Impact of Katrina on U.S. Housing Markets: Building Codes Change in Response to Catastrophic Risk

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Society of Wood Science and Technology

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Outline

- Building Code Changes: Opportunity for Wood?
- North America Statistics
- Offshore Observations
- Evolving Construction Techniques
- U.S. Home Construction Statistics
- Implications – Wood Products Industry
- Conclusion
Most Damaging Natural Disasters

Sources: APA, Red Cross, McGraw-Hill Construction
Building Codes

Code Background & Evolution:

Building codes & Federal law: States not required to follow “model” or “umbrella code”

Code employed – discrete state’s prerogative & even counties within a state

Consequently, codes differ – confusing for builders & general public
Building Codes

Code Background & Evolution:
Changes have occurred: Why?

After “Andrew” (1992) Florida adopted & implemented tougher codes – S. FL

Hurricanes Katrina & Rita forced similar action by LA & Gulf Coast states
Building Codes

Codes consolidated in mid-1990’s:

International Code Council formed: Combined BOCA, ICBO, & SBCCI into a model code with 2-parts:

IBC & International Residential Code

Simplified “code environment” – more effective for promoting better construction practices

→ can greatly reduce hurricane & earthquake damage

An opportunity for wood building materials?
Attention to code & code enforcement increased throughout U.S.

Improved Code Knowledge:

(1) FL’s State Building Code – based on IBC & IRC;

(2) LA approved adopted IBC & IRC (12/05):
  ▪ Insure new homes built in the Gulf Coast can withstand winds of 130 to 150 mph
  ▪ Applies to buildings rebuilt after Katrina & Rita & all buildings built/rebuilt in LA in ‘07
(3) Significant – tougher standards for any state adopting the ICC code:

Areas where winds > 110-120 mph

- Building standards tougher: 19/32” sheathing vs. 3/8”
- Better tie downs: Roof to frame
- Bigger & more nails
- Impact resistant windows, etc.

FL – homes built to ICC code fared better than older homes (less demanding state code)
Homes with wood shear walls & bracing usually performed well

Fully sheathed homes performed better than partially sheathed homes

Most observers:

- Gulf Coast’s older homes → poor construction contributed to severity of Katrina damage
- Newer homes built to ICC design codes performed well
Insurers Response to Increasing Claims

Allstate to drop quake coverage for 352,000

By Edward Iwata, USA TODAY

As the insurance industry debates how to handle billions of dollars in potential claims from natural disasters, Allstate is dropping earthquake coverage for 352,000 policyholders in most states to cut its risk of losses from catastrophes.

Allstate spokesman Mike Trevino said Tuesday that the Northbrook, Ill., insurer has 407,000 homeowners' policyholders with quake coverage, but not all will lose it.

That's because regulators in six states — Connecticut, Florida, New Hampshire, New York, Pennsylvania and Rhode Island — might require Allstate to renew the quake coverage for existing policyholders. Talks with the states are ongoing.

Allstate’s move won’t hurt its policyholders in earthquake-prone California, where 14% of homeowners have earthquake coverage through the California Earthquake Authority, a public-private entity funded by insurance companies.

Allstate’s property-and-casualty operations lost money last year, with Allstate paying $5.7 billion in claims for all U.S. catastrophes in 2005, Trevino said. Most of the claims covered

Seeking 70% (ave) Statewide Rate Increase
North America Statistics

- Hurricanes: More frequent & violent?
- Earthquakes: Steady?
Wind Speed Map – Eastern U.S.

Special Wind Region

<table>
<thead>
<tr>
<th>Location</th>
<th>V mph (m/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hawaii</td>
<td>105 (47)</td>
</tr>
<tr>
<td>Puerto Rico</td>
<td>145 (65)</td>
</tr>
<tr>
<td>Guam</td>
<td>170 (76)</td>
</tr>
<tr>
<td>Virgin Islands</td>
<td>145 (65)</td>
</tr>
<tr>
<td>American Samoa</td>
<td>125 (56)</td>
</tr>
</tbody>
</table>

Notes:
1. Values are nominal design 3-second gust wind speeds in miles per hour (m/s) at 33 ft (10 m) above ground for Exposure C category.
2. Linear interpolation between wind contours is permitted.
3. Islands and coastal areas outside the last contour shall use the last wind speed contour of the coastal area.
4. Mountainous terrain, gorges, ocean promontories, and special wind regions shall be examined for unusual wind conditions.

FIGURE 5-1 continued
BASIC WIND SPEED
## Housing Affected by Hurricanes: Wind Speeds (> 110 mph)

<table>
<thead>
<tr>
<th>State, % of permits where winds &gt; 110mph</th>
<th>2005 Permits</th>
<th>Affected Permits*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Florida – 50%</td>
<td>285,060</td>
<td>142,530</td>
</tr>
<tr>
<td>Texas – 20%</td>
<td>208,980</td>
<td>41,796</td>
</tr>
<tr>
<td>Louisiana – 35%</td>
<td>21,790</td>
<td>7,626</td>
</tr>
<tr>
<td>Mississippi – 20%</td>
<td>12,990</td>
<td>2,600</td>
</tr>
<tr>
<td>South Carolina – 20%</td>
<td>53,760</td>
<td>10,752</td>
</tr>
<tr>
<td>North Carolina – 20%</td>
<td>100,220</td>
<td>20,000</td>
</tr>
<tr>
<td>NY – 10%</td>
<td>59,310</td>
<td>5,931</td>
</tr>
<tr>
<td>PA – 10%</td>
<td>44,180</td>
<td>4,418</td>
</tr>
<tr>
<td>MA – 20%</td>
<td>23,840</td>
<td>4,768</td>
</tr>
<tr>
<td>RI – 25%</td>
<td>2,790</td>
<td>697</td>
</tr>
<tr>
<td>AL – 15%</td>
<td>30,270</td>
<td>4,540</td>
</tr>
<tr>
<td>CT – 15%</td>
<td>11,670</td>
<td>1,750</td>
</tr>
<tr>
<td>NJ – 20%</td>
<td>38,480</td>
<td>7,696</td>
</tr>
<tr>
<td>GA – 10%</td>
<td>104,360</td>
<td>10,430</td>
</tr>
<tr>
<td>VA – 10%</td>
<td>60,960</td>
<td>6,096</td>
</tr>
<tr>
<td><strong>Sub-Totals</strong></td>
<td><strong>1,058,580</strong></td>
<td><strong>271,552</strong></td>
</tr>
<tr>
<td><strong>U.S. Permits</strong></td>
<td><strong>2,147,600</strong></td>
<td><strong>13% of U.S. permits</strong></td>
</tr>
</tbody>
</table>
Problematic Seismic Areas: U.S. East

Source: ASCE, Minimum Design Loads for Buildings and Other Structures; ASCE 7-05
## Housing Affected by Potential Seismic Activity

State and % of permits within earthquake zones

<table>
<thead>
<tr>
<th>State</th>
<th>2005 Permits</th>
<th>Affected Permits*</th>
</tr>
</thead>
<tbody>
<tr>
<td>California – 35%</td>
<td>202,220</td>
<td>70,770</td>
</tr>
<tr>
<td>Washington – 30%</td>
<td>52,780</td>
<td>15,834</td>
</tr>
<tr>
<td>South Carolina – 20%</td>
<td>53,760</td>
<td>10,752</td>
</tr>
<tr>
<td>Colorado – 15%</td>
<td>46,260</td>
<td>6,939</td>
</tr>
<tr>
<td>Missouri – 15%</td>
<td>31,280</td>
<td>4,692</td>
</tr>
<tr>
<td><strong>Sub-Totals</strong></td>
<td><strong>386,290</strong></td>
<td><strong>108,987</strong></td>
</tr>
<tr>
<td><strong>U.S. Permits</strong></td>
<td><strong>2,147,600</strong></td>
<td>5% of U.S. permits</td>
</tr>
</tbody>
</table>
## Housing Affected by Hurricanes & Earthquakes

<table>
<thead>
<tr>
<th></th>
<th>2005 Permits</th>
<th>Affected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hurricanes</td>
<td>1,058,580</td>
<td>271,552</td>
</tr>
<tr>
<td>Earthquakes</td>
<td>386,290</td>
<td>108,987</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>1,444,870</strong></td>
<td><strong>380,539</strong></td>
</tr>
<tr>
<td>U.S. Permits</td>
<td>2,147,600</td>
<td>18%</td>
</tr>
</tbody>
</table>
Offshore Observations

Kobe earthquake – huge impact on Japanese residential construction

U.S. Housing Markets – Will wood & the wood industry capture the opportunity as in Japan?

What does the wood industry need to do?
Seismic Issues
Japan: Precut Homes Increasing

Drivers:

- Demographics
- New government building regulations
- Quality assurance law: 10-yr home warranty program
- Kobe earthquake

Post & Beam construction:

- Moving to factory components with CAD
- Cut to length
- Machine cut mortise & tenon components
- Numbered parts
- Using more glulam & engineered wood products
Japan: Precut Homes

Precut Home Starts

% Post & Beam (Precut)

Source: APA (Japan Wood Housing, Precut Assoc.; Daily Wood Products J.)
Impact of Prefab Use in Japan: Drives Use of Glulam & Laminated Lbr

Thousand cubic meters

Laminated structural lumber increasing @ 10 – 15% annually

Domestic production
Imported laminated lumber
Imported glulam
Glulam: Japanese Output & Imports

490% growth in 9-yrs

Kobe earthquake

Source: APA
Drivers:

- Demographics (skilled labor shortages),
- Kobe earthquake: tougher building regulations (e.g., quality assurance law, 10-yr warranty)

End Result:

- Better materials in home construction
- More EWPs & factory built components
  & less conventional (e.g., green) Lbr products
Japanese LVL: Production & Imports

JAPAN LAMINATED LUMBER PRODUCTION AND IMPORTS

- Domestic: Non-Structural LL
- Imported: Non-Str’l LL
- Domestic: Structural LL
- Imported: Structural LL

Kobe earthquake

Source: JLLMA
U.S. Home Construction Statistics
Building Material Trends: Concrete making significant inroads – South mostly (45% of starts)

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete</td>
<td>29%</td>
<td>29%</td>
<td>31%</td>
<td>35%</td>
<td>34%</td>
<td>36%</td>
<td>36%</td>
<td>38%</td>
</tr>
<tr>
<td>Steel</td>
<td>&lt;1</td>
<td>&lt;1</td>
<td>&lt;1</td>
<td>&lt;1</td>
<td>&lt;1</td>
<td>&lt;1</td>
<td>&lt;1</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Lumber Joists</td>
<td>40</td>
<td>39</td>
<td>35</td>
<td>31</td>
<td>29</td>
<td>26</td>
<td>26</td>
<td>24</td>
</tr>
<tr>
<td>I-Joists</td>
<td>20</td>
<td>22</td>
<td>23</td>
<td>23</td>
<td>26</td>
<td>27</td>
<td>25</td>
<td>27</td>
</tr>
<tr>
<td>Open Web wood truss</td>
<td>10</td>
<td>9</td>
<td>10</td>
<td>9</td>
<td>10</td>
<td>10</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Others</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>&lt;1</td>
<td>&lt;1</td>
<td>&lt;1</td>
</tr>
</tbody>
</table>

Wall Sheathing

- **Critical** to structural performance in high winds & seismic events
- Wood products: Facing more competition
- Need to develop novel & improved wood products…
  
  or **CONTINUE** to lose market share

Proper Sheathing – vital for damage reduction
Residential Wall Sheathing
2004 Market Share

Wood Structural Panels - 69%

Foam 16%
Fiberboard 2%
Kraft Board 1%
Other 10%
Gypsum 2%

“Other” includes stucco walls without sheathing, plywood, or OSB siding directly to studs & structural insulated panels.
AD:

“The principle benefits of the Strong-Wall Shearwall® are its consistency and strength... ...this allows for more windows and doors in the house design because you use 30-70% less shearwall than typically required.”
Insulated Concrete Form: < 1% of U.S. single family homes

Source: Oke Woodsmith Building Systems, Canada
# Homebuilding Methods: Wall Structure Type Basis

<table>
<thead>
<tr>
<th>Wall Structure Type</th>
<th>1997</th>
<th>2004</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stick Built</td>
<td>1,146</td>
<td>1,365</td>
<td>1,455</td>
</tr>
<tr>
<td>Panelized</td>
<td>115</td>
<td>260</td>
<td>270</td>
</tr>
<tr>
<td>Masonry</td>
<td>145</td>
<td>260</td>
<td>270</td>
</tr>
<tr>
<td>Modular</td>
<td>45</td>
<td>43</td>
<td>43</td>
</tr>
<tr>
<td>Steel Frame</td>
<td>10</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>SIPs</td>
<td>5</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>Other</td>
<td>8</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>1,474</td>
<td>1,956</td>
<td>2,068</td>
</tr>
<tr>
<td>Manufactured</td>
<td>354</td>
<td>130</td>
<td>147</td>
</tr>
<tr>
<td>Grand Total</td>
<td>1,828</td>
<td>2,086</td>
<td>2,215</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>1,000 units</th>
<th>1,000 units</th>
<th>1,000 units</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td>1,146 - 78%</td>
<td>1,365 - 70%</td>
<td>1,455 - 70%</td>
</tr>
<tr>
<td>2004</td>
<td>260-13%</td>
<td>270-13%</td>
<td>270-13%</td>
</tr>
<tr>
<td>2005</td>
<td>260-13%</td>
<td>270-13%</td>
<td>270-13%</td>
</tr>
</tbody>
</table>

Evolving Construction Techniques

Favor wood or other building materials?

Outlook for wood building materials in new code environment:

Shear wall strength/racking strength is key for good performance in hurricanes

Full-wood sheathing is great – there are alternatives:

- Simpson’s Strongwall-Shearwall product
- Reinforced concrete – Steel
- ICF – insulated concrete form
Building methods are evolving with code changes:

In response to:

Skilled labor shortages, site waste, competitive pressures (e.g., volatile building material prices)

 Builders are consolidating & using more EWPs, more factory built components, installed sales, &

Substituting non-wood materials – steel & engineered concrete products
Implications for the Wood Products Industry

- Residential construction should remain strong for at least another decade.
- Drivers: Positive demographics, demand for 2nd homes, & aging housing stock.
- Work with your customers → builders & remodelers:
  - Develop products & systems that help them solve problems.
  - Large, national builders lead by adopting new products/systems (e.g., EWPs).
### Implications for the Wood Products Industry

- Building codes evolution will continue & force builders to build more durable homes utilizing the best materials.

- Work with code officials to ensure wood materials are consistent with code changes.

- Develop new products/systems that add value for the end-user.

  Can we stay ahead of the competition – steel, concrete, etc.?
A Very Unique Period: Why?

U.S. Single-family Housing Starts

Million Units

1.8
1.6
1.4
1.2
1.0
0.8
0.6


Annual

Demographic Trend
U.S. Single Floor Space

Source: U.S. Census Bureau & APA forecast.
Consolidation in U.S. Homebuilding

Top 100 use an estimated 20% of all structural panels & about 30% of all EWP

Larger companies have $$$; streamlining delivery; building faster; increasing quality; & willing to try new technology

* Homes closed by largest for-sale builders

Source: Builder Magazine by Hanley Wood & Builder 100 annual survey
Building material manufacturers & suppliers – consolidation continues

Big builders adopt new construction techniques (e.g., panelized walls) & new building materials faster than most smaller builders.
Increasing efforts to build homes to withstand hurricanes & earthquakes.
Many of our wood building materials are either mature or in decline. Susceptible to competition – industry needs to be innovative.

Source: United States Forest Service
Efficiency, Cost, Quality, & Design Issues – Drive demand for new EWP products
Engineered wood plants have doubled in past 15 yrs ...

Growth:
- Environmental pressure
- Consistent quality
- Fewer callbacks
- More consistent price
- Less jobsite waste

Source: APA, March 2006
Conclusion

There is opportunity for wood products & the industry –

Will we meet it?