MARKET TRENDS AND OPPORTUNITIES FOR PLASTIC PROFILES IN CONSTRUCTION
PROFILES 2018
Home Innovation Research Labs

- Founded in 1964 as wholly-owned subsidiary of NAHB
- Independent, for-profit researchers assisting development and commercialization of new building technologies
  - Engineering research & development
  - Market & field research
  - Laboratory testing
- #1 in green home building certification (NGBS)
- Building codes and standards developers
- Partners with ICC-ES to fast-track issuance of ESRs
Purpose and Outline of Presentation

1. Review of building materials trends in new homes and remodeling
   1. Windows & Patio Doors
   2. Roofing
   3. Siding & Exterior Finishes
   4. Exterior Trim & Fascia
   5. Decks & Railing Systems
   6. Fences & Privacy Walls

2. Current market opportunities; Pitfalls in launching & promoting new building products & services
Basis for Trend Data: Annual Building Product Tracking Studies

- Home Innovation has been tracking annual materials purchases since 1995
  - Builder Practices Survey of 1,500 U.S. Builders
  - Consumer Practices Survey of 100,000+ U.S. households
- Decades of custom market research, sponsored by hundreds of building materials manufacturers
- Support of development and launch of hundreds of new building products
Windows Installed in New U.S. Homes and Home Remodeling, 2017
(millions of window units)

- Vinyl: 12.2 (New Homes) + 17.3 (Home Remodeling)
- Wood: 4.2 (New Homes) + 8.4 (Home Remodeling)
- Composite & Other: 0.9 (New Homes) + 6.1 (Home Remodeling)
- Aluminum: 1.6 (New Homes) + 3.9 (Home Remodeling)

About 55 million windows/year installed in homes

Source: Annual Builder & Consumer Practices Reports
Windows in New U.S. Homes

Source: Annual Builder Practices Reports

2017 Findings
- Vinyl 68% (up)
- Wood 24% (up)
- Aluminum 5% (down)
- Composite 4% (down)
Change in New Home Construction Mix

Source: Home Innovation Research Labs, NAHB
Windows in New U.S. Homes, by Census Divisions, 2016

Source: Annual Builder Practices Reports

Source: Annual Builder Practices Reports

Source: Annual Builder Practices Reports
Windows in U.S. Home Repair, Replacement, and Remodeling

Source: Annual Consumer Practices Reports
More than 3 million residential patio doors were purchased in 2017.
Residential Roofing: New Homes and Home Replacements/Additions, 2017
(millions of sf)

- **Asphalt--architectural**
  - New Homes: 1,832
  - Remodeling: 4,819
- **Asphalt--3-tab**
  - New Homes: 338
  - Remodeling: 5,963
- **Metal**
  - New Homes: 1,615
- **Clay or Concrete Tile**
  - New Homes: 328
  - Remodeling: 577
- **Cedar shingles & shakes**
  - New Homes: 1,048
- **Single Ply**
  - New Homes: 333
- **Slate**
  - New Homes: 252
- **Composite**
  - New Homes: 150

Residential Roofing is about an 18 billion sq. ft. per-year market.

Source: Annual Builder & Consumer Practices Reports
Roofing Materials Installed in New U.S. Homes

Asphalt--Three Tab
Asphalt--Architectural
Wood Shakes/Shingles
Concrete and Clay Tile
Metal
Plastic Composite
Other

Source: Annual Builder Practices Reports

2017 Findings
Asphalt 82% (up)
Tiles 8% (down)
Roofing Material Installed in U.S. Home Replacements

Source: Annual Consumer Practices Reports
Siding in New Homes and Remodeling, 2017
(millions of sq.ft.)

<table>
<thead>
<tr>
<th>Material Type</th>
<th>New Homes</th>
<th>Remodeling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vinyl &amp; Other Plastic</td>
<td>568</td>
<td>1,740</td>
</tr>
<tr>
<td>Engineered Wood</td>
<td>393</td>
<td>585</td>
</tr>
<tr>
<td>Stone &amp; Brick</td>
<td>571</td>
<td>341</td>
</tr>
<tr>
<td>Fiber Cement</td>
<td>486</td>
<td>317</td>
</tr>
<tr>
<td>Natural Wood</td>
<td>87</td>
<td>423</td>
</tr>
<tr>
<td>Stucco</td>
<td>432</td>
<td>254</td>
</tr>
<tr>
<td>Metal</td>
<td>26</td>
<td>375</td>
</tr>
<tr>
<td>Other</td>
<td>96</td>
<td></td>
</tr>
</tbody>
</table>

Residential siding represents about 7 billion sq.ft. annually.

Source: Annual Builder & Consumer Practices Reports
Siding on New U.S. Homes

2017 Findings
- Vinyl 19% (up)
- Fiber Cement 22.5% (up)
- Eng. Wood 15.5% (up)
- Stone 9.5% (down)
- Brick 12.5% (down)

Source: Annual Builder Practices Reports
Siding Shares on New U.S. Homes, by Major Price-Points, 2016

Source: Annual Builder Practices Reports
Exterior Cladding in Home Remodeling

Source: Annual Consumer Practices Reports
Exterior Cladding in Home Remodeling (Lowest Tier)

Source: Annual Consumer Practices Reports
Exterior Trim & Fascia Board for New U.S. Homes, 2017
(millions of LF)

- Natural Wood: 155 (New Homes) - 185 (Total)
- Engineered Wood: 167 (New Homes) - 81 (Total)
- Aluminum Wrap: 126 (New Homes) - 73 (Total)
- Vinyl Wrap/Profile: 63 (New Homes) - 95 (Total)
- Fiber Cement: 133 (New Homes) - 15 (Total)
- PVC Board: 58 (New Homes) - 48 (Total)
- Other: 58 (New Homes) - 43 (Total)

The residential trim market was about 1.3 billion LF in 2017.

Source: Annual Builder & Consumer Practices Reports
Exterior Trim & Fascia Board for New U.S. Homes

Source: Annual Builder Practices Reports

2017 Findings
Vinyl Wrap 9% (up)
Natural Wood 19% (down)
Eng. Wood 21% (down)
Porch & Deck Surfacing in New Homes and Remodeling, 2016
(millions of sf installed)

- Treated wood: 595
- Composite: 181
- Cedar: 149
- Redwood: 82
- Other untreated wood: 33
- PVC & other plastic: 28

Source: Annual Builder & Consumer Practices Reports

Residential Decking market is about 700 million sq.ft. installed per year (composite = 220 MM)
Porch and Deck Surfacing Materials in New U.S. Homes

Source: Annual Builder Practices Reports
Porch and Deck Surfacing Material in U.S. Residential Remodeling

Source: Annual Consumer Practices Reports
The U.S. home porch and deck railing market is about 120 million linear feet per year (~1 billion feet of lineals).
Deck and Porch Railing in New U.S. Homes

2017 Findings
Aluminum 13% (up)
PVC 13% (n.c.)
Treated Wood 33% (n.c.)
Untreated Wood 15% (down)
Composite 12% (down)

Source: Annual Builder Practices Reports
Deck and Porch Railing in U.S. Home Remodeling

Source: Annual Consumer Practices Reports
Fences & Privacy Walls Installed in New Homes and Remodeling, 2017
(millions of LF)

<table>
<thead>
<tr>
<th>Material</th>
<th>New Homes</th>
<th>Residential Remodeling</th>
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</thead>
<tbody>
<tr>
<td>Wood Vertical Boards</td>
<td>138</td>
<td>771</td>
</tr>
<tr>
<td>Wood Rails or Timbers</td>
<td>272</td>
<td></td>
</tr>
<tr>
<td>Plastic or Composite</td>
<td>212</td>
<td></td>
</tr>
<tr>
<td>Chain Link</td>
<td>170</td>
<td></td>
</tr>
<tr>
<td>Iron or Steel</td>
<td>58</td>
<td></td>
</tr>
<tr>
<td>Concrete &amp; Other</td>
<td>55</td>
<td></td>
</tr>
<tr>
<td>Brick or Block</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aluminum</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stone</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

About 1.8 million LF of fence installed per year = 8 billion SF
Plastic/Composite = about 230 million LF = 1.2 billion SF

Source: Annual Builder & Consumer Practices Reports
Fence & Privacy Wall Trends in New U.S. Homes

Source: Annual Builder Practices Reports

2017 Findings
- Treated Wood 61% (up)
- Iron or Steel 6.5% (up)
- Plastic 9.5% (n.c.)
- Brick or Block 13% (down)
Fence & Privacy Walls Installed in U.S. Home Remodeling

Source: Annual Consumer Practices Reports
Some Pitfalls to New Building Product Introductions

- Product benefits someone other than specifier, purchaser or end-user (such as some labor saving innovations)
- Product requires systemic change in design/construction
  - Drop-in replacements have higher likelihood of success
- Wrongly assuming little emotional content in purchase decision...confidence, smart, or conveys personal values
- Benefits are difficult or disadvantageous to convey
  - When more than multiple logical points need to be made, or if benefits rest on hard-to-understand engineering principles
  - Involves mentioning of disasters, sickness, raises questions
Common Mistakes with New Building Product Introductions

- Entering the most regulated or complex applications first
  - Wall systems in very cold or high-wind areas, for example

- Sellers create value proposition that relies on purist view, requires all-or-nothing decision
  - Exterior trim & molding is a prime example: a single house may have four or more different exterior trim materials

- Failure to realize that home building & remodeling companies are businesses
  - Sales, design, marketing, regulations, code approvals, coordinating construction, financing, hiring & training & retaining employees
  - Your product can improve their home - how about their business?
  - Some offer program assistance - bidding, scheduling, financing, etc.
Common Mistakes with New Building Product Introductions

- New products address complaints or nuisances, but fail to really **solve problems** or **create opportunities**
  - Contractors will not always pay more for a product that is less heavy, less dusty, or less itchy
- Some new product benefits create unintended consequences—examples of issues with early Green homes
  - Ultra-low-flow fixtures and long wait times for hot water
  - Very high efficiency AC and high indoor humidity
  - Very tight homes and poor indoor air quality
- True advantages are often not learned until after the product has been on the market a while
How Switching to a New Product Can Impact Builders and Contractors

- Switching Costs—new products often require new place of purchase, training installers & supervisors, new tools
  - “Tool Programs” are one popular way to reduce switching cost
  - Field techs, design assistance, code consultation are common with successful launches
- There is an implied “risk premium” required by contractors for switching—so your product/service need to have substantially greater benefits or lower cost
- Remember that most installers do not read instructions, and they want the contractor to make decisions on how to install
New Product Strategies to Help Solve Construction Labor Shortage

▪ Reduce skills required (system that can allow unskilled worker to do job of journeyman, for example)
▪ Reduce crew size (run more crews with same workforce)
▪ Allowing one construction trade to do the work of two
▪ Fewer trips to the jobsite
▪ Reduce fatigue & jobsite injuries to keep workers longer
▪ Allow for easier payment of workers by piece rates
▪ Cautions: saving time for one worker does not always translate into overall time savings
▪ Focus innovation on time-consuming activities
Your New Product Installs So Easily, Anyone Can Do It…

- Anticipate resistance from some skilled trades
- Demonstration is very important to selling
- Consider non-traditional users, like
  - remodeling generalists
  - handymen who welcome alternatives that don’t require special tools or training
- Consider do-it-yourselfers (prosumers, weekend warriors, etc.)
Management Labor Deficit

Recent Home Innovation study of ASHRAE members revealed that there is a deficit management levels of construction companies – not just skilled tradespeople

- The primary lack was project coordination and management
- The skills were particularly lacking a deep knowledge of construction (not engineering) need jobsite experience and maturity to anticipate issues

Technologies/apps/software solutions are available, but only tech saavy younger generation inclined to use them

- Webinars to facilitate face-to-face contact
- Tracking software to communicate real-time with building team
- Communications apps
## Industry Concentration Among New Home Builders

<table>
<thead>
<tr>
<th></th>
<th>Share of 2016 Total Starts</th>
<th>Total 2016 Starts of Smallest in the Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nation's Largest Builder</td>
<td>3%</td>
<td>41,652</td>
</tr>
<tr>
<td>Top 5 Builders</td>
<td>10%</td>
<td>14,229</td>
</tr>
<tr>
<td>Top 10 Builders</td>
<td>13%</td>
<td>6,098</td>
</tr>
<tr>
<td>Top 20 Builders</td>
<td>16%</td>
<td>2,790</td>
</tr>
<tr>
<td>Top 100 Builders</td>
<td>22%</td>
<td>403</td>
</tr>
<tr>
<td>Top 200 Builders</td>
<td>24%</td>
<td>149</td>
</tr>
<tr>
<td>All Builders Under 149 Starts</td>
<td>76%</td>
<td>1</td>
</tr>
</tbody>
</table>

Calculations Based on Builder Magazine’s Builder 100 and NAHB-reported housing starts

- Single Family Starter, 20%
- Single Family Moveup, 27%
- Single Family Luxury, 13%
- Townhouses, 12%
- Multifamily Apartments, 28%

Source: U.S. Census and Annual Builder Practices Reports
## Value of New U.S. Homes Built 2016

<table>
<thead>
<tr>
<th></th>
<th>Average SF of Finished Floor Area</th>
<th>Average Selling Price (USD)</th>
<th>Total Value (Billions USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Townhouses</td>
<td>1,745</td>
<td>$327,091</td>
<td>$48</td>
</tr>
<tr>
<td>Multifamily Apartments</td>
<td>1,118</td>
<td>$191,640</td>
<td>$66</td>
</tr>
<tr>
<td>Single Family Starter</td>
<td>1,700</td>
<td>$183,428</td>
<td>$46</td>
</tr>
<tr>
<td>Single Family Moveup</td>
<td>2,535</td>
<td>$364,136</td>
<td>$121</td>
</tr>
<tr>
<td>Single Family Luxury</td>
<td>3,931</td>
<td>$767,320</td>
<td>$119</td>
</tr>
</tbody>
</table>

*Source: Annual Builder Practices Reports*