We live in a world of increasingly constrained resources where demand for energy efficiency, durability, and air quality are market requirements. **How we build, what we build and where we build matters more than ever.**

**Footprint Development’s ambition** is to deliver superior climate risk-adjusted returns, enhance Minneapolis’s urban fabric, and move regional multifamily development toward more carbon-smart, climate-compatible practices …delivering better results for people, the planet and investment partners.

### Our Projects

- **Carbon Smart Apartments**
  (Completed 2021)

- **Solstice Northeast**
  (Under Construction)

- **3561 Minnehaha**
  (Coming 2024)
Footprint develops carbon-smart, climate-resilient, multifamily assets built to last

1. **What We Build**
   - 100% Electric
   - Solar Powered
   - Energy Efficient

2. **How We Build**
   - Low Embodied Carbon
   - Building Science Based

3. **Where We Build**
   - Urban
   - Walkable
   - Bikeable
   - Transit Oriented
Project Overview

A low carbon / high performance, cycling and transit-oriented market-rate multifamily development located in the heart of Northeast Minneapolis, MN

CONTEXT: Infill urban lot

- No onsite vehicle parking, but a reserved onsite temporary drop-off and loading zone
- 5-minute walk to multiple transit lines
- 10-minutes to the commercial heart of both Saint Anthony East and Logan Park; two of Minneapolis’ most vibrant arts, entertainment and jobs districts, and home to dozens of breweries, coffee shops, performance venues and workspaces.

AMENITIES: Ground floor Bike Hub with a 42” wide automatic door, 1.5 stalls per unit, water bottle refill station, bike repair station, and bike/pet wash station

ENERGY: 33.75 kW DC bifacial photovoltaic roof top array, projected annual energy production of ~40,000 kWh.
Project Specifics

**MN BUILDING CODE**
IBC Construction VA R-2
Wood frame combustible materials, 1-hr rated from interior and exterior

**MN ENERGY CODE**
IECC 2018, ASHARE 90.2-2016
Climate Zone 6B – Cold Wet

**SIZE**
18,960 GSF
50’x100’ Footprint, 4 Stories
(23) 1-2 Bedroom Units
Double loaded corridor, ~6 units/floor

**CONTRACT**
Design to PHIUS Core 2021
Target 40% reduction in MCE
Passive & low carbon are complimentary

**DESIGN**

Climate responsive strategies
- Simple massing and optimized orientation
- WWR, shading, and selective solar gain

Passive building principles
- Continuous insulation / TB free
- Airtight

**SPECIFICATION**

Materials
- Structural Systems
- Insulation – Thermal / Sound Transmission
- Finishes and Cladding

Product selection
- EPDs

**CONSTRUCTION**

Quality of Installation

Mechanical Systems

Testing and Verification

Product verification onsite
- Evaluate substitution requests
Carbon/Cost Case Study

**SOLSTICE**

- Phius Core 21 Design Certified
- Low-carbon material specification
- 100% electric
- Rooftop solar array

**STANDARD**

- Typical local construction
- Some assemblies “slightly better than code”
- Gas and electric

* Climate responsive design consistent
# Case Study - Envelope and Systems Comparison

<table>
<thead>
<tr>
<th>Solstice</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ENVELOPE</strong></td>
<td><strong>ENVELOPE</strong></td>
</tr>
<tr>
<td><strong>Air Tightness:</strong> 0.06 CFM/sf @ 50Pa</td>
<td><strong>Air Tightness:</strong> 3.0 CFM/sf @ 50Pa</td>
</tr>
<tr>
<td><strong>Windows</strong></td>
<td><strong>Windows</strong></td>
</tr>
<tr>
<td>• Fiberglass - Fixed &amp; Casement</td>
<td>• Vinyl - Fixed &amp; Double Hung</td>
</tr>
<tr>
<td>• Triple Pane U-value @ 0.16</td>
<td>• Double Pane U-value @ 0.4</td>
</tr>
<tr>
<td><strong>Insulation:</strong></td>
<td><strong>Insulation:</strong></td>
</tr>
<tr>
<td>• Foundation: GPS @ R10/ Perimeter GPS @ R15</td>
<td>• Foundation: None / Perimeter EPS @ R15</td>
</tr>
<tr>
<td>• Wall: Cellulose + GPS @ R36</td>
<td>• Wall: Fiberglass Batt + Polyiso @ R24</td>
</tr>
<tr>
<td>• Roof: Cavity Cellulose @ R18 / Polyiso @ R36</td>
<td>• Roof: Polyiso @ R36</td>
</tr>
<tr>
<td><strong>MECHANICAL</strong></td>
<td><strong>MECHANICAL</strong></td>
</tr>
<tr>
<td><strong>Unit HVAC:</strong></td>
<td><strong>Unit HVAC:</strong></td>
</tr>
<tr>
<td>• 100% Electric</td>
<td>• Gas &amp; Electric</td>
</tr>
<tr>
<td>• Heating/Cooling: Minotair (Heat Pump)</td>
<td>• Heating/Cooling: Magic Pak V-Series</td>
</tr>
<tr>
<td>• Ventilation: Minotair (Integrated ERV)</td>
<td>• Ventilation: None</td>
</tr>
<tr>
<td>• Bath &amp; Kitchen: Minotair Boost Switch</td>
<td>• Bath &amp; Kitchen: x2 Exhaust Fans @ 30 CFM</td>
</tr>
<tr>
<td><strong>Common HVAC:</strong></td>
<td><strong>Common HVAC:</strong></td>
</tr>
<tr>
<td>• 100% Electric</td>
<td>• 100% Electric</td>
</tr>
<tr>
<td>• (x3) Carrier Mini Splits</td>
<td>• (x3) Carrier Mini Splits</td>
</tr>
<tr>
<td>• (x2) 200 CFM ERVs</td>
<td><strong>Hot Water</strong></td>
</tr>
<tr>
<td><strong>Hot Water</strong></td>
<td>• (x23) Power vented gas DHWH</td>
</tr>
<tr>
<td>• (x6) 80 gallon Rheem hybrid heat pump DHWH</td>
<td>• No recirculation</td>
</tr>
<tr>
<td>• On-demand recirculation</td>
<td></td>
</tr>
</tbody>
</table>
Goals and Outcomes – Energy & Emissions

Phius Core 21 Certification
• 60%-70% reduction from Standard

Net-Zero Energy Ready
• 100% electric

AIA 2030 Commitment
• 80% energy reduction from Baseline
Goals and Outcomes – Energy & Emissions

Phius Core 21 Certification
- 60%-70% reduction from Standard

Net-Zero Energy Ready
- 100% electric

AIA 2030 Commitment
- 80% energy reduction from Baseline

61% Reduction Total Energy
72% Reduction in Net EUI

~30% Onsite solar

84% Reduction
Goals and Outcomes – Energy & Emissions

Phius Core 21 Certification
- 60%-70% reduction from Standard

Net-Zero Energy Ready
- 100% electric
- ~30% Onsite solar

AIA 2030 Commitment
- 80% energy reduction from Baseline

Operational Emissions
- 78% Reduction from 2030 Baseline

- Currently electricity grid has greater GWP per equivalent unit of energy than natural gas
- This improves as utilities add renewable energy and decommission coal plants

61% Reduction Total Energy
72% Reduction in Net EUI

100% electric
~30% Onsite solar

84% Reduction

84% Reduction Total Energy

~30% Onsite solar

84% Reduction

100% electric
~30% Onsite solar

84% Reduction

84% Reduction Total Energy
Goals and Outcomes – Emissions

Embodied Carbon

- 40% EC reduction vs. Standard building

60% Reduction

Embodied Carbon (Tons CO2e)
Goals and Outcomes – Emissions

Embodied Carbon
- 40% EC reduction vs. Standard building

60% Reduction

Equivalent to 38 kgCO2e/m2

1.1 Metric Tons per occupant (59 Occupants)
A handful of specs have a disproportionate impact on Embodied Carbon

Substantial reductions in embodied carbon can be achieved using readily available, familiar to trades and largely cost-neutral materials

Source: Architecture 2030 Carbon Smart Materials Pallet
# Case Study – Materials Comparison

<table>
<thead>
<tr>
<th>STRUCTURE</th>
<th>Solstice</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete</td>
<td>• Low Carbon mix + Fibers in Slab</td>
<td>• Standard mix + Wire Mesh in Slab</td>
</tr>
<tr>
<td>Framing Lumber</td>
<td>• FSC Certified Lumber (excludes trusses)</td>
<td>• Standard Lumber</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>INSULATION</th>
<th>Solstice</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foundation</td>
<td>• GPS @ R10/ Perimeter GPS @ R15</td>
<td>• None / Perimeter EPS @ R15</td>
</tr>
<tr>
<td>Exterior Wall Sheathing</td>
<td>• Plywood / GPS @ R15</td>
<td>• Zip-R6</td>
</tr>
<tr>
<td>Exterior Wall Cavity</td>
<td>• Dense Pack Cellulose (DPC) @ R21</td>
<td>• Fiberglass Batt @ R21</td>
</tr>
<tr>
<td>Roof</td>
<td>• Cavity Cellulose @ R18 / Polyiso @ R36</td>
<td>• Polyiso @ R36</td>
</tr>
<tr>
<td>Interior Partitions</td>
<td>• Cellulose</td>
<td>• Fiberglass Batt</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FINISHES</th>
<th>Solstice</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flooring</td>
<td>• Interface Carpet &amp; LVP</td>
<td>• Standard Carpet &amp; LVP</td>
</tr>
<tr>
<td>Gypsum Board</td>
<td>• USG Ecosmart 5/8” Type X</td>
<td>• Standard 5/8” Type X</td>
</tr>
<tr>
<td>Cladding</td>
<td>• 85% engineered wood</td>
<td>• 85% cement board</td>
</tr>
<tr>
<td></td>
<td>• 15% thin brick veneer</td>
<td>• 15% face brick</td>
</tr>
</tbody>
</table>
Net Embodied Carbon Comparison

* 1,000 kgCO2e = 1 Metric ton

Can you put a total at the top of each bar?

177 (9% INCREASE)
163 Metric tons

66 (60% REDUCTION)
Net Embodied Carbon Comparison

* 1,000 kgCO2e = 1 Metric ton

163 Metric tons

177 (9% INCREASE)

66 (60% REDUCTION)
Full Embodied Carbon Comparison

* 1,000 kgCO2e = 1 Metric ton

- **185 Mt**
  - (877) kgCO2e
  - (20,831) kgCO2e

- **156 Mt**
  - (4,151) kgCO2e
  - (20,059) kgCO2e

- **22 Mt**
  - (61,734) kgCO2e

- **90 Mt**
  - (4,398) kgCO2e

Emissions Intense Materials Offset by Biogenic Materials

Biogenic Materials = Carbon Storing
Highest Impact Materials

- Finishes: Ext Cladding: 14%
- Finishes: Gyp Board: 9%
- Finishes: Flooring: 9%
- Insulation: Cavity: 3%
- Insulation: Roof: 1%
- Insulation: Sheathing: 34%
- Structure: FSC Lumber: 13%
- Structure: Concrete Mix: 34%

97 Mt
Highest Impact Materials

* BIOGENIC VALUE OF VIRGIN FOREST PRODUCTS DEBATABLE, WE CREDITED 30% OF EC STORAGE POTENTIAL
Highest Impact Materials - Concrete

Share of CO2e Reduction

- Structure: Concrete Mix 13%
- Insulation: Sheathing 34%
- Insulation: Roof 1%
- Insulation: Cavity 3%
- Finishes: Flooring 17%
- Finishes: Gyp Board 9%
- Finishes: Ext Cladding 14%

Highest Impact Materials - Concrete


diagram showing relative shares of CO2e reduction for concrete materials and finishes.
Highest Impact Materials – Cavity Insulation

Finishes: Ext Cladding
- 14%

Finishes: Gyp Board
- 9%

Finishes: Flooring
- 9%

Insulation: Cavity
- 3%

Insulation: Roof
- 17%

Insulation: Sheathing
- 34%

Structure: FSC Lumber
- 13%

Structure: Concrete Mix

SPECIFY ASSEMBLIES WITH BIO-BASED INSULATION
Highest Impact Materials – Finishes

- Finishes: Ext Cladding (14%)
- Finishes: Gyp Board (9%)
- Finishes: Flooring (9%)
- Insulation: Cavity (3%)
- Insulation: Roof (1%)
- Insulation: Sheathing (34%)
- Structure: FSC Lumber (13%)
- Structure: Concrete Mix (17%)

Take one bold step to reducing your carbon footprint.

When you choose Interface flooring, you’re on the path to a more sustainable space. You’re choosing to reduce the carbon footprint of your space and help improve the health of the planet.

This flooring products that we sell, including carpet tile, LVT, vinyl sheet, resilient, and rubber, can all contribute to our overall sustainability efforts.

We calculate your floor’s impact so you can see its contribution to reducing global warming.

The Carbon Neutral Floors program is now certified to PAS 2050, an internationally recognized standard for carbon neutrality. Read the Assurance Statement.
Highest Impact Materials – Cladding

- **Finishes: Ext Cladding**
  - 14%
- **Finishes: Gyp Board**
  - 9%
- **Finishes: Flooring**
  - 9%
- **Insulation: Cavity**
  - 17%
- **Insulation: Roof**
  - 3%
- **Insulation: Sheathing**
  - 34%
- **Structure: FSC Lumber**
  - 13%
- **Structure: Concrete Mix**
  - 1%

**ENGINEERED WOOD VS FIBER CEMENT**

**THIN VENEER MASONRY**
Impact

* Does not reflect future grid emission factor reductions
Impact

BY 2030, A STANDARD BUILDING WILL EMIT 3.5 TIMES MORE CO2e THAN SOLSTICE

* Does not reflect future grid emission factor reductions
What are the cost implications of Carbon-Smart Passive House Construction?
Passive House costs accounted for 7.5% of Total Cost, with Hard Costs accounting for ~86% of Marginal PH Cost

<table>
<thead>
<tr>
<th>Passive House Incremental Cost Data</th>
<th>Total Project Cost</th>
<th>Total</th>
<th>Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Project Cost</td>
<td>$6,138,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Base Cost</td>
<td>$5,675,738</td>
<td></td>
<td>92.5%</td>
</tr>
<tr>
<td>Phius Cost</td>
<td>$462,262</td>
<td></td>
<td>7.5%</td>
</tr>
<tr>
<td>Hard Cost</td>
<td>$398,112</td>
<td></td>
<td>6.5%</td>
</tr>
<tr>
<td>Soft Cost</td>
<td>$64,150</td>
<td></td>
<td>1.0%</td>
</tr>
</tbody>
</table>

![Bar chart showing total costs and shares]
HVAC, Solar and Insulation were the largest cost drivers

### Hard Costs

<table>
<thead>
<tr>
<th>Category</th>
<th>Solstice</th>
<th>Baseline</th>
<th>Incr. ($)</th>
<th>Incr. (%)</th>
<th>Incr. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HVAC</td>
<td>$476,667</td>
<td>$355,934</td>
<td>$120,733</td>
<td>33.9%</td>
<td>7.0%</td>
</tr>
<tr>
<td>Unit HVAC</td>
<td>$172,500</td>
<td>$115,000</td>
<td>$57,500</td>
<td>50.0%</td>
<td>1.0%</td>
</tr>
<tr>
<td>Common Space ERV</td>
<td>$3,000</td>
<td>$0</td>
<td>$3,000</td>
<td>N/A</td>
<td>0.1%</td>
</tr>
<tr>
<td>Labor &amp; Other Material</td>
<td>$301,167</td>
<td>$240,934</td>
<td>$60,233</td>
<td>25.0%</td>
<td>1.1%</td>
</tr>
<tr>
<td>Windows</td>
<td>$109,121</td>
<td>$40,458</td>
<td>$68,663</td>
<td>169.7%</td>
<td>1.2%</td>
</tr>
<tr>
<td>Plumbing</td>
<td>$280,000</td>
<td>$250,000</td>
<td>$30,000</td>
<td>12.0%</td>
<td>0.5%</td>
</tr>
<tr>
<td>Insulation</td>
<td>$198,234</td>
<td>$114,409</td>
<td>$83,826</td>
<td>73.3%</td>
<td>1.5%</td>
</tr>
<tr>
<td>Below Grade</td>
<td>$20,064</td>
<td>$4,968</td>
<td>$15,096</td>
<td>304.0%</td>
<td>0.3%</td>
</tr>
<tr>
<td>Wall Cavity</td>
<td>$14,149</td>
<td>$12,472</td>
<td>$1,677</td>
<td>13.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Exterior Sheathing &amp; Insulation</td>
<td>$95,036</td>
<td>$30,591</td>
<td>$64,445</td>
<td>211.1%</td>
<td>1.1%</td>
</tr>
<tr>
<td>Roof Polyiso</td>
<td>$66,378</td>
<td>$66,378</td>
<td>$0</td>
<td>0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Roof Cellulos</td>
<td>$2,608</td>
<td>$2,608</td>
<td>$0</td>
<td>N/A</td>
<td>0.0%</td>
</tr>
<tr>
<td>Other</td>
<td>$117,890</td>
<td>$23,000</td>
<td>$94,890</td>
<td>N/A</td>
<td>1.7%</td>
</tr>
<tr>
<td>Roof Self-Adheared Vapor Barrier</td>
<td>$13,990</td>
<td>$0</td>
<td>$13,990</td>
<td>N/A</td>
<td>0.2%</td>
</tr>
<tr>
<td>Unit Gas Lines</td>
<td>$0</td>
<td>$23,000</td>
<td>($23,000)</td>
<td>N/A</td>
<td>-0.4%</td>
</tr>
<tr>
<td>Air Sealing Contingency</td>
<td>$20,000</td>
<td>$0</td>
<td>$20,000</td>
<td>N/A</td>
<td>0.4%</td>
</tr>
<tr>
<td>Solar</td>
<td>$83,900</td>
<td>$0</td>
<td>$83,900</td>
<td>N/A</td>
<td>1.5%</td>
</tr>
</tbody>
</table>
How can higher first costs deliver superior climate-risk adjusted returns for investors?

Resilient returns on higher upfront costs are generated through:

- **Utility fees** – Residents pay a flat monthly fee for water, energy and waste management. Acting as the utility intermediary, owners generate a return on investments in energy efficiency and solar generation, increased NOI and cash out at refinancing, and provide occupants with lower, more predictable utility costs than available elsewhere.

- **Reduced Turnover** – Other Passive House multifamily developers report lower resident turnover because their buildings are healthier, more comfortable and quieter than standard construction. This reduces maintenance, marketing and vacancy costs.

- **Lower Maintenance Costs** – Building-science design best practices, superior (verified & tested) build quality and unitized HVAC drive lower annual insurance, maintenance and repair costs.

- **Lower Insurance Costs** – A growing number of insurers are providing discounts for building certification and measures taken to reduce a property’s carbon footprint.*

Sources: *Climate Change Creating a New Climate for Real Estate Investing*, Blomberg Law (March, 2023)
## Key financial definition metric definitions

<table>
<thead>
<tr>
<th>Metric</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Internal Rate of Return (IRR)</strong></td>
<td>is the compounded rate of return on an investment, with the inputs being the cash inflows/(outflows) over a specified number of time periods (e.g. years).</td>
</tr>
<tr>
<td><strong>Cash-on-Cash</strong></td>
<td>return is the pre-tax cash distributions to equity holders divided by the equity invested. Often calculated annually and as an average over multiple years.</td>
</tr>
<tr>
<td><strong>Equity Multiple</strong></td>
<td>is the total cash distributions received from an investment, divided by the total equity invested.</td>
</tr>
</tbody>
</table>

### Market Rate

<table>
<thead>
<tr>
<th>Rate</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>12-25%</strong></td>
<td>Varies widely by geography, product type, economic cycle, investor type, etc.</td>
</tr>
<tr>
<td><strong>3-10%</strong></td>
<td>Varies widely by geography, product type, economic cycle, investor type, etc.</td>
</tr>
</tbody>
</table>

### Example

\[
\text{Equity Multiple} = \frac{(\text{Total Profit} + \text{Max. Equity Invested})}{\text{(Max. Equity Invested)}}
\]

\[
\frac{($8,588 + $10,000)}{$10,000} = 1.86x
\]

i.e. “your money back, plus 86%.”
The five-year marginal IRR is 105%, with a ~37% average stabilized Cash-on-Cash return.

<table>
<thead>
<tr>
<th>Construction</th>
<th>Y1</th>
<th>Y2</th>
<th>Y3</th>
<th>Y4</th>
<th>Y5</th>
<th>Sale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marginal Revenue</td>
<td>$182,440</td>
<td>$54,013</td>
<td>$55,634</td>
<td>$57,303</td>
<td>$59,022</td>
<td>$1,240,6</td>
</tr>
<tr>
<td>Marginal Costs</td>
<td>$(144,66)</td>
<td>$(3,457)</td>
<td>$(3,561)</td>
<td>$(3,668)</td>
<td>$(3,778)</td>
<td>$(3,891)</td>
</tr>
</tbody>
</table>

**IRR (5 year)**
- 105% (v. 12%)

**Cash-on-Cash**
- 37% (v. 4%)

**Equity Multiple**
- 11.3x (v. 2.3x)
But what does a worst-case scenario look like?

• Project Specific Inputs
  • Financing
    • Interest rate
    • LTV
    • Loan Amount
    • Equity Required
  • Grants & Rebates
  • Vacancy Expense
  • Utility Fees
  • Insurance Premiums
  • Sale Premium

• Worst Case Inputs
  • Financing
    • Interest rate
    • LTV
    • Loan Amount
    • Equity Required
  • Grants & Rebates
  • Vacancy Expense
  • Utility Fees
  • Insurance Premiums
  • Sale Premium
The marginal IRR of Passive House is still 15%, even excluding grant, financing, turnover and resale benefits.

**IRR (5 year)**
15%
(v. 12%)

**Cash-on-Cash**
9%
(v. 4%)

**Equity Multiple**
1.8x
(v. 2.3x)
Passive House increases project value more than cost, even in a worst case where debt service increases.
A handful of specs have a disproportionate impact on Embodied Carbon

Substantial reductions in embodied carbon can be achieved using readily available, familiar to trades and largely cost-neutral materials.
~35% of EC reductions cost nothing; exterior insulation had the lowest ‘Carbon Return on Cost’

Carbon Smart specs account for just 1.7% of Total Project Cost

97 MT CO$_2$e

No Cost

Added Cost

Roof, Cellulose, GVB

Lumber

Exterior Sheathing & Insulation

$6.14M

$102K

Baseline (98.3%)
Certainty of impact & cost are highly variable

High ROI + High Certainty

<table>
<thead>
<tr>
<th>Material</th>
<th>Kg of CO2e Reduction</th>
<th>Carbon Smart Costs</th>
<th>Carbon ROI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lumber</td>
<td>(34,276)</td>
<td>$30,000</td>
<td>(1.14)</td>
</tr>
<tr>
<td>Wall Cavity</td>
<td>(17,673)</td>
<td>$800</td>
<td>(22.09)</td>
</tr>
<tr>
<td>Cladding</td>
<td>(14,448)</td>
<td>$-</td>
<td>N/A</td>
</tr>
<tr>
<td>Concrete</td>
<td>(13,234)</td>
<td>$-</td>
<td>N/A</td>
</tr>
<tr>
<td>Flooring</td>
<td>(9,211)</td>
<td>$-</td>
<td>N/A</td>
</tr>
<tr>
<td>Gyp. Wall Board</td>
<td>(9,059)</td>
<td>$3,200</td>
<td>(2.83)</td>
</tr>
<tr>
<td>Roof Cellulose</td>
<td>(2,857)</td>
<td>$2,608</td>
<td>(1.10)</td>
</tr>
<tr>
<td>Sheathing &amp; Exterior</td>
<td>(1,309)</td>
<td>$64,445</td>
<td>(0.02)</td>
</tr>
</tbody>
</table>
Key Takeaways for missing middle housing

• **Economically rational investors will choose Passive House** at this scale (in current market conditions)
  • This should also apply to larger scale projects, but may not apply to smaller scale

• **Passive House financial returns are better**...even without incentives or adjusting for climate risk

• **Major Embodied Carbon reductions** can be achieved for **no cost**

• **Start with structural for Embodied Carbon.** Invest marginal dollars in **Wall Cavity Insulation & Gypsum Board**
Questions?

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Low carbon concrete is readily available, easy to specify and (largely) cost equivalent
Footprint’s transit-oriented multifamily homes radically reduce household transportation energy consumption

Where We Build

Location Efficiency: Household Transportation Energy Use by Location

Transit Oriented Multifamily households use ~80% less energy on transportation than single-family home households in auto-dependent locations

Source: U.S. Environmental Protection Agency (March 2011); “Location Efficiency and Housing Type”
Climate risks are not yet widely or accurately priced in real estate markets, but winds are shifting

Where We Build

Insurers are reassessing risk exposure in historically hot real estate markets…

**Bloomberg**
“*Climate Is Forcing the Most Risk-Aware Industry to Reinvent Itself*”
- Bloomberg (January 2023)

**Tampa Bay Times**
“Farmers Insurance is *leaving Florida* in latest blow to homeowners”
- Tampa Bay Times (July 2023)

**Associated Press**
“*California* insurance market rattled by withdrawal of major companies”
- Associated Press (June 2023)

…and Industry leaders are trumpeting the opportunity for sophisticated investors
Data & analytics providers are proliferating as savvy investors seek to understand and manage climate risk.
Real assets face both **physical** and **transitional risks** as markets and governments react to climate change.

### Where We Build

<table>
<thead>
<tr>
<th>Physical Risks</th>
<th>Transitional Risks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Resilience:</strong></td>
<td><strong>Insurance Cost and Availability</strong></td>
</tr>
<tr>
<td>Certain geographies carry greater risk of <strong>physical damage</strong> and <strong>declining asset</strong> values from:</td>
<td>The growing number of catastrophic weather events may lead to significant increases in property insurance premiums or even limit the availability of insurance in some markets altogether.</td>
</tr>
<tr>
<td>- Floods</td>
<td></td>
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<tr>
<td>- Fires (&amp; air quality)</td>
<td></td>
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<tr>
<td>- Hurricanes</td>
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<td>- Increased heat</td>
<td></td>
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<tr>
<td>- Rising sea levels</td>
<td></td>
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<tr>
<td>- Access to fresh water</td>
<td><strong>Emissions Regulations</strong></td>
</tr>
<tr>
<td><strong>Tort Liability:</strong></td>
<td>Major cities throughout the US are enacting rules to curb greenhouse gases emitted from the construction and operation of buildings.</td>
</tr>
<tr>
<td>Owner liability for failing to anticipate how climate events could harm a tenant's safety or property</td>
<td><strong>Diligence Scopes &amp; Methods</strong></td>
</tr>
</tbody>
</table>

There will be a **flight to resilience, quality, and climate havens** as markets begin accurately pricing climate risk.