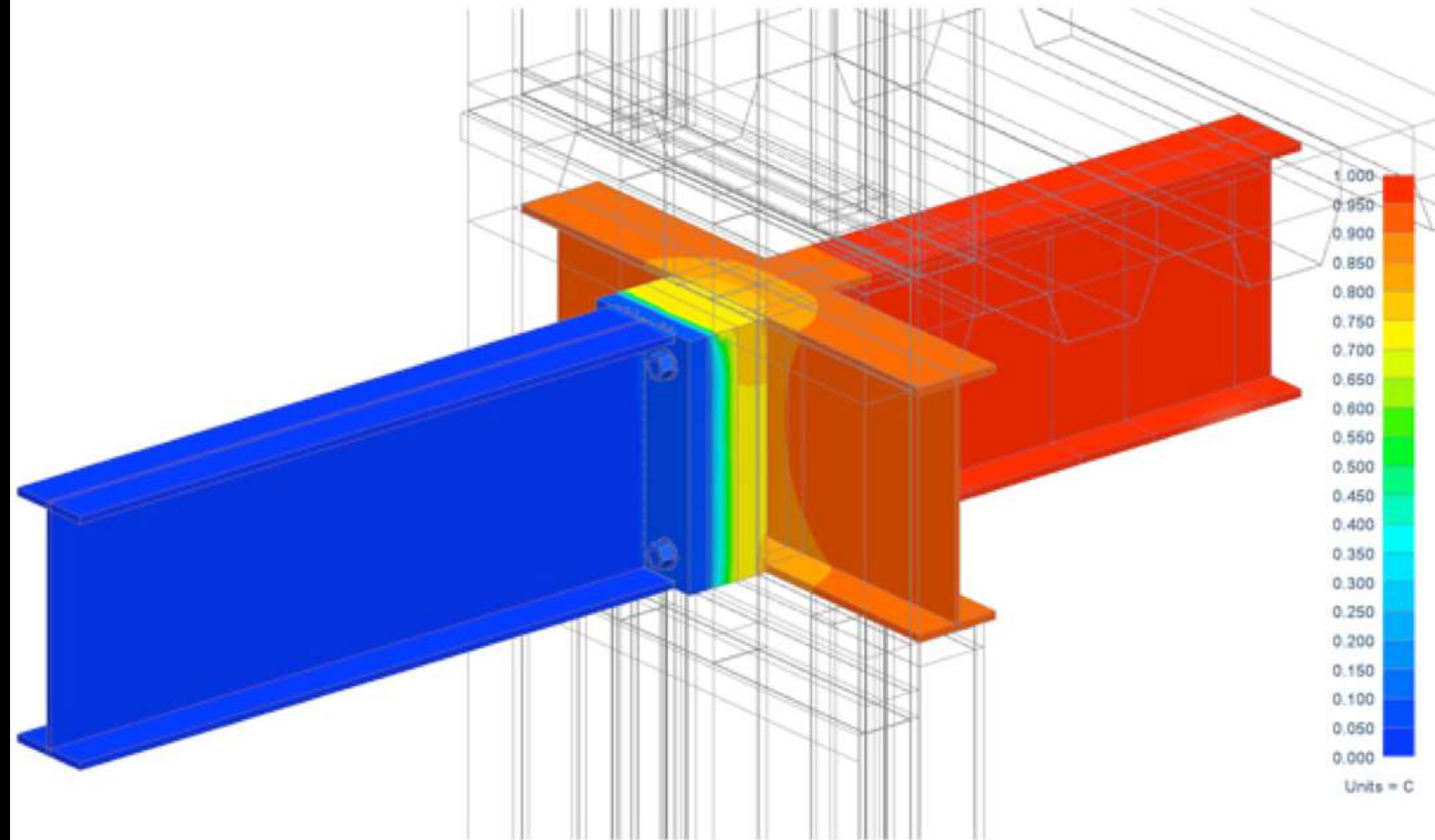


Photo Courtesy of
Armatherm

WINDOWS



- 1: Windows should be energy neutral**
- 2: Minimize heat gains in summer**
- 3: Maximize heat gains in winter**

HVAC

Conventional Approach

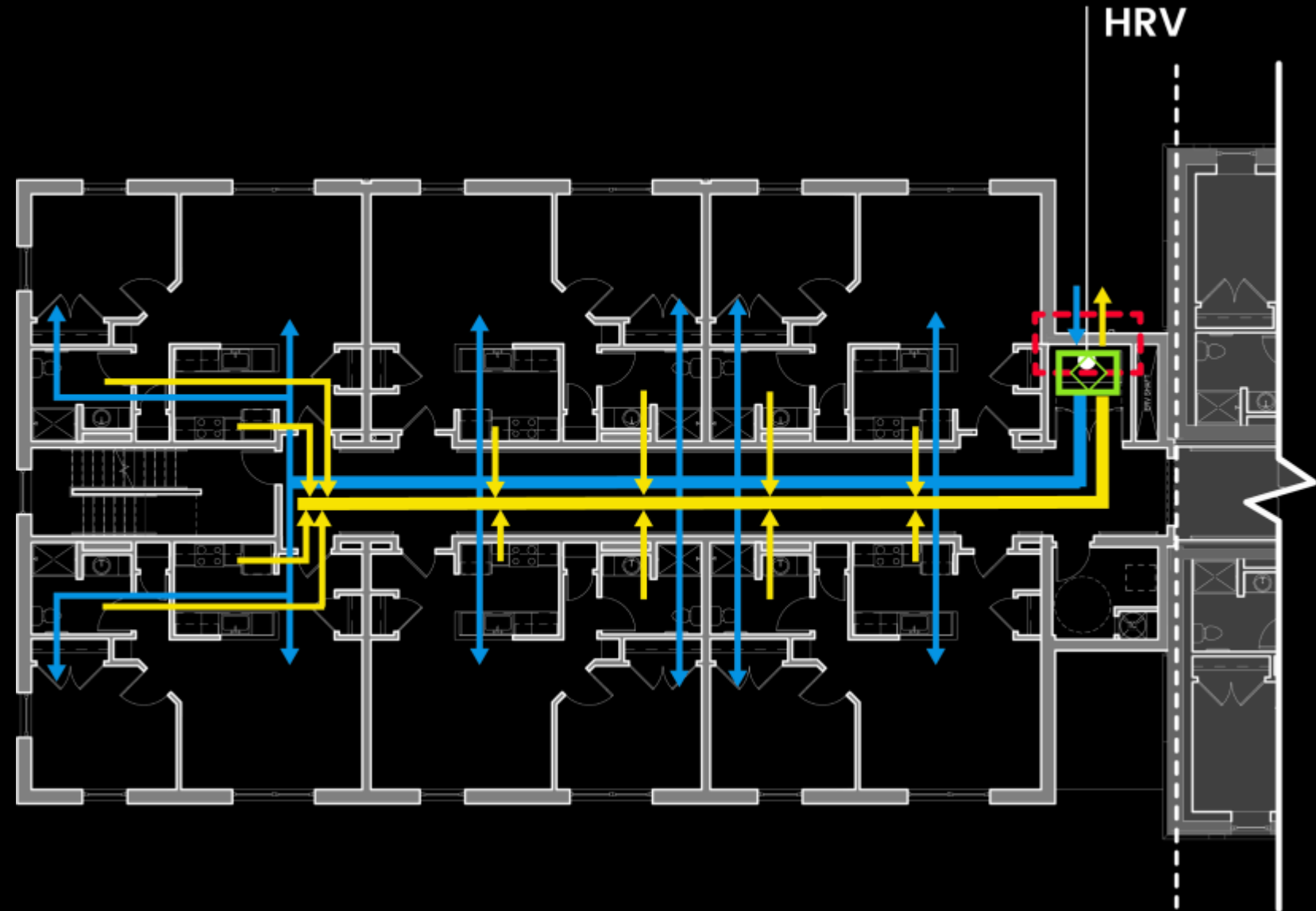
Exhaust penetrations leak conditioned air



HVAC

Ventilation Solutions

Floor-by-Floor

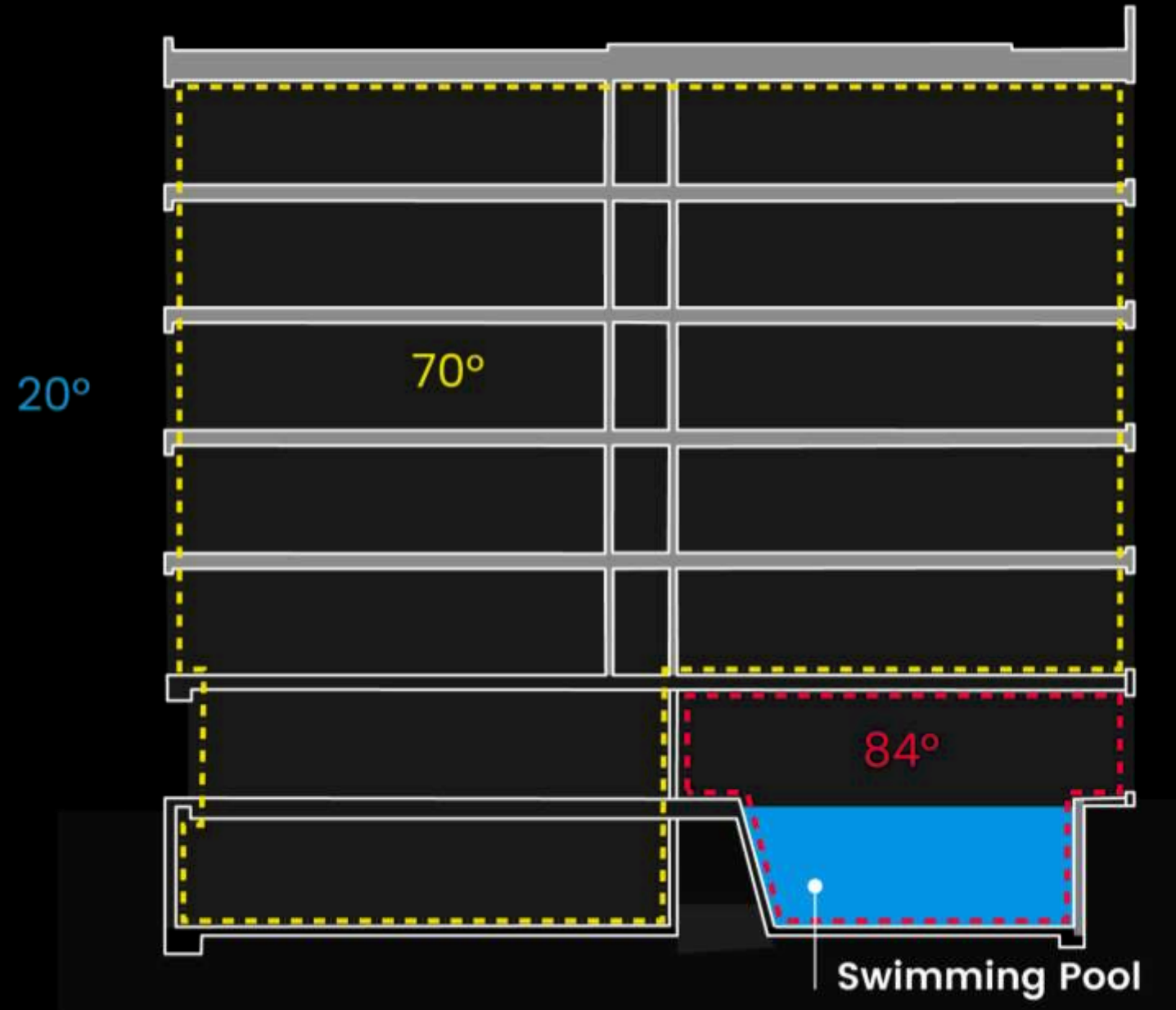


The only section of ductwork that needs to be insulated is the section that connects the HRV to the exterior wall, as the rest of the ductwork is on the sealed side of the HRV.

- Fresh Air
- Stale Air
- Heat

HOT WATER

Swimming Pool Strategy



Thank you.

brandon@nkarch.com