Economics of Disaster Resilience

Lars Powell, PhD
University of Alabama
resilience
/rezil-əns/
noun

1. the capacity to recover quickly from difficulties; toughness.
   "the often remarkable resilience of so many British institutions"

2. the ability of a substance or object to spring back into shape; elasticity.
   "nylon is excellent in wearability and resilience"
Resilience = value = profit
The cost of vulnerability

- Poorly engineered buildings create a debris field
- People whose homes and businesses are destroyed do not buy goods and services
- Depressed businesses reduce consumption and employment
How do we increase resilience?

• Insurance
• Building standards
• Planning
Planning
• 19% of Louisiana residents live in multifamily housing
• Residents prefer FORTIFIED
• FORTIFIED is profitable for owners
  • Inexpensive
  • High return
Typical apartment building
Specs:

- 2 stories
- 30 units
- 30,000 square feet
- Construction cost = $3,000,000

FORTIFIED cost over code
- $6,600 - $38,000
- 0.23% to 1.27%
ASCE Wind Zones (https://asce7hazardtool.online)
<table>
<thead>
<tr>
<th>Zone</th>
<th>Fortified Roof</th>
<th>Fortified Gold</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hurricane ($\geq 140$)</td>
<td>$7,000$</td>
<td>$7,000$</td>
</tr>
<tr>
<td>Hurricane ($&lt; 140$)</td>
<td>$6,600$</td>
<td>$38,000$</td>
</tr>
<tr>
<td>High wind and hail</td>
<td>$16,900$</td>
<td>$16,900$</td>
</tr>
</tbody>
</table>
Willingness to Pay Survey

- 2021
- 1,050 Respondents
- 11 states

“How much more rent would you pay to live in a FORTIFIED apartment complex?”
Willingness to Pay Survey

- 74% willing to pay at least 0.5%
- AR, OK, TN = $6 / month
- Coastal states = $12 / month
Wind Insurance Discounts

Table 2: Average Expected Insurance Premium Reductions from FORTIFIED

<table>
<thead>
<tr>
<th>FORTIFIED Program</th>
<th>Wind zone</th>
<th>Expected loss</th>
<th>Risk load</th>
<th>Premium Standard</th>
<th>Premium Roof</th>
<th>Premium Gold</th>
<th>Discount Roof</th>
<th>Discount Gold</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hurricane</td>
<td>&gt;140</td>
<td>$5,327</td>
<td>$10,653</td>
<td>$15,980</td>
<td>$14,694</td>
<td>$9,858</td>
<td>$1,286</td>
<td>$6,122</td>
</tr>
<tr>
<td>Hurricane</td>
<td>≤140</td>
<td>2,170</td>
<td>4,340</td>
<td>6,511</td>
<td>5,598</td>
<td>4,254</td>
<td>913</td>
<td>2,256</td>
</tr>
<tr>
<td>HWH</td>
<td>&lt;115</td>
<td>2,002</td>
<td>2,002</td>
<td>4,003</td>
<td>3,197</td>
<td>2,784</td>
<td>806</td>
<td>1,219</td>
</tr>
</tbody>
</table>
## Benefit /cost analysis

<table>
<thead>
<tr>
<th></th>
<th>Hurricane Roof &gt;140</th>
<th>Hurricane Gold &gt;140</th>
<th>Hurricane Roof 115-140</th>
<th>Hurricane Gold 115-140</th>
<th>HWH Roof</th>
<th>HWH Gold</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Loss/insurance savings</td>
<td>$1,286</td>
<td>$6,122</td>
<td>$913</td>
<td>$2,256</td>
<td>$806</td>
<td>$1,219</td>
</tr>
<tr>
<td>2 Increased demand</td>
<td>2,160</td>
<td>2,160</td>
<td>2,160</td>
<td>2,160</td>
<td>1,080</td>
<td>1,080</td>
</tr>
<tr>
<td>3 Annual benefit</td>
<td>3,446</td>
<td>8,282</td>
<td>3,073</td>
<td>4,416</td>
<td>1,886</td>
<td>2,299</td>
</tr>
<tr>
<td>4 Cost</td>
<td>7,000</td>
<td>7,000</td>
<td>6,600</td>
<td>38,000</td>
<td>16,900</td>
<td>16,900</td>
</tr>
<tr>
<td>5 Payback period (years)</td>
<td>2.03</td>
<td>0.85</td>
<td>2.15</td>
<td>8.61</td>
<td>8.96</td>
<td>7.35</td>
</tr>
<tr>
<td>6 Internal rate of return</td>
<td>49%</td>
<td>118%</td>
<td>47%</td>
<td>10%</td>
<td>9%</td>
<td>12%</td>
</tr>
</tbody>
</table>
Thank you

Lars.Powell@ua.edu