

Building the Future: Trend of Aluminum Use in the Construction Market

Public Summary Report

August, 2024



Introduction & Methodology



Scope of Analysis: Markets covered for Aluminum Sheet/ Plate and Aluminum

Primary Applications

Secondary Applications

Focus Applications

1. Curtain walls, storefronts, entrances
2. Windows, doors, screens
3. Gutters and downspouts
4. Residential siding, including trim coil, soffits, and fascia
5. Roofing and roofing products (vents, rain channels, etc.)
6. Awnings and Canopies
7. Manufactured Housing, including mobile homes
8. Other building and construction applications TBD
9. Examples: Commercial wall panels, solar panels, fencing, shading devices, building signage

Aluminum Categories

- Aluminum Sheet/ Plate
- Aluminum Extrusions

Geography

- United States



Demography

- Commercial and Industrial
- Education
- Office
- Retail
- Manufacturing/ Warehouse
- Single Family Residential
- Multifamily Residential

Glossary of Terms and Acronyms

Term	Acronym	Definition/Context
Building & Construction	B&C	Activity related to the assembly and maintenance of buildings and non-building infrastructure
Gross Domestic Product	GDP	Total output of the US measured in dollars (real or nominal)
Residential	Res.	Buildings where people live including multifamily buildings up to 9 stories
Nonresidential	Nonres.	Building where people do not live except multifamily >9 stories
Multi-family Housing	MFH	Housing that contains multiple separate dwelling units, including apartments, condos, townhouses, and duplexes
Single Family Housing	SFH	Housing that is composed of a single unit and is often detached
Repair & Replacement	R&R	Activity related to the maintenance of buildings and building products
Fiber-Reinforced Plastic	FRP	Composite material made of a polymer matrix reinforced with fiber composed glass, carbon or other materials
Fenestration		Design, construction, and presence of openings in a building including windows, doors, skylights, louvers, and other glazed or unglazed elements that are integrated into the building's envelope

Key Study Takeaways

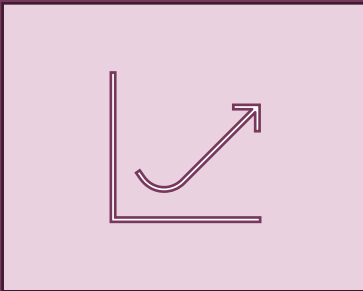


Key Takeaways



Aluminum Market Demand Today

- ~2.5 B lbs. of demand for aluminum in B&C products, with ~2/3 coming from nonresidential applications due to the largest segments (nonresidential windows & cladding)
- While 55% of products utilize aluminum profiles, these primarily come from 3 applications: nonresidential and residential res windows, and fencing; additionally, a small amount of demand comes from entry and patio doors
- The remaining applications feed into sheet and plate, with the largest segments being nonresidential cladding and gutters/ rainware



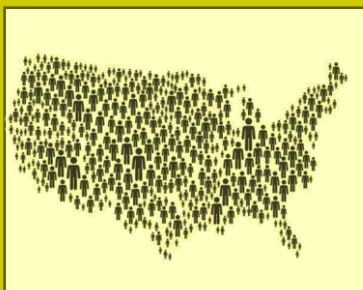
Aluminum Market Drivers

- Market Drivers are typically part of larger construction industry; largest segments (Nonresidential windows and cladding) are primarily based on new construction within Commercial segments (office, retail, etc.)
- 3rd and 4th largest segments (gutters and residential windows) have more consistent demand due to age-related replacement; gutters also benefit from storm activity
- Solar installations exhibit the highest forecasted CAGR due to rapid adoption of clean energy due to declining costs and federal/state/local tax credits and rebates



Material Share and Trends

- Aluminum utilization in most applications remains stable, including key segments of nonresidential windows and gutters/ rainware
- Aluminum is taking share away from wood in fencing, and from masonry materials in nonresidential cladding due to aesthetics trends, longevity (for fencing), and easier installation (for cladding)
- Declines in residential windows and patio door share are due to inferior energy performance, as the u-values for aluminum-framed windows tend to perform worse than vinyl or composite options
- Declines in residential siding are more due to aesthetics, with a wood look historically being the norm. As vinyl, fiber cement, and engineered wood products have improved in their durability and ability to withstand the elements, aluminum has become a niche form of siding



Aluminum Opportunities

- The majority of architects and builders favor aluminum as it is durable, meets compliance codes, and is lightweight; however, it can be value-engineered out of certain projects
- Designers are currently looking for materials that are modern, environmentally friendly, and natural looking, and aluminum can take advantage of the first two categories
- Specific opportunities for growth in roofing (where metal is taking share from shingles), residential windows (particularly for higher-end segment and larger windows), as well as nonresidential cladding (where panelization continues to emerge as a trend)

Aluminum Product Form Content (2022)

Residential Extruded
(-13M Lbs by 2027)
Share loss in windows segments due to the energy efficiency and competitive price of vinyl

~265M Lbs
CAGR 22-27: ~-1%

~1,065M Lbs
CAGR 22-27: ~2.2%

Nonresidential Extruded (+123M Lbs by 2027)
The largest single segment, supported by high Window share and stable growth in commercial applications

Residential Sheet
(+9M Lbs by 2027)
Growth supported by recoveries in housing starts and remodel activity

~591M Lbs
CAGR 22-27 0.4%

~471M Lbs
CAGR 22-27 ~2.4%

Nonresidential Sheet
(+59M Lbs by 2030)
On trend aesthetics and prioritization of durability will continue to support Nonresidential Cladding markets

Estimated Total Volume in 2022 & CAGR between 2022 and 2027

Key Growth Components (2022 to 2027)

1

+132M Lbs between
2022 and 2027

Nonresidential Windows



High strength-to-weight ratio supports aluminum usage in on-trend large format windows

2

+44M Lbs between
2022 and 2027

Nonresidential Cladding



Durability and modern, minimalist aesthetics in commercial segments support cladding growth

3

+30M Lbs between
2022 and 2027

Solar Installations



Aluminum volumes will grow as the clean energy transition continues, supported by falling costs and gov't subsidies

Durability and relatively lower environmental impact compared to steel will support aluminum entry doors growth

4

+9M Lbs between
2022 and 2027

Nonresidential Entry Door



Source: Ducker Carlisle Research and Analysis

Long Term Aluminum Competitiveness

- Although all Ducker scenarios point to YoY growth, there are risks to monitor that may impact the rate of growth for aluminum in the long term (2026 - 2030)

Technology is advancing and starting to see limited FRP usage in curtainwall applications



Aesthetic trends can be tough to predict; possibility of cladding or fencing trends changing over time



Perceived steel advantage in durability; as coatings options increase limited shifts possible



Both opportunity and a risk; within window applications aluminum perceived as less efficient than vinyl/ fiberglass (and those continue to take share)



Most applications have material substitution possible were there to be serious shifts in pricing

Key Takeaways from Builders and Architects



Aluminum Usage

52% of B&C Pros report typically using Aluminum, falling behind their usage of Wood, Brick/Stone, and Steel, and 62% expect their usage of Aluminum to grow, with Architects predicting a **significantly stronger** future for Aluminum than Builders.

Gutters/ Downspouts & Roofing/ Roofing Accessories

are the **most common** product types B&C Pros use Aluminum for.

Durability & Regulatory Compliance

are **most important** to B&C Pros' decisions on which material type to use, and they are mostly satisfied with Aluminum's performance on them.

Positive Perception of Aluminum

B&C Pros have more positive than negative things to say about Aluminum, noting its light **weight is its biggest advantage**.

Growth Opps

B&C Pros see **new build construction** as the largest avenue for Aluminum usage to grow, due to its **versatility and light weight**.

Top 3 Material Type in Popularity & Momentum

B&C Pros rate Aluminum among the **top three material types** in terms of popularity and momentum, below Composites and in line with Fiber Cement.

Biggest Threat to Aluminum

Composites represent the biggest threat to other building materials in terms of predicted future usage, popularity, and product advancements.

Innovative Material Technologies

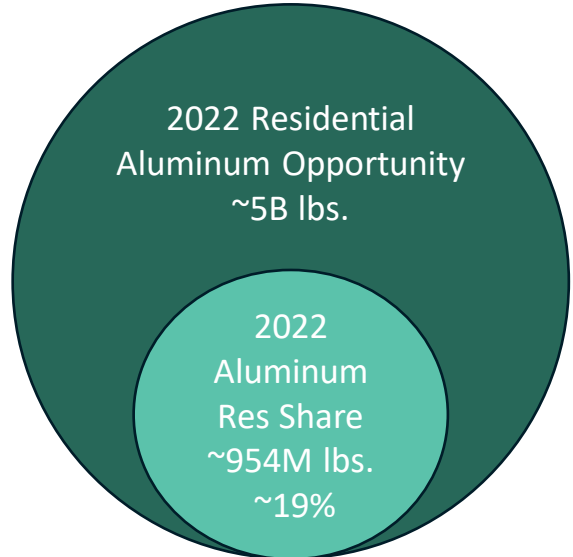
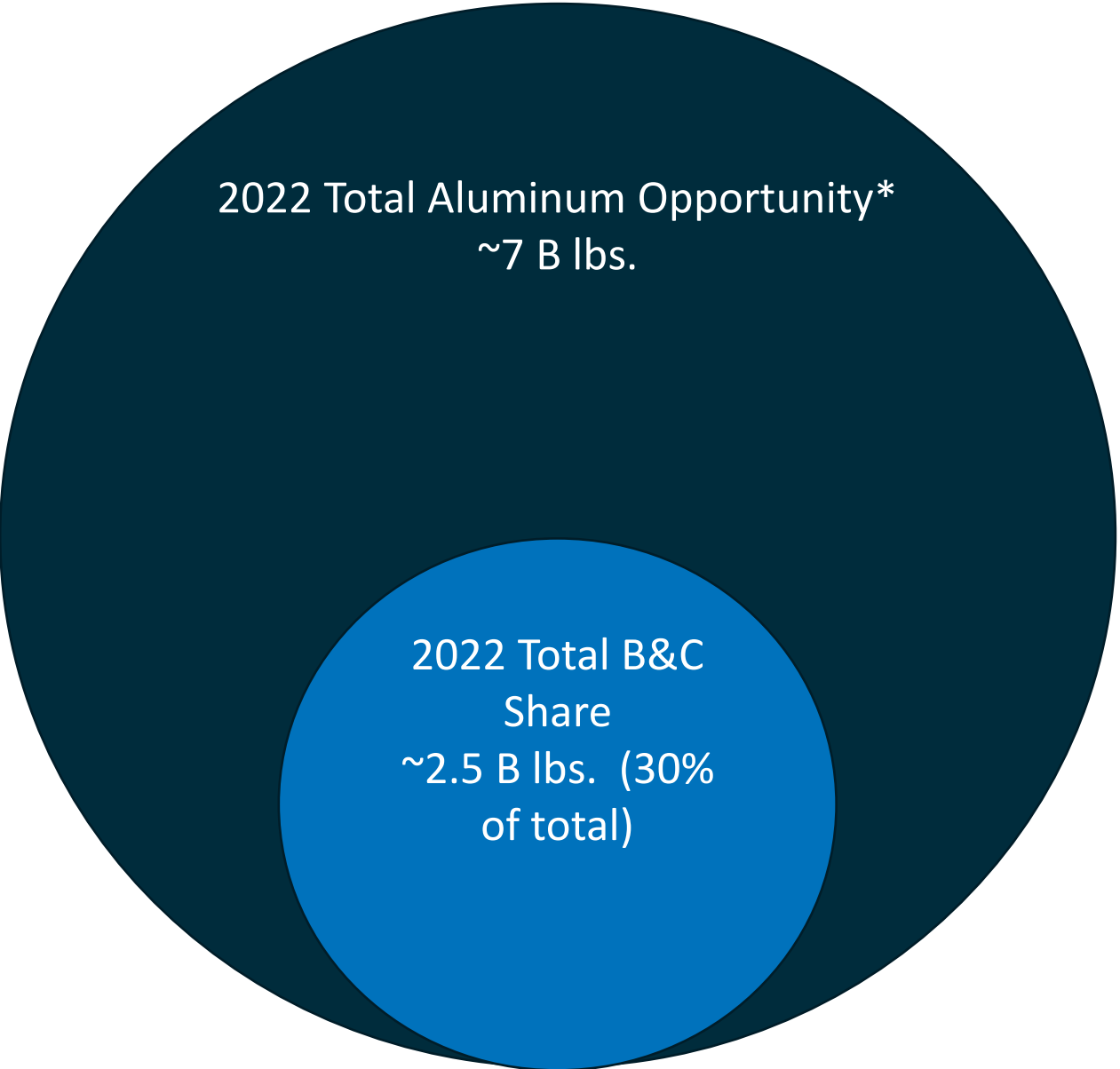
Advanced Composite Materials and Environmentally-Friendly Materials are the advancements B&C Pros see having the largest impact on the building and construction industry.

Aesthetic/ Style Trends

Modern, Environmentally-Friendly, and Natural-Looking are the most influential trends B&C Pros are witnessing drive demand for certain building products and materials, **including Aluminum**.

Residential windows, Nonresidential Cladding, and Fencing displayed the largest opportunities for aluminum share gain in 2022

*Opportunity includes if 100% of a given product category was aluminum; individual categories can be found on the right hand side of this slide

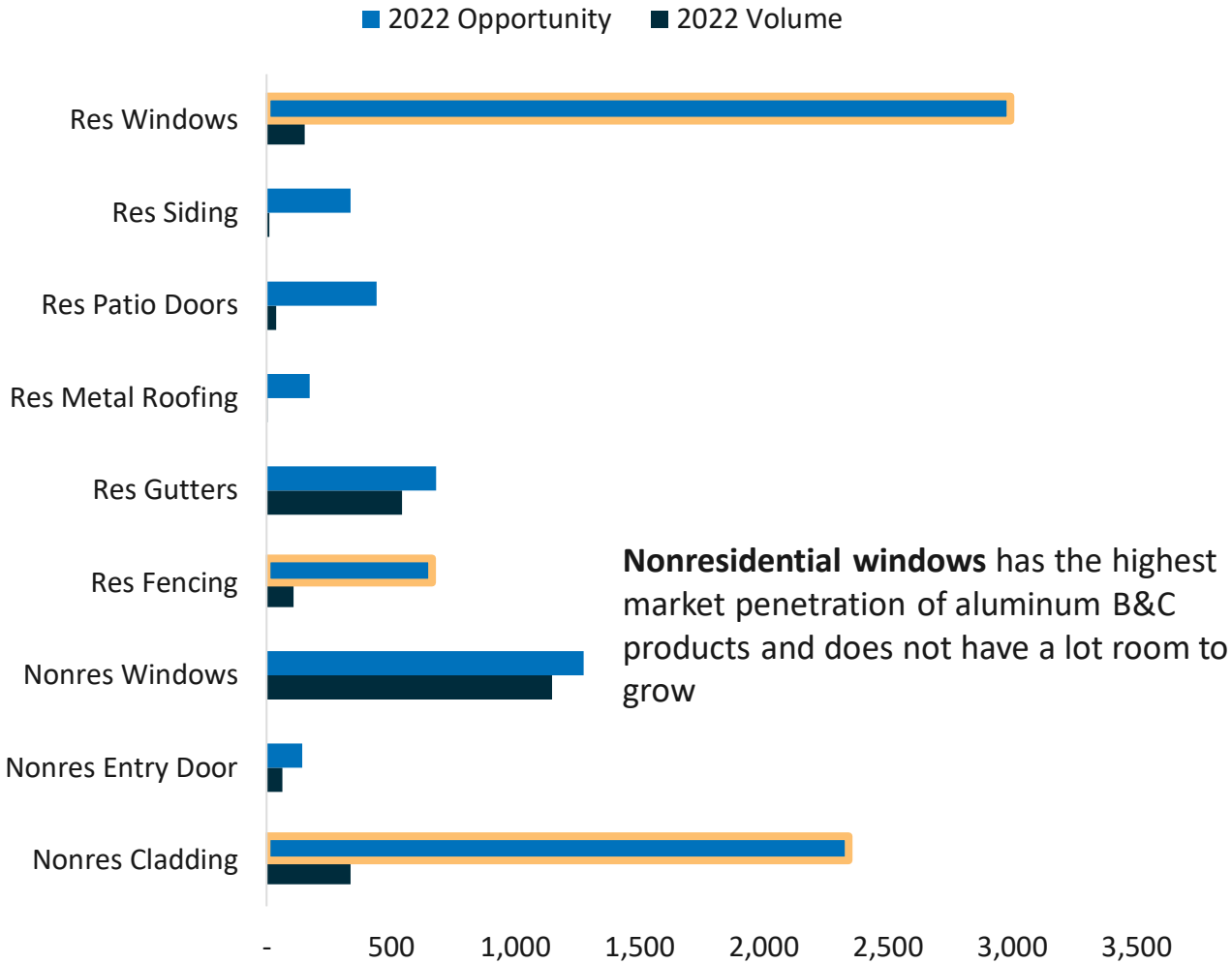


Windows, Fencing, and Patio Doors represent the greatest opportunity in **Residential**



Cladding represents the greatest **Nonresidential Opportunity**

2022 Opportunity per Product Segment
Millions of Lbs. of Aluminum

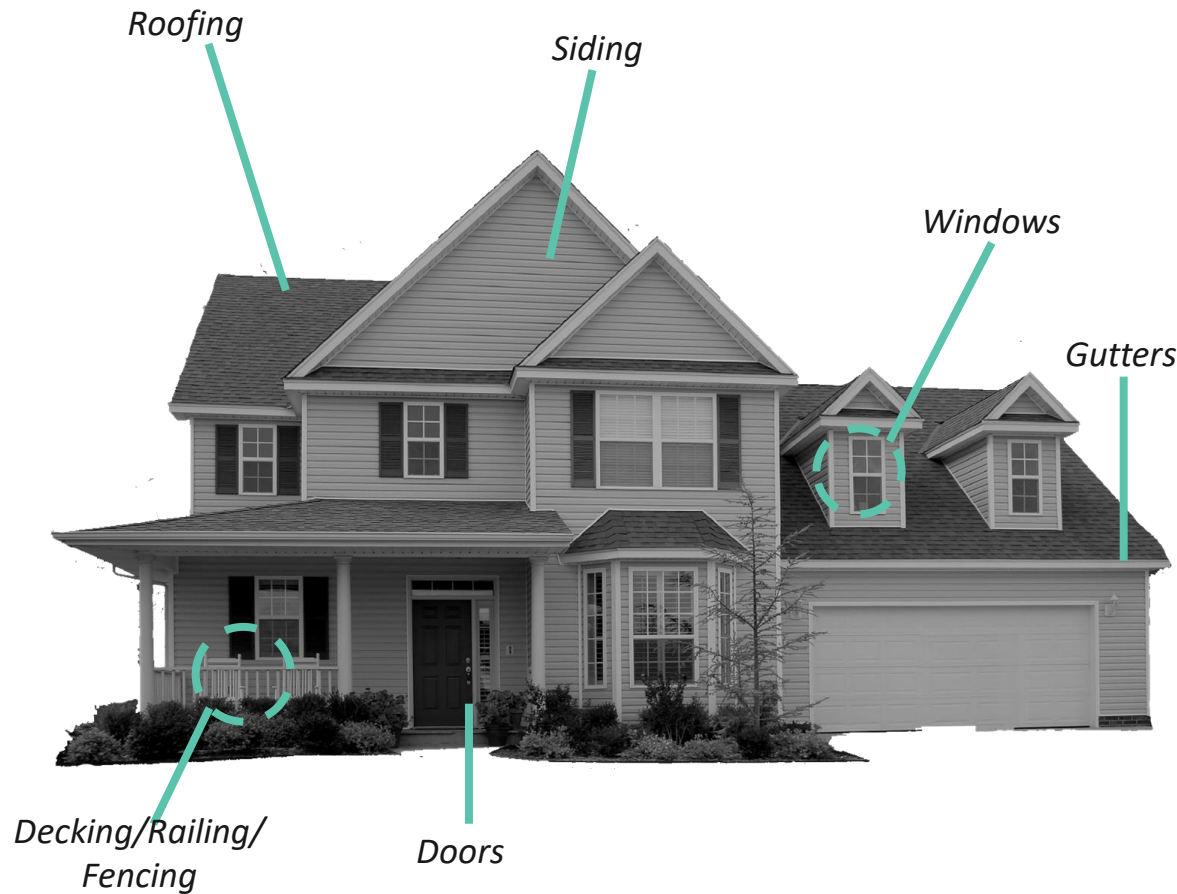


Nonresidential windows has the highest market penetration of aluminum B&C products and does not have a lot room to grow

*Aluminum roofing share is defined as share of Metal Roofing Market

Sources: Ducker Carlisle Primary Research and Analysis, John Burns Consulting, US Census Bureau, NBEA, BLS, Home Innovation Research Labs, DOE

\$100K in Residential Spending Drove up to ~126lbs of Aluminum usage in Residential Construction



Products	Opportunity per \$100K of 2022 Residential Spending (lbs)	Growth Factors	Growth Outlook
Roofing (Panel)	0-1 lbs	New construction in eastern coastal regions, high end custom home building	↑
Siding	10-15 lbs	New construction in eastern coastal regions, high end custom home building, weather damage related replacement and repair	→
Rainware (Gutters/ Roofing Accessories)	55-65 lbs	New housing starts and age-related replacement	→
Windows	15-25 lbs	New housing starts, age related replacement and upgrades based on aesthetics and energy efficiency	→
Patio Doors	3-5 lbs	New housing starts, age related replacement and upgrades based on aesthetics and energy efficiency	→
Fencing	10-15 lbs	New housing starts, age related replacement and upgrades based on aesthetic trends	↑
Total Average Take per \$100K of Res Spending (incl. other products)	93-126 lbs		

*Excluding Awnings, Solar and Manufactured Housing

Sources: Ducker Carlisle Analysis, HomeAdvisor, Forbes, Primary Outreach Conversations, Company Websites/Articles

\$100K in Nonresidential Spending in 2022 Drove up to 183lbs of Aluminum Usage



Products	Opportunity per \$100K of 2022 Nonresidential Spend	Growth Factors	Growth Outlook
Windows	120-130 lbs	New commercial construction, age related replacement and upgrades based on aesthetics and energy efficiency	➔
Entry Door	5-8 lbs	New commercial construction, age related replacement and upgrades based on aesthetics and energy efficiency	➔
Nonresidential Cladding	35-45 lbs	New commercial construction, age related replacement and upgrades based on aesthetics and energy efficiency (in the case of insulated panels)	⬆
Total Average Take per 100K of Nonres. Spending (incl. other products)	160-183 lbs		

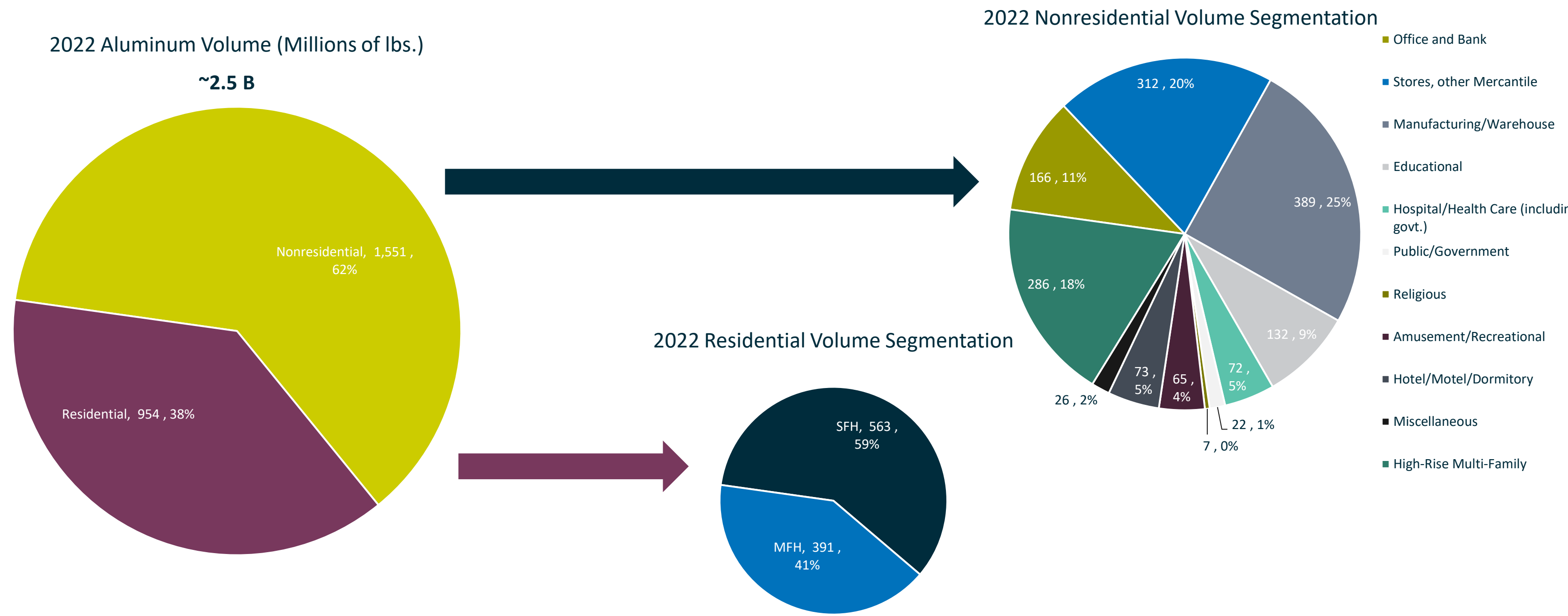
*Excluding Awnings and Solar

Sources: Ducker Carlisle Analysis, HomeAdvisor, Forbes, Primary Outreach Conversations, Company Websites/Articles

Market Size, Segmentation, & Key Macro Drivers



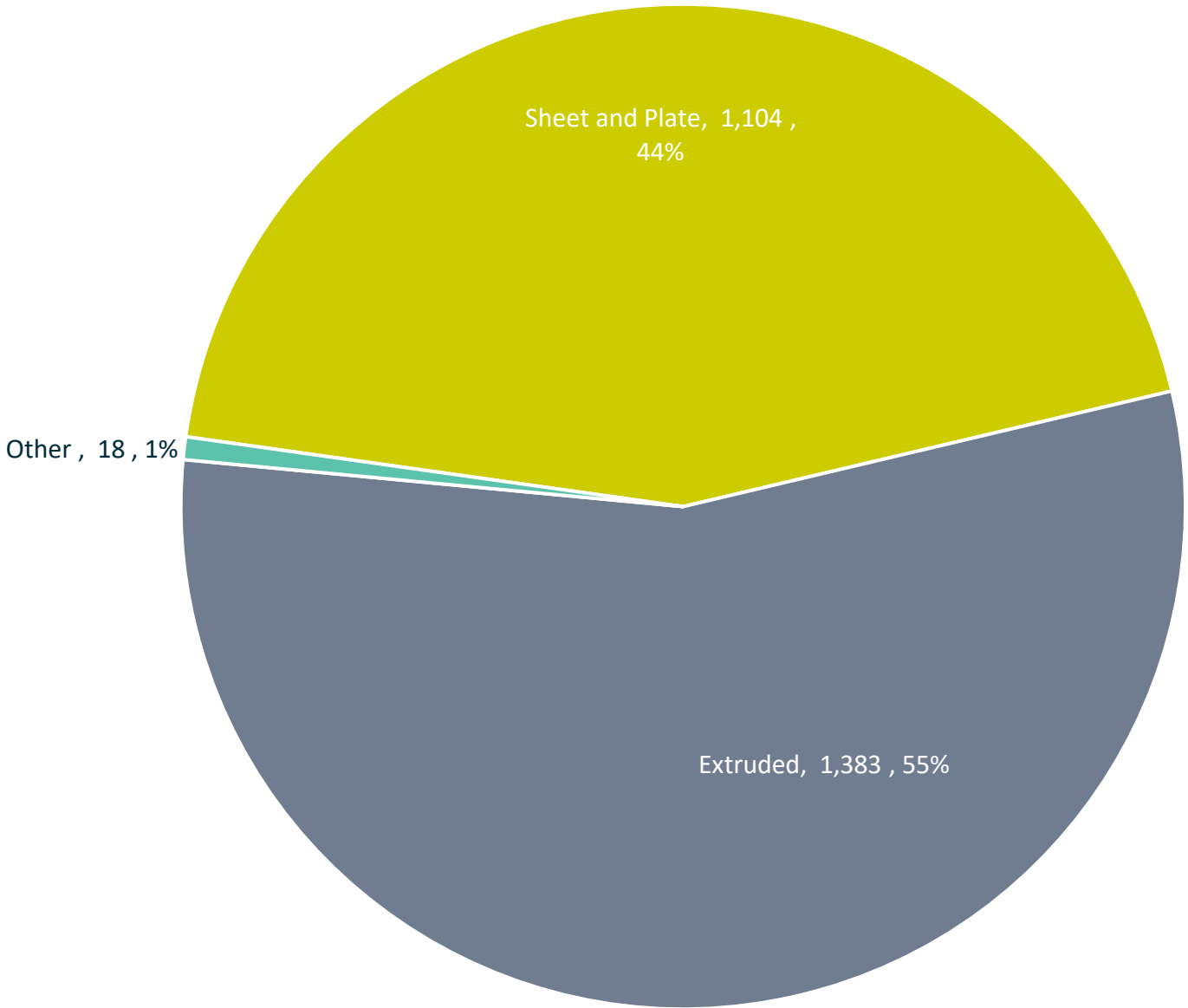
Nonresidential construction composed ~61% of the 2.5B lbs. of aluminum utilized in B&C applications in 2022



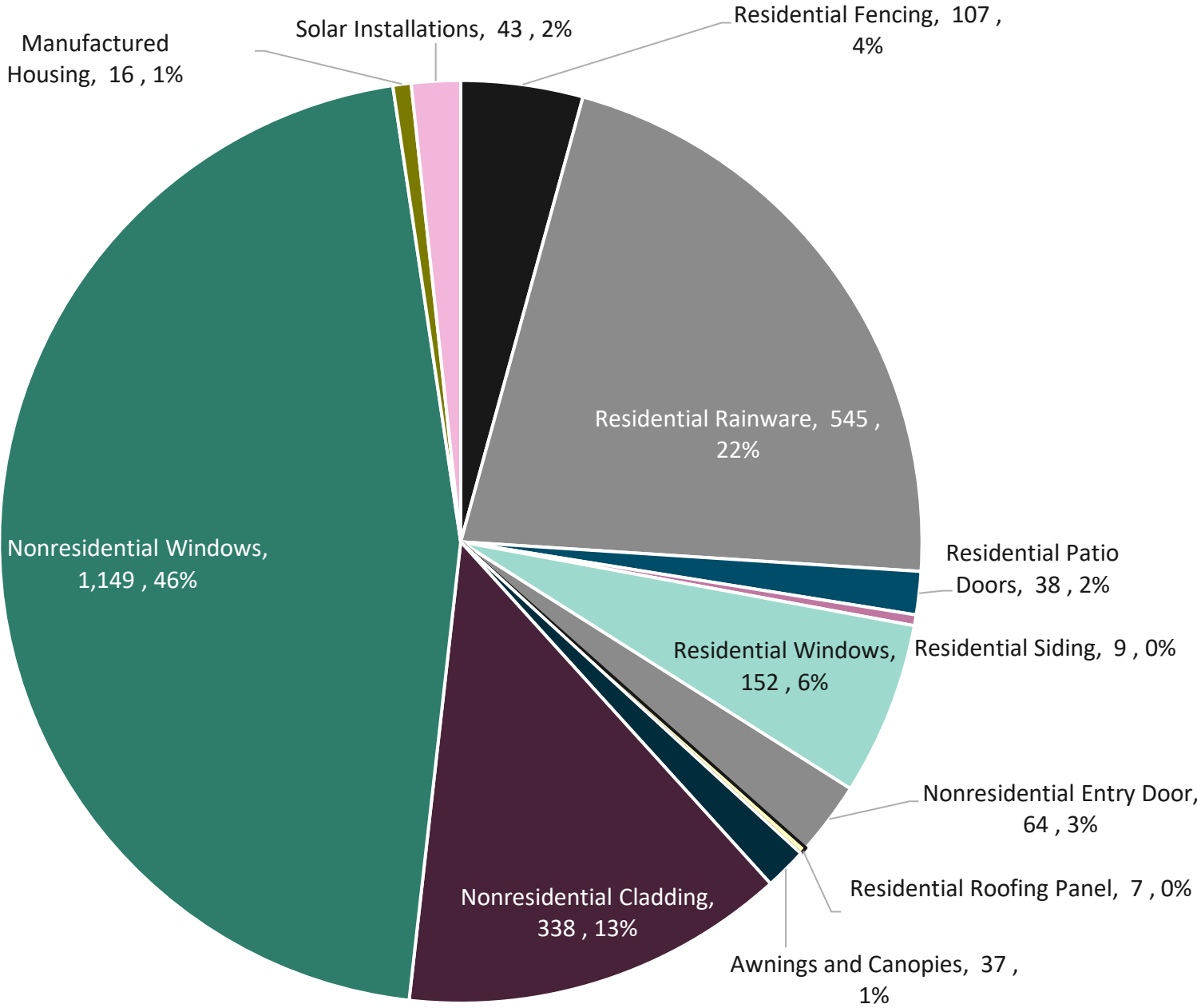
Sources: Ducker Carlisle Primary Research and Analysis, John Burns Consulting, US Census Bureau, NBEA, BLS, Home Innovation Research Labs, DOE

Extruded products make up more share than Sheet products due to higher demand for window applications

2022 Aluminum Volume (Millions of lbs)
~2.5 B



2022 Aluminum Volume (Millions of lbs)



*Aluminum roofing share is defined as share of Metal Roofing Market

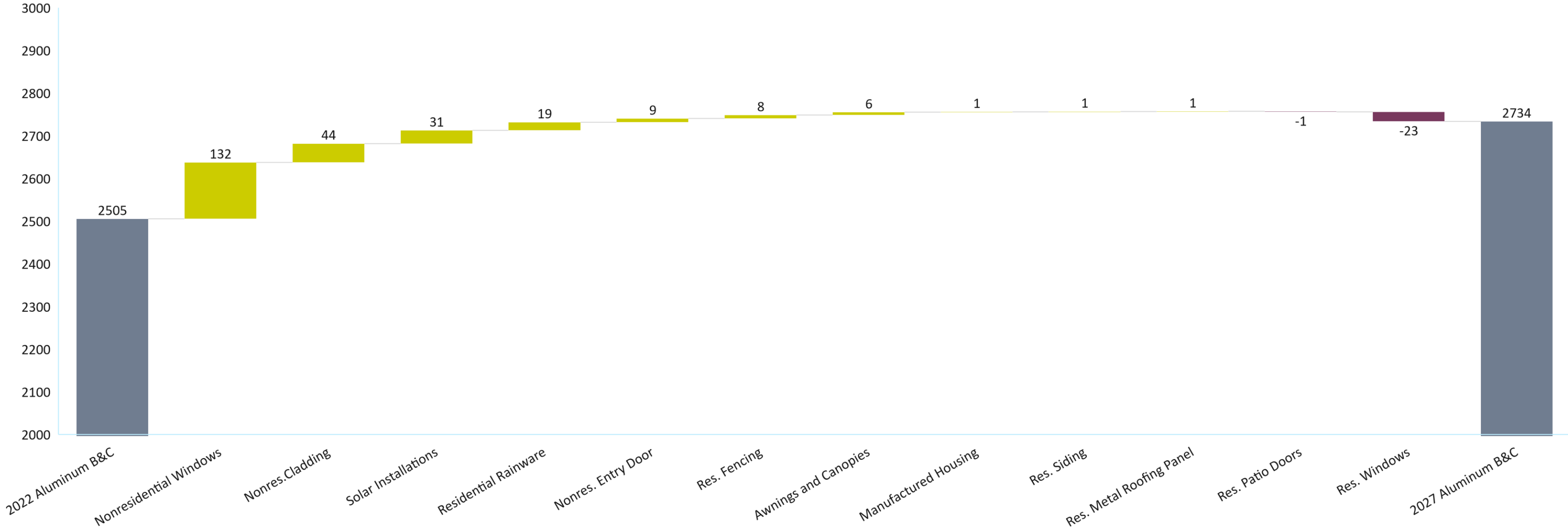
Sources: Ducker Carlisle Primary Research and Analysis, John Burns Consulting, US Census Bureau, NBEA, BLS, Home Innovation Research Labs, DOE

The Aluminum B&C Market will grow ~9% by 2027 over 2022 volumes, bolstered by nonresidential growth

- As construction activity recovers from rate shocks and shortages, aluminum will demonstrate stable growth with large volumes concentrated in nonresidential sectors like Windows, Cladding, and Solar Installations

2022 vs 2027 B&C Aluminum Volumes
 - Net weight in millions of lbs -

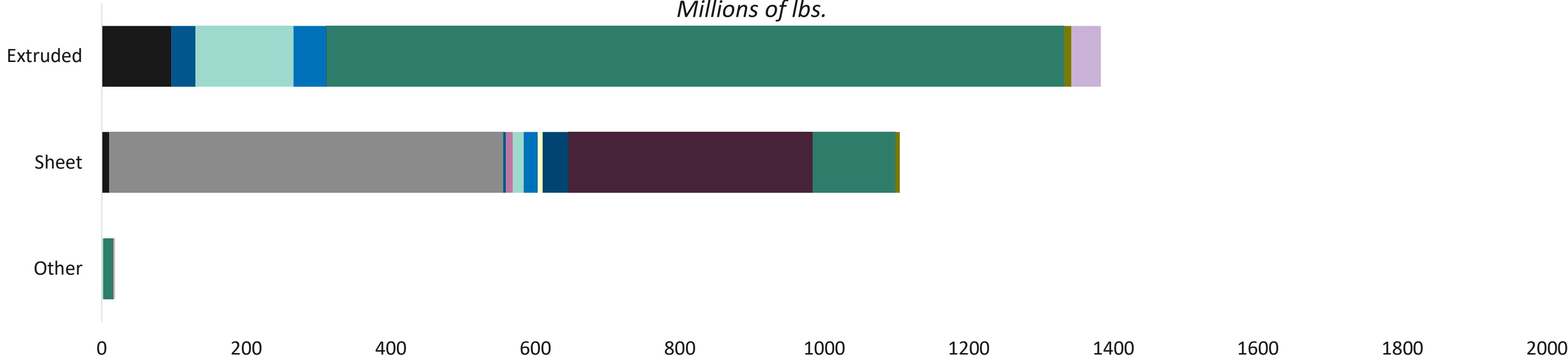
■ Increase ■ Decrease ■ Total



Source: Ducker Carlisle

Extrusion composes a majority share of aluminum B&C products due to its use in window applications

Aluminum B&C Volumes by Form/Process* (2022)
Millions of lbs.



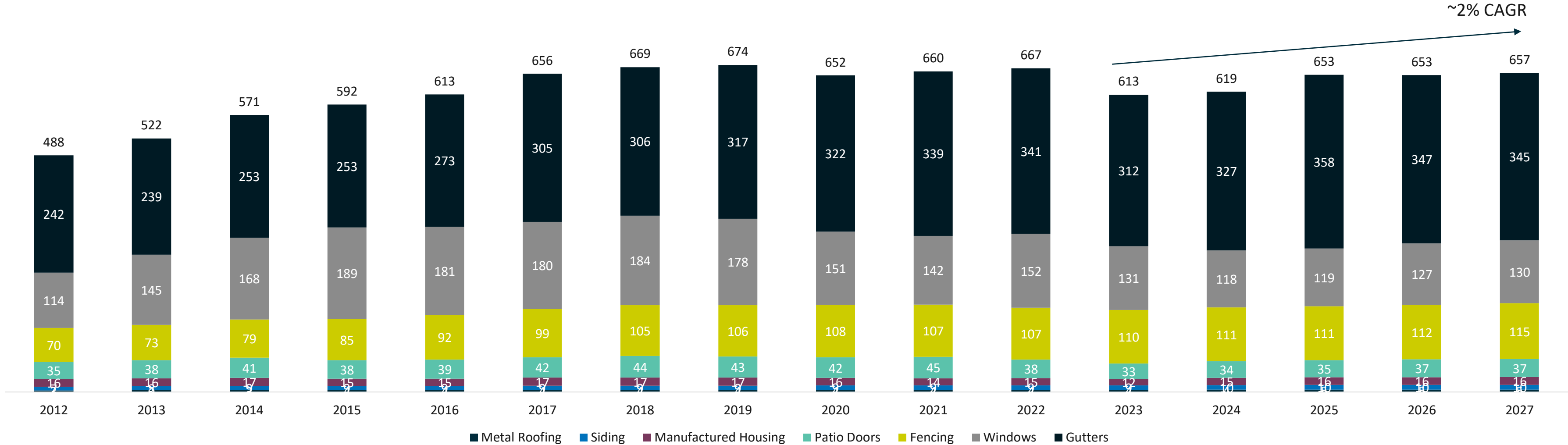
	Other	Sheet	Extruded
■ Residential Fencing	0	11	96
■ Residential Rainware	0	545	0
■ Residential Patio Doors	0	4	34
■ Residential Siding	0	9	0
■ Residential Windows	2	15	135
■ Nonresidential Entry Door	0	19	45
■ Residential Roofing Panel	0	7	0
■ Awnings and Canopies	0	36	1
■ Nonresidential Siding	0	338	0
■ Nonresidential Windows	14	114	1021
■ Manufactured Housing	0	6	10
■ Solar	2	0	41

*Excludes Solar

Residential aluminum markets are expected to recover based on rebound in remodel activity and housing starts

- Aluminum demand will grow based on high-end aesthetic trends, demand for large format products that require high strength-to-weight ratio, and climate/weather related demand in coastal regions

Residential Aluminum Volumes Forecast and Historical
*Millions of Pounds of Aluminum *Excludes Awnings, Canopies and Solar*

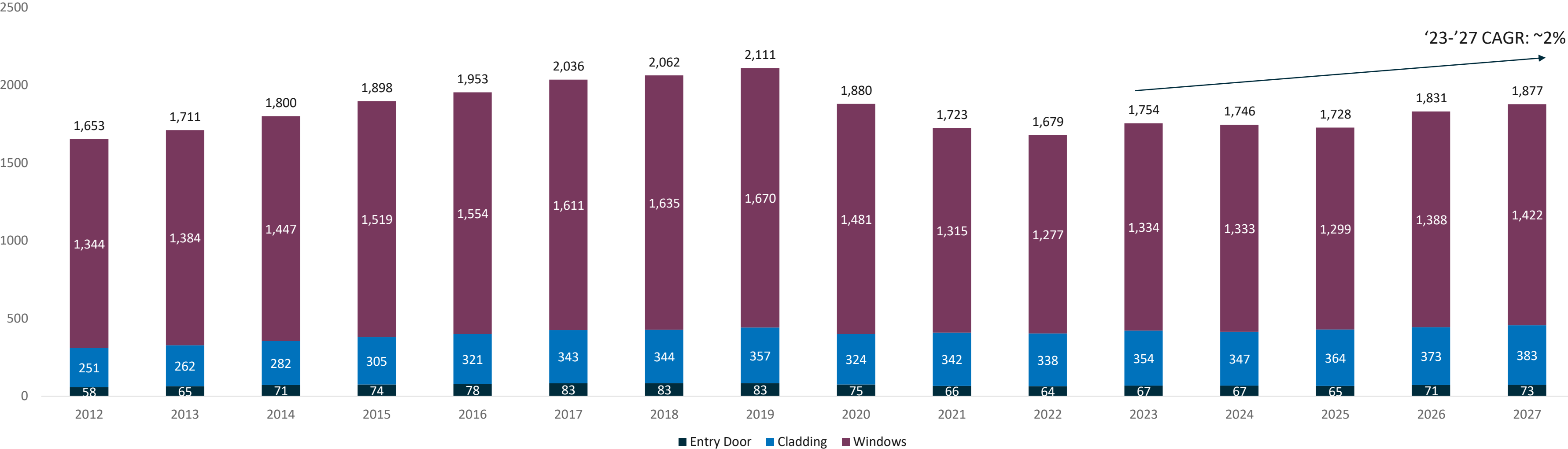


Sources: Ducker Carlisle Primary Research and Analysis, John Burns Consulting, US Census Bureau, NBEA, BLS, Home Innovation Research Labs, DOE

Nonresidential aluminum markets will grow through the forecast period supported by recoveries in commercial and office construction

- Depressed post-pandemic office occupancy trends and commercial lending will continue pose a threat through the forecast period, but demand for commercial construction will continue as rates are cut and fundamentals maintain strength

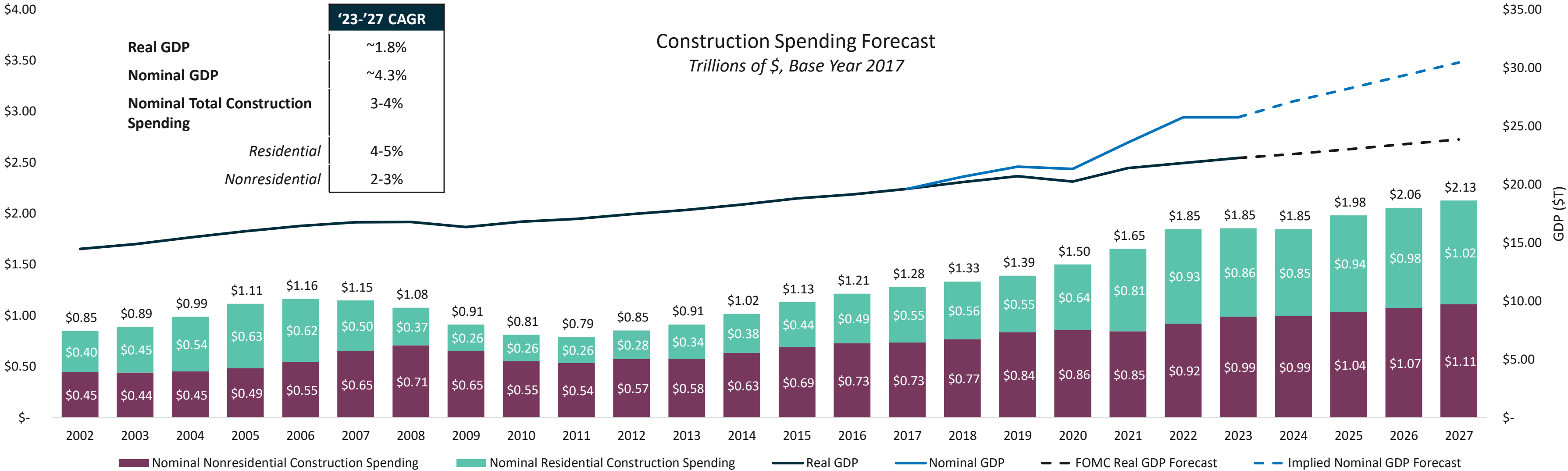
Nonresidential Aluminum Volumes Forecast and Historical
Millions of Pounds of Aluminum



Sources: Ducker Carlisle Primary Research and Analysis, John Burns Consulting, US Census Bureau, NBEA, BLS, Home Innovation Research Labs, DOE

Construction Spending growth will be supported by rate cuts, disinflation and fundamental drivers such as population growth through 2027

- Real GDP is expected to growth at ~2% CAGR, matching historical norms
- While Residential spending will match overall GDP, Nonresidential market is expected to decline due to declines in education spending following a draw down of Covid-Era ESSER funding and manufacturing (recent boosts due to Chips act to normalize by 2027)

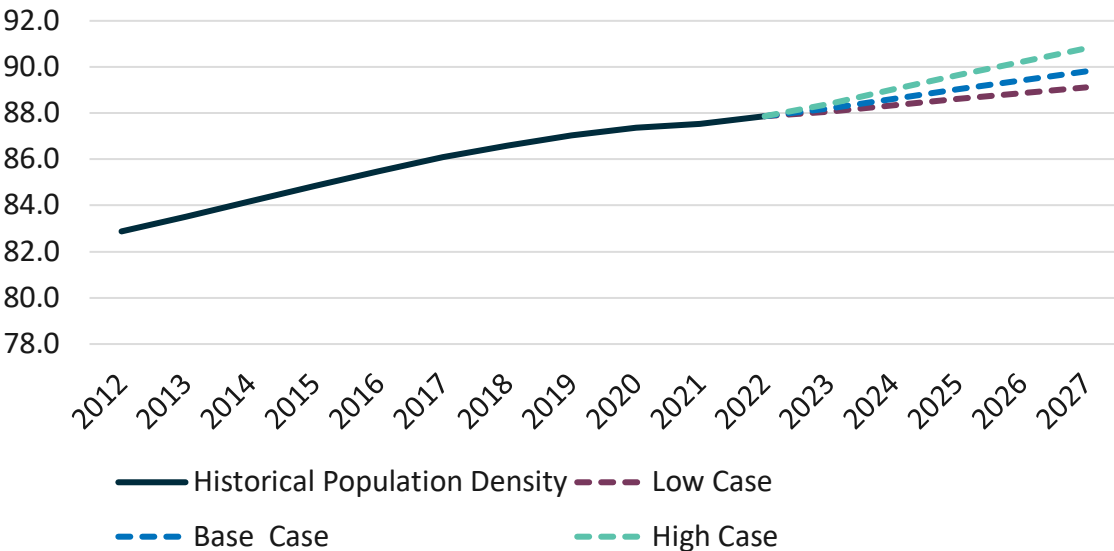


Sources: Ducker Carlisle Primary Research and Analysis, John Burns Consulting, US Census Bureau, NBEA, BLS, Home Innovation Research Labs, DOE, Federal Reserve

Aluminum demand is impacted by “Surban” style trends that are driven by increasing population density in suburban areas

Population Density

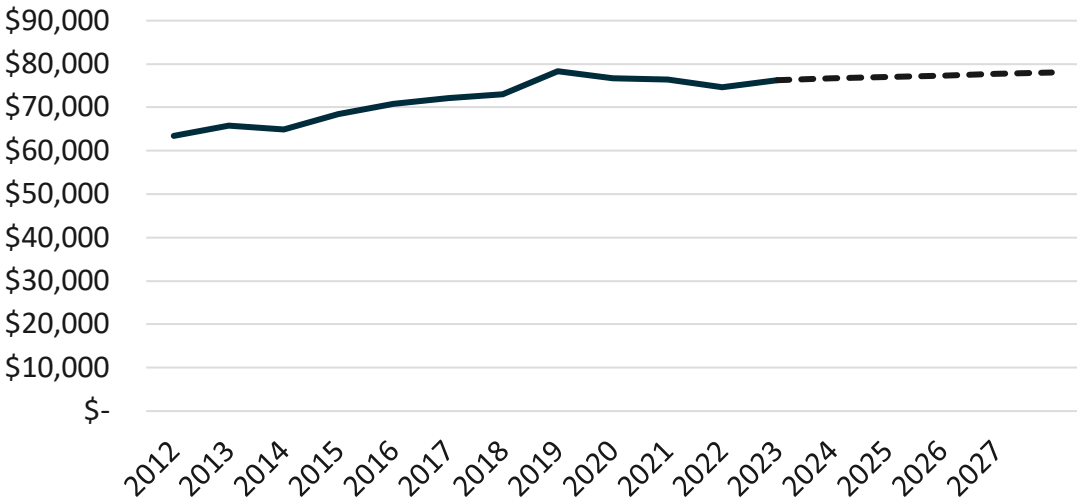
US Population Density



- Increased population density is an indicator of increased multifamily, nonresidential and mixed-use high-rise construction which drives exterior and structural aluminum products
- Increased population density also indicates greater intensity of “**Surbanization**” (urbanization of residential suburbs) which promotes more durable and vertically extended construction

Incomes

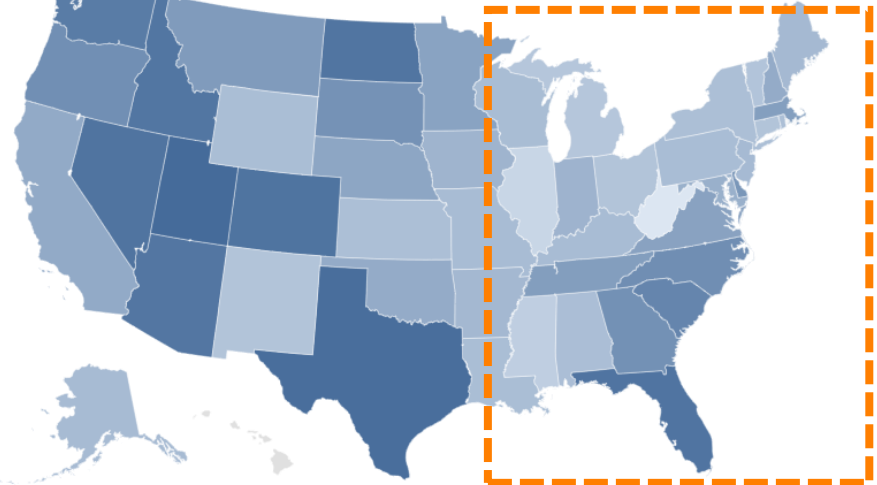
US Household Median Income



- Higher median household incomes support the usage of premium building products such as aluminum siding and roofing
- Greater household incomes allows for greater access to credit to support discretionary upgrades based on aesthetics and style

Climate, Code and Geography

2010-2020 CAGR -1% 1%



- Population growth in regions where climactic and code conditions require durability and anti-corrosive properties will continue to support aluminum usage
 - Regions include the coastal southeast (i.e., Broward County, FL), the Midwest and Northeast

Sources: Ducker Carlisle Research and Analysis, US Census, John Burns Consulting NBEA

Governments are prioritizing energy efficiency through regulation, incentives, and code

- The built environment is responsible for 42% of global carbon emissions, of which 27% are attributable to building operations such as heating and lighting
- As countries attempt to mitigate carbon emissions through net zero targets, industries such as Building & Construction are coming under increased pressure to provide new products and techniques that satisfy net zero building requirements
 - The IRA introduces a national net zero target for 2050 which includes a 2030 goal of 40% reduction in overall carbon emissions and a 30% reduction goal for the built environment
 - The IRA is preceded by statewide net zero goals implemented by over 20 states
 - The IRA includes significant incentives for energy efficiency and net zero building for commercial and institutional sectors
- As stakeholders attempt to reduce operational emissions, energy efficient building products such as HVAC, Roofing and Building Envelope components will become more critical in reducing thermal bridging and other causes of energy waste
- Net zero targets will continue to drive changes in the energy generation sector and will result in continued pressure from electricity prices, constituting a consistent push factor toward net zero building as stakeholders pursue lower costs
- Net Zero Building is forecasted to grow at an accelerated rate as the IRA 2030 target nears



Sources: Department of Energy, Green Building Council, UN

The Inflation Reduction Act’s Net Zero targets are supported by a robust regime of policy incentives to drive emissions reductions

High alignment ● ● ● ● ○ No alignment

Section	Policy Name	Description	Impacted Markets	Aluminum Alignment
13303: 179D	Tax Deduction for Energy Efficient Commercial Buildings	Tax deductions for projects achieving 25-50% better performance than applicable ASHRAE standards; can be allocated to builders or project designer, available through 2027	Commercial Retrofit	●
13303: 45L	New Energy Efficient Homes Credit	Tax credits available for all multifamily new home construction at \$2.5K/\$5K per unit that meet energy efficiency criteria, available through 2032	Multifamily New Construction	●
50121 and 50122	Department of Energy Efficiency and Electrification Rebates	Provides \$4.3B in rebates for all energy saving residential improvements, including multifamily retrofit projects (up to \$400K per multifamily building)	Multifamily Retrofit	●
60103	Greenhouse Gas Reduction Fund	Provides a \$27B “green bank” through the EPA to support financing of green projects; retrofits of existing buildings has been labeled a priority for financing from this fund.	Government/Institutional and Multifamily Retrofit	●
50131	Building Energy Code Adoption	Provides \$1B in grants for helping state and local governments implement building energy codes, with increased funding for meeting net zero requirements.	All Construction Markets	●
60112, 60111, 60116, 60506	“Buy Clean” Initiative	IRA 60112, 60111, 60116, 60506 all compose the IRA’s “Buy Clean” initiative, which subsidizes the procurement and use of “low-embodied” carbon materials in government and institutional projects	Government/Institutional New Construction and Retrofit	●

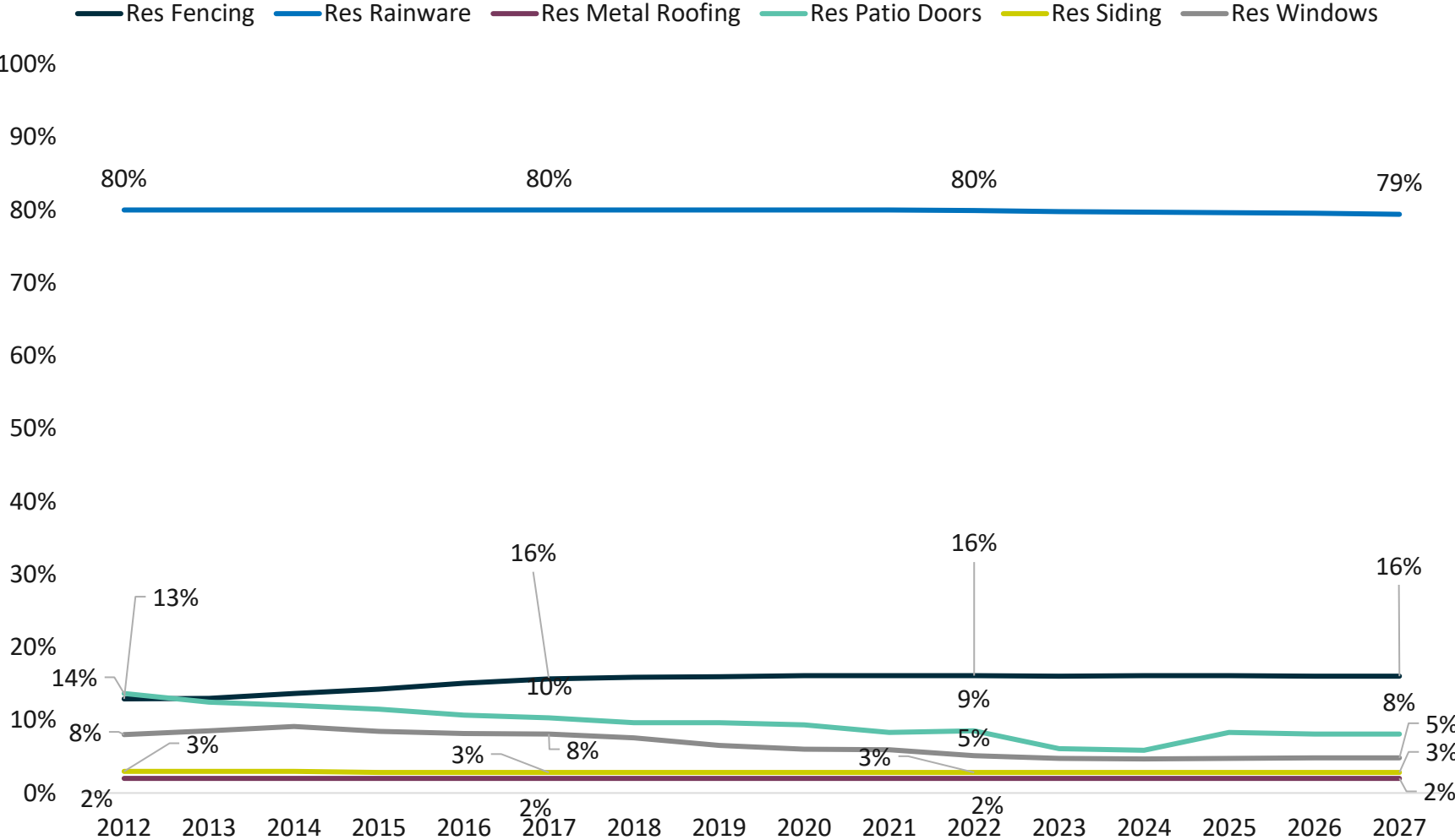
Sources: US Green Building Council, White House

Aluminum's Market Share Dynamics & Opportunities

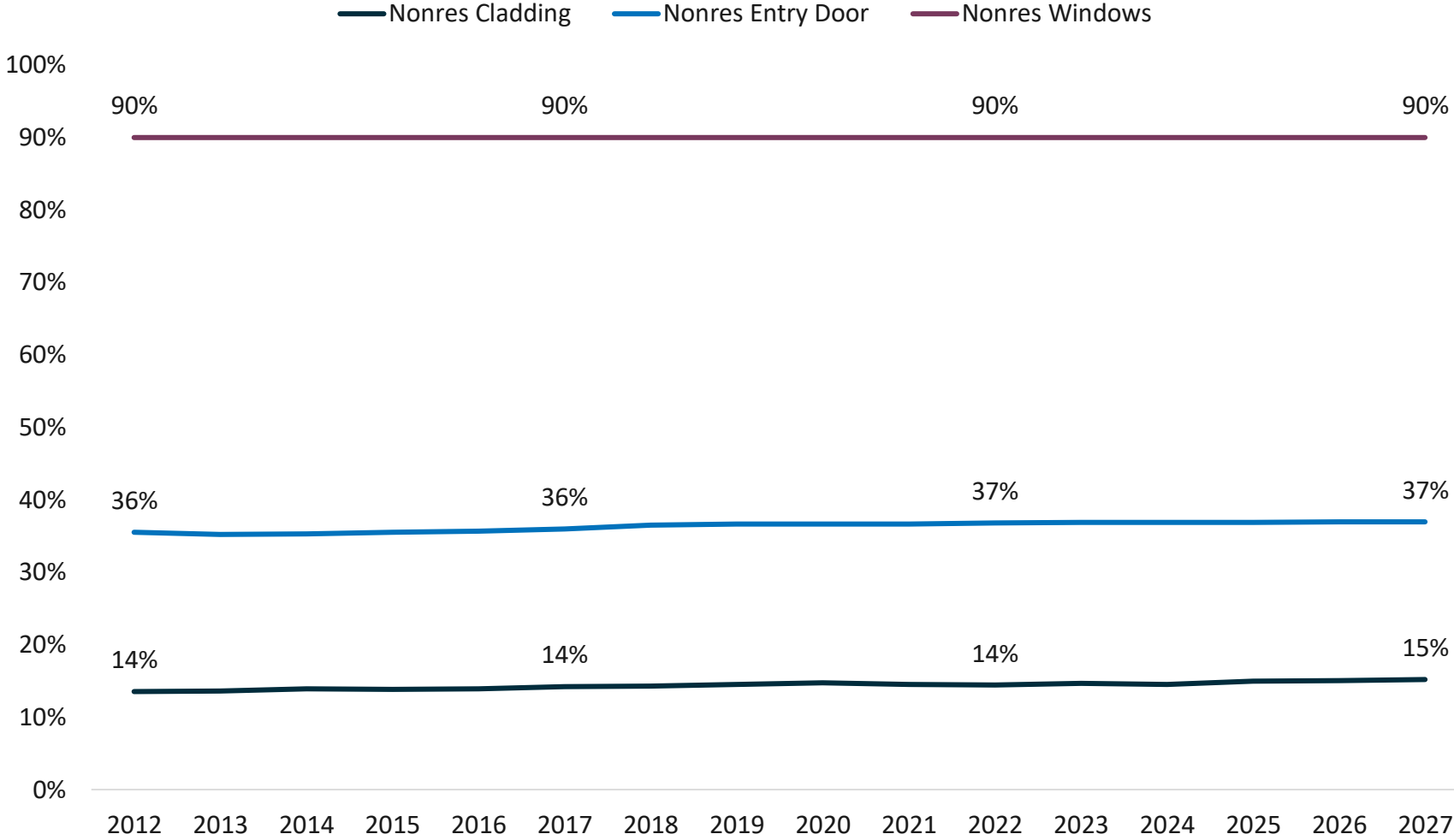


Residential markets display more volatile material share dynamics, with fenestration related products losing significant share since 2012

Aluminum Residential Product Market Share
% Share of Total Volume*



Aluminum Nonresidential Product Market Share
% Share of Total Volume



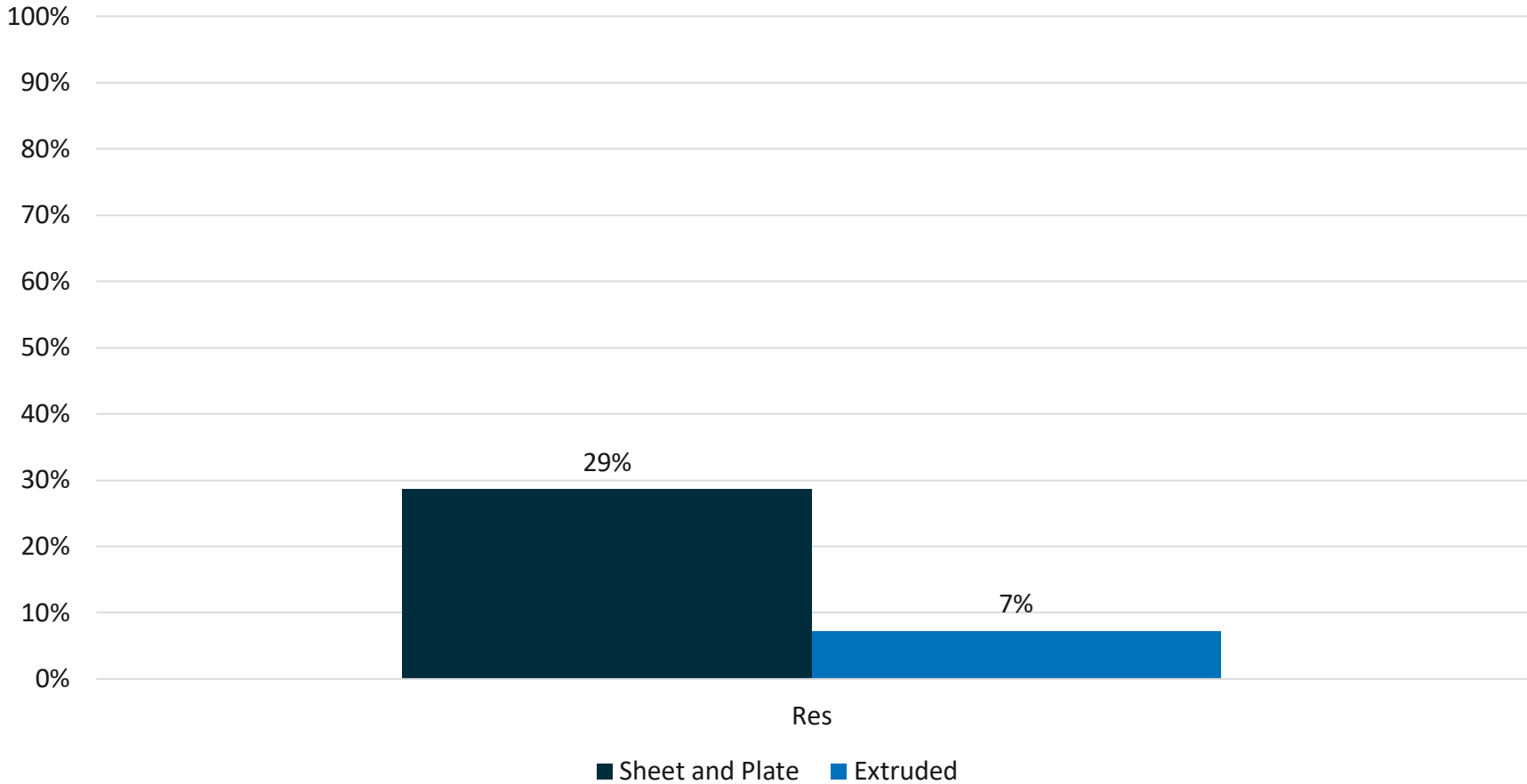
- Aluminum share gain in residential markets requires greater focus on **high-end aesthetics, larger format window and door products, and corrosion resistance**

- Aluminum share gain in Nonresidential markets also requires greater focus on **high-end aesthetics and larger format products, as well as adapting to changing building codes related to climate resiliency and energy efficiency**

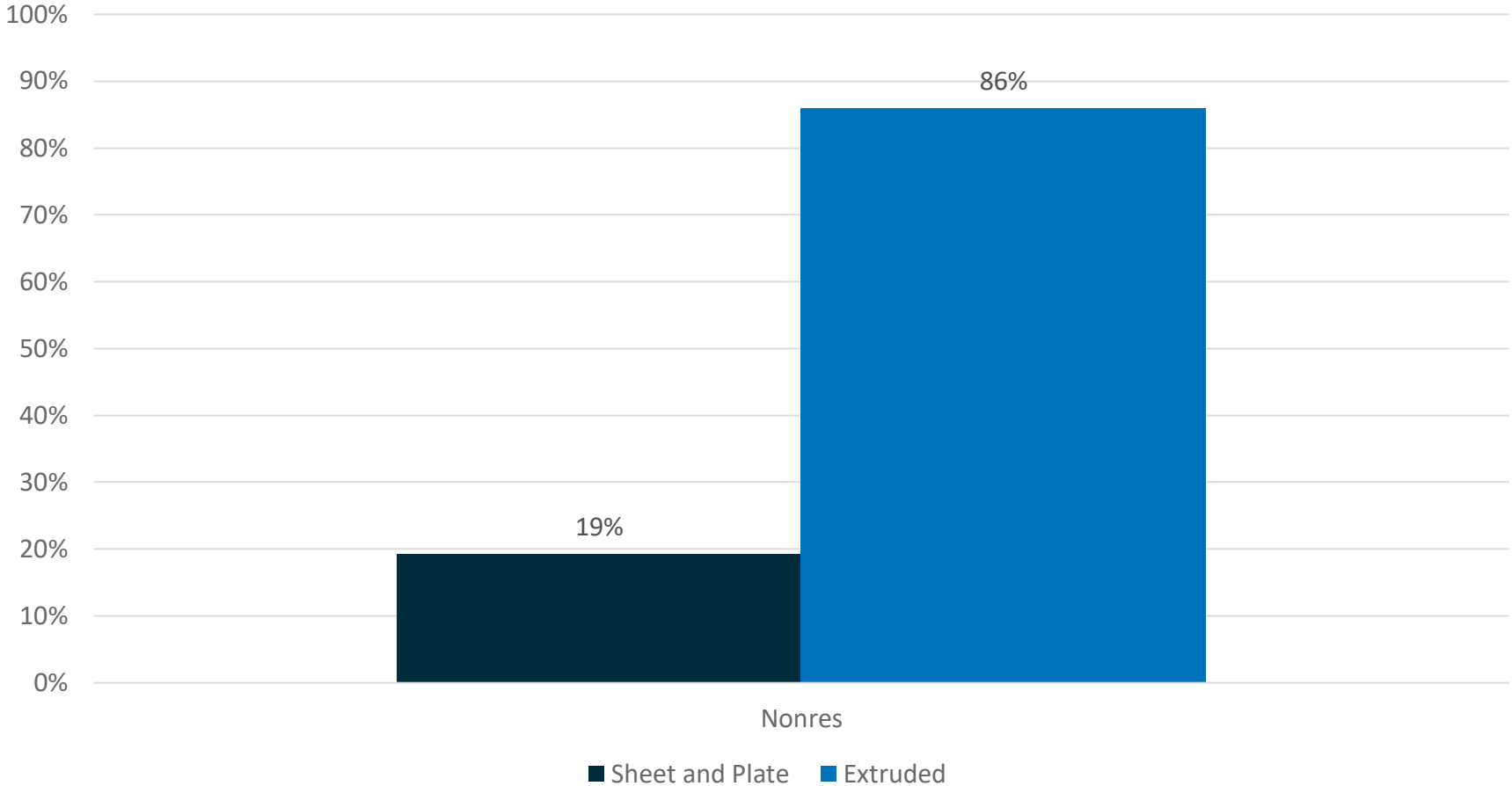
* Aluminum Roofing shown as a percentage of metal roofing
Ducker Carlisle Primary Research and Analysis, US Census Bureau

Durable extruded forms have high market penetration in Nonresidential markets through window market share

2022 Form/Process Penetration of Applicable Residential Markets
% Share of Total Volume



2022 Form/Process Penetration of Applicable Nonresidential Markets
% Share of Total Volume



- Residential Markets have greater penetration by Sheet and Plate products than extruded products, indicating lower priority for load-bearing capabilities
- Extruded aluminum has less share in Residential Windows compared to Nonresidential Windows due to high share of vinyl
- Other manufacturing methods limited presence in residential window and door application, such as forged elements of frames and hardware

- Nonresidential Markets have greater penetration by Extruded products than Sheet and Plate products, indicating higher priority for load-bearing capabilities
- Nonresidential Windows drive the high extruded share of aluminum products, with ~90% share of the market
- Forged products such as window and door frames and hardware have minor presence in nonresidential markets, along with other manufacturing methods such as casting and additive manufacturing for decorative architectural features

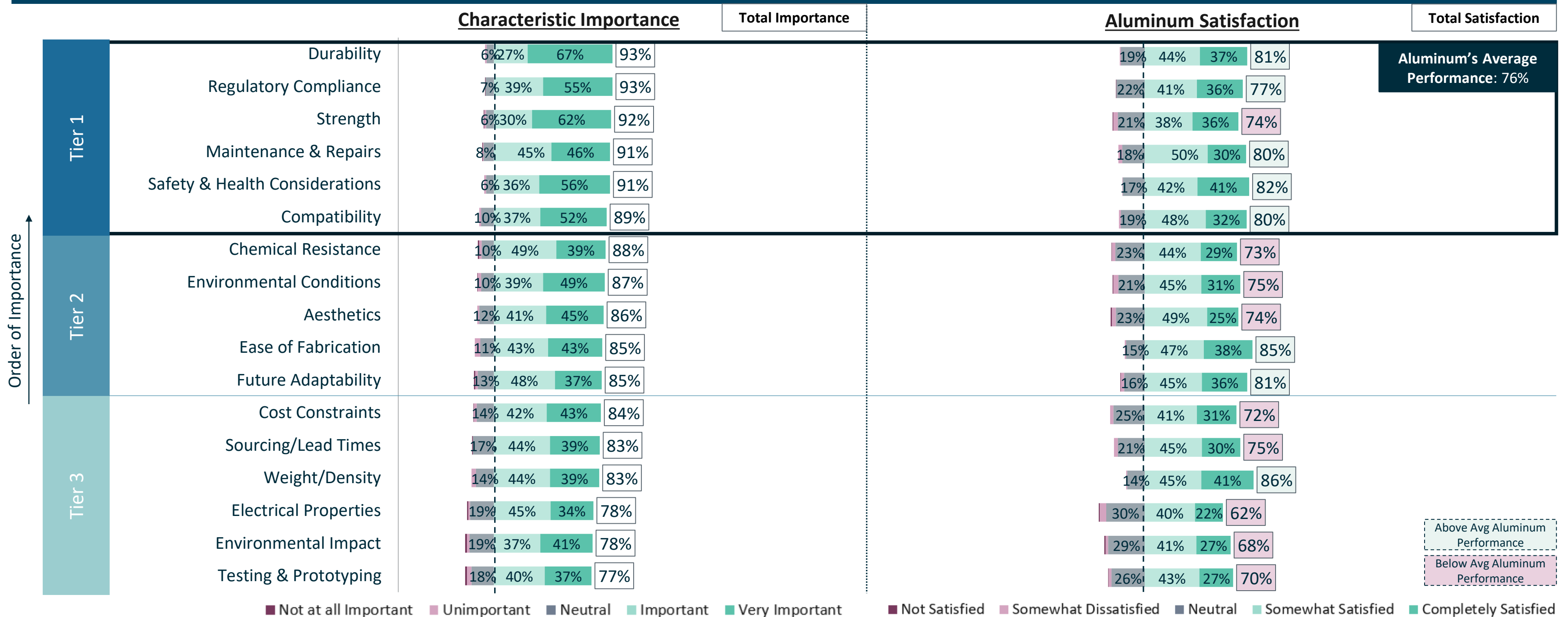
Sources: Ducker Carlisle Primary Research and Analysis, US Census Bureau

B&C pros seek Durability and Regulatory Compliance, and are generally satisfied with aluminum's performance on these factors



Material Decision Criteria Importance & Aluminum Satisfaction – Overall

% of Respondents, n=200

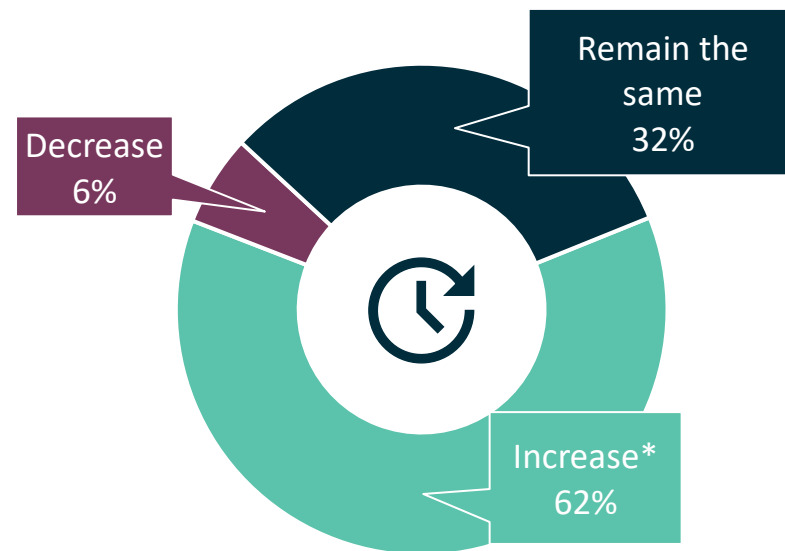


Overall, B&C Pros expect their usage of aluminum to increase in the near future, with significantly more Architects believing so than Builders

Predicted Change in Aluminum Usage Over Next Three Years

Overall

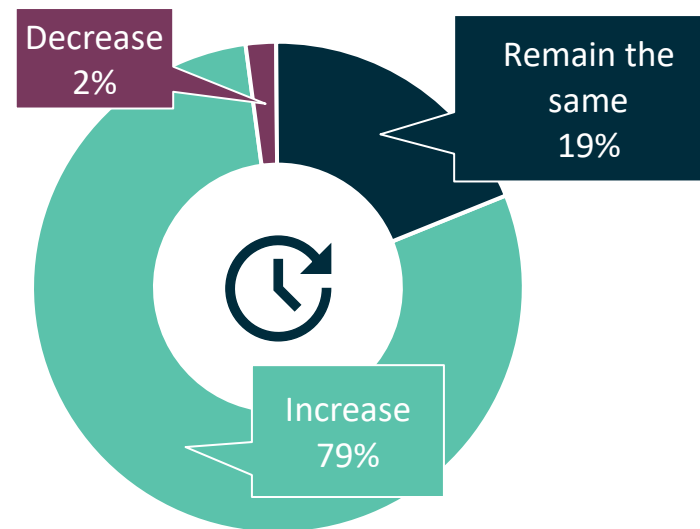
% of Respondents, n=200



Why Decrease (6%)	Why Increase (62%)
1. Cost-Effective (2%)	1. Strength, Durability, & Quality (17%)
2. Less Demand, Preference for Other/Manmade Materials (2%)	2. Demand (15%)
3. New/Generally More Innovative Alternatives (2%)	3. Cost-Effective (12%)
4. Strength (1%)	4. Lightweight/Ease of Use (10%)

Architects

% of Architects, n=100 

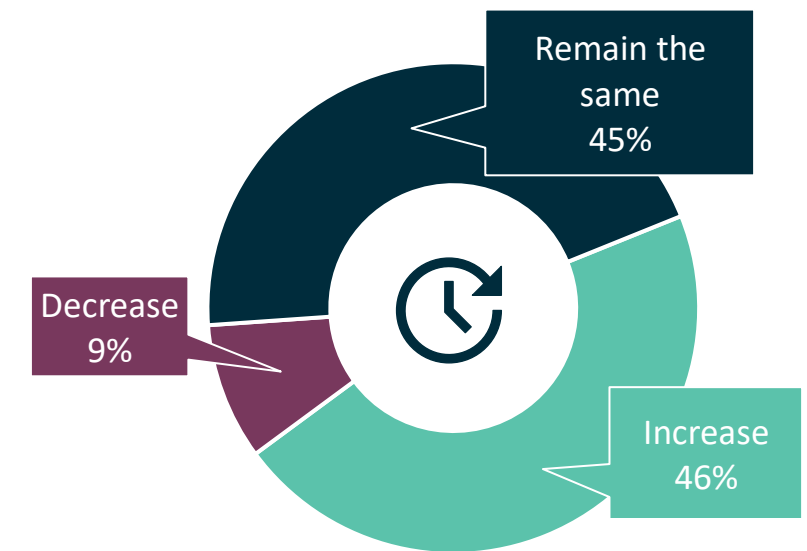


Why Decrease (2%)	Why Increase (79%)
1. Less Demand, Preference for Other/Manmade Materials (1%)	1. Strength, Durability, & Quality (20%)
	2. Lightweight/Ease of Use (17%)
1. Strength (1%)	3. Sustainable/Recyclable (12%)
	4. Demand (11%)
	4. Cost-Effective (11%)

"Aluminum is a unique combination of lightweight, strength, corrosion resistance, and sustainability – making it a material of choice for a wide range of projects." – Architect

Builders

% of Builders, n=100 



Why Decrease (9%)	Why Increase (46%)
1. Cost-Effective (4%)	1. Demand (19%)
2. Less Demand, Preference for Other/Manmade Materials (3%)	2. Strength, Durability, & Quality (13%)
	3. Cost (12%)
2. New/Generally More Innovative Alternatives (3%)	4. General Ideal Material (5%)
	5. Lightweight/Ease of Use (3%)

"Everyone seems to be falling back in love with aluminum." – Builder

B&C Pros see more positives than negatives with Aluminum; 7% report no disadvantages using Aluminum



Bold = unique for each material

Material	Advantages +	Disadvantages -
Aluminum (n=200)	<ul style="list-style-type: none"> Lightweight (40%) Corrosion Resistance (26%) Durability (25%) Ease of Use (handle, transport, cut, install, remove) (24%) Strength (19%) Malleable (17%) Cost-Effective (15%) 	<ul style="list-style-type: none"> Versatility/Multiple Applications (7%) Sustainable/Recyclable (6%) Appearance (5%) Color/Finish Options (4%) Availability (4%) Repair/Maintenance (4%) Fire Resistance (3%) Pest Proof (2%)
		<ul style="list-style-type: none"> Cost (23%) Easily Dented (20%) Strength (19%) Sturdiness (18%) Easily Damaged by Weather (heat, wind, hail, rain, etc.) (14%) Draws/Holds Heat (10%) Appearance (5%) Difficult to Fabricate, Paint or Stain (5%) Repair/Maintenance (4%) Poor Insulator (3%) Color/Finish Options (3%) Availability (2%) Projects Noise (2%)

Verbatims

"Easy to bend in the desired shape that you need."

"Light and durable, can come in multiple colors and is strong as long as it's installed properly. Can be used for multiple purposes and can withstand the elements as well."

"Waterproofing and weatherproofing capabilities and ease of installation. Most contractors know how to install it correctly, based on other more unique products. It's ability to be updated over time is also a plus."

"A stronger bond and easy to lay out, as compared to wood. It's easier to cut to fit where it needs to go, very lightweight and easy to haul around."

"Sturdy enough to walk on if you know what you're doing."

"Variety of extrusions possible."

"Easy to damage, and when damaged, not very repairable cosmetic-wise."

"Can be pricey and damages easily. Requires lots of skill to use."

"Seems to rust quickly if puncture or scratches come about."

"Not the strongest material for bearing weight. Will need to be coated over its lifetime."

"It isn't the most aesthetically interesting material."

"It's a lightweight product that doesn't provide much thermal insulation or resistance. If the metal isn't treated with the correct chemicals, it can also corrode or stain over time."

Note: Does not equal 100% due to multiple responses

B&C Pros rate Aluminum third among competitive materials in both popularity and momentum

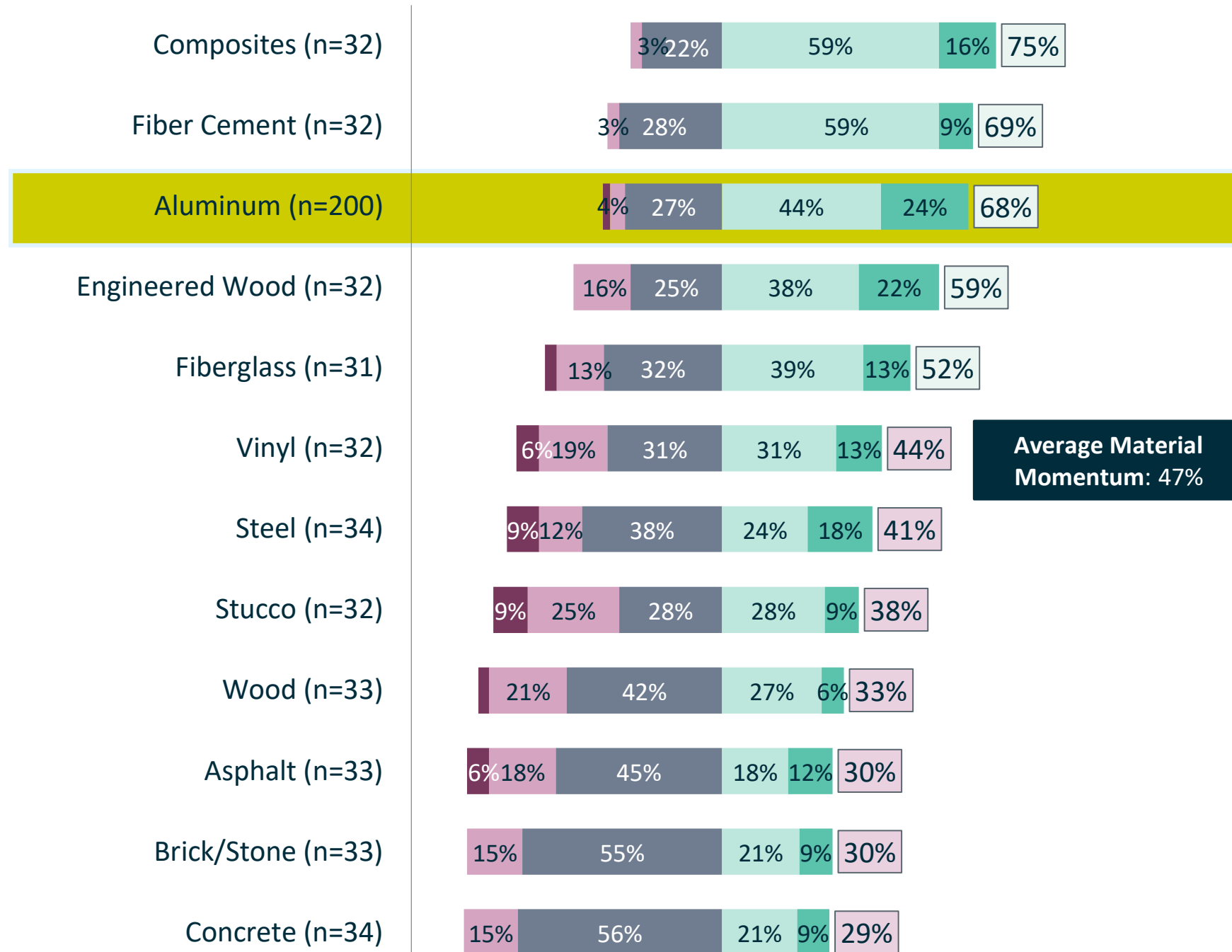


Material Momentum – Overall

% of Respondents, n=200

■ In Decline ■ Becoming Somewhat Less Popular ■ Not Changing ■ Becoming Somewhat More Popular ■ On the Rise

Top 2 Box



Above Avg Momentum
Below Avg Momentum

Average Material Momentum: 47%

Reasons Aluminum is on the Rise & Becoming Much More Popular

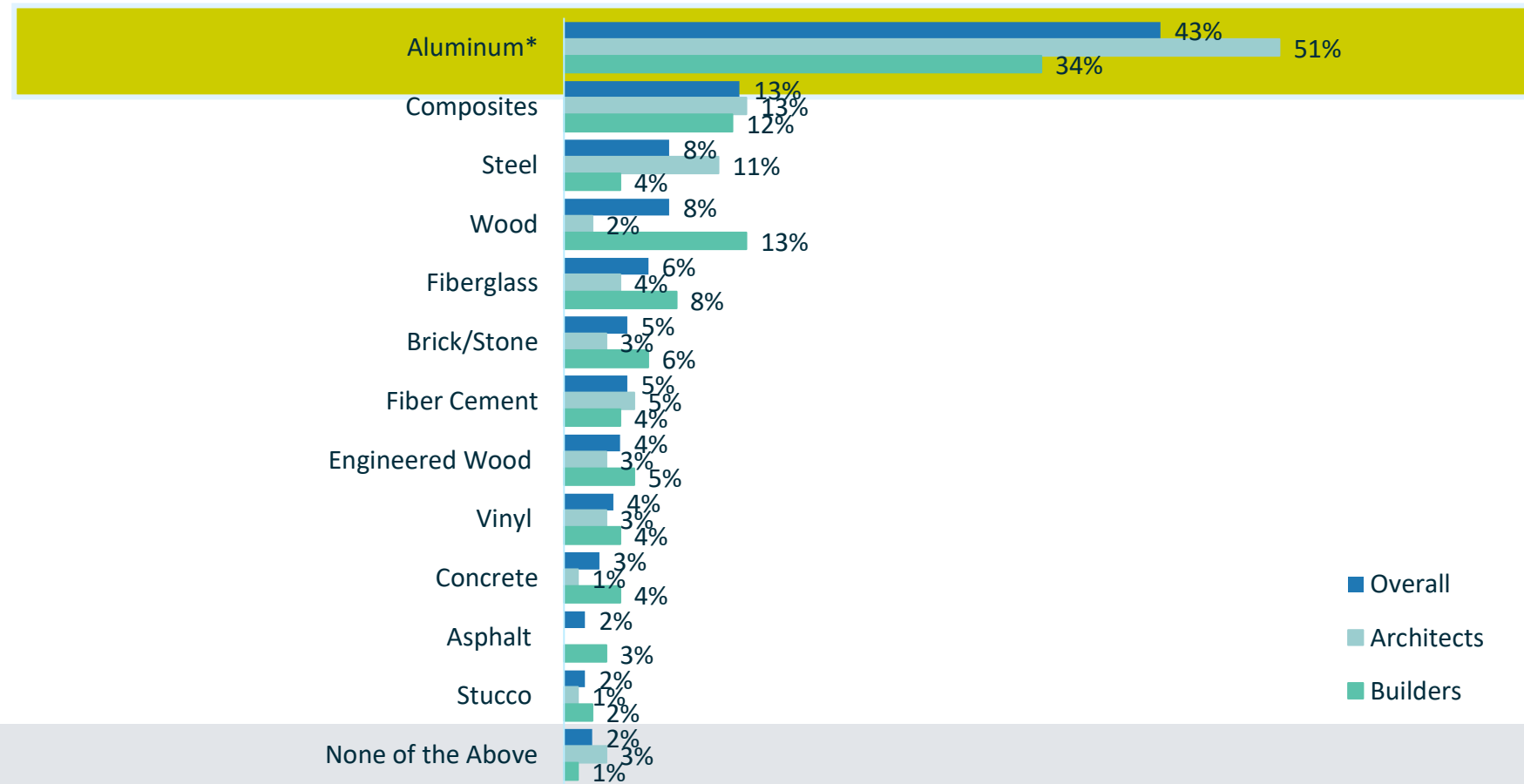
- **Lightweight**
 - “Because aluminum is a lightweight material, it has a lighter weight compared to other traditional materials such as steel.”
 - “Lightweight, durable and cost-effective.”
- **Corrosion Resistant**
 - “Aluminum is corrosion-resistant, making it a good choice for projects in harsh environments.”
 - “People are using aluminum more because it doesn't rust.”
 - “Weather friendly.”
- **Visual Aesthetics**
 - “It can be finished with various coatings, offering a large range of visual options.”
 - “We're finding new and interesting ways to use it.”
 - “Aluminum is way cheaper than any other metal to put up because it's easier and plus it looks a lot nicer.”
- **Sustainability**
 - “Aluminum is one of the most recyclable metals, with a recycle rate of 80%, meaning it can be made into new products.”

B&C Pros (particularly architects) are most likely to increase aluminum usage while wood is the most likely to decrease in usage



Materials Most Likely to Increase Use of

% of Respondents, n=200



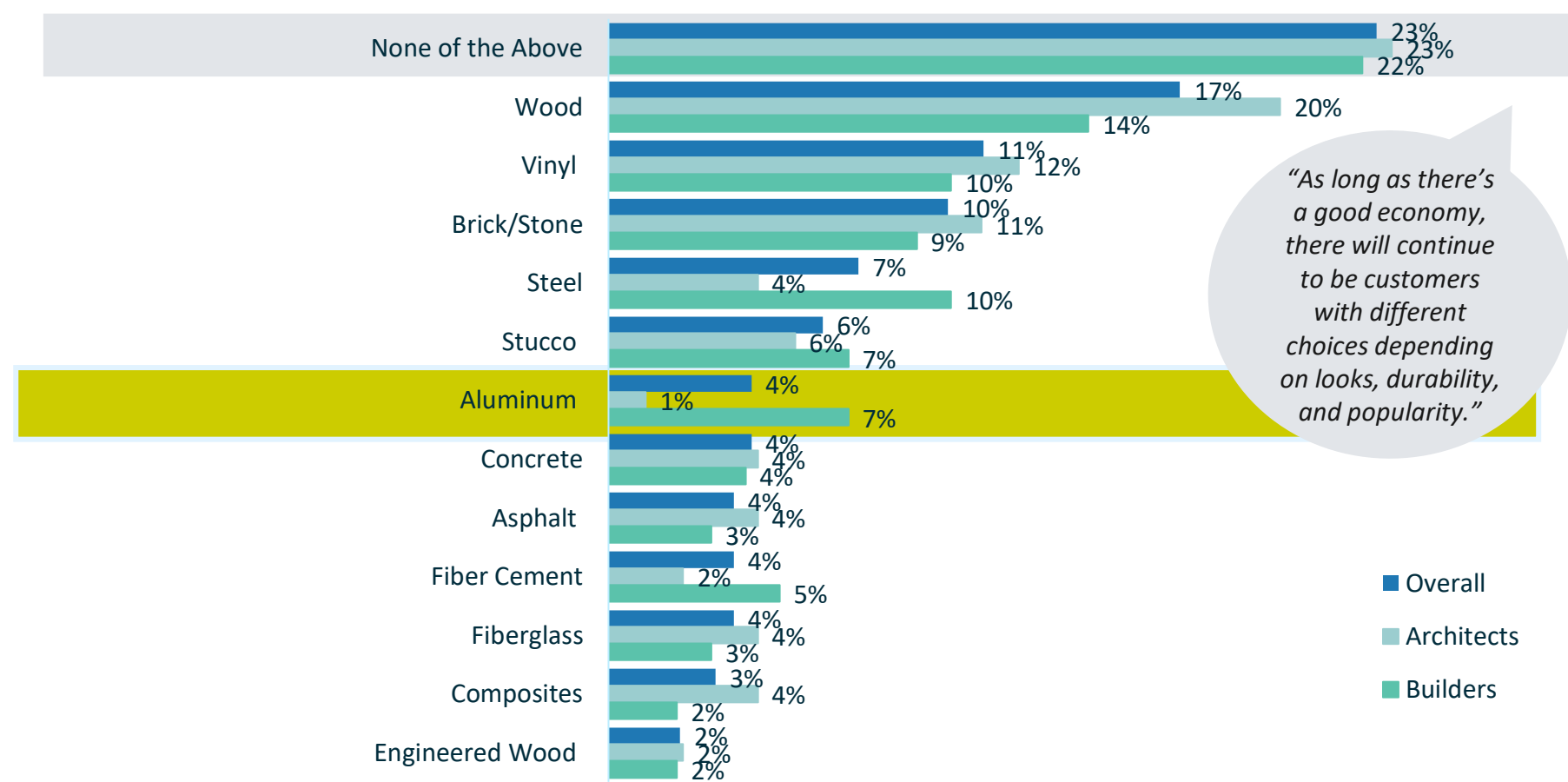
Why Will Increase Use of Aluminum (43%)

1. Demand (20%)
2. Strength, Durability, & Quality (19%)
3. Cost-Effective (14%)
4. Corrosion Resistant (12%)
5. Lightweight/Ease of Use (11%)

- "Aluminum seems to be **on the rise** as a roofing alternative."
- "A lot of building parts are **going away from steel** to aluminum."
- "A lot of people are wanting it on their house **in replace of vinyl siding**."
- "It has become **very popular in modern homes**."
- "Because of the economy and prices rising. It's **cheaper and as durable** as most other products."

Materials Most Likely to Decrease Use of

% of Respondents Typically Using More than One Material, n=188



"As long as there's a good economy, there will continue to be customers with different choices depending on looks, durability, and popularity."

Why Will Decrease Use of Wood (17%)

1. Sustainability/Environmental Impact (6%)
2. Cost (5%)
3. Deterioration/Rotting (2%)
3. Flammable (2%)
3. Better/More Innovative Alternatives (2%)

- "Can't grow it **fast enough**."
- "Wood harvesting and processing can have serious environmental consequences, such as deforestation, soil erosion, and pollution. These concerns motivate the need for **more environmentally friendly solutions**."
- "Wood is **expensive**, and it requires a **lot of upkeep**, so people don't like it as much."

*Respondents had to use Aluminum to participate in this study, contributing to their prediction of increased usage of Aluminum in the future

Aluminum Market Prioritization



Aluminum has runway to pursue in multiple Residential markets while extending Nonresidential share through cladding growth

Product	Market Opportunity			Attribute Potential		Feasibility/Ease of Entry		Total Score
	Forecast Market Growth	Forecast Aluminum Share Growth	Opportunity Size	Aluminum Performance on Sustainability and Environmental Impact	Market Priority Alignment	Likelihood for Success	Association-led Impact Potential	
Nonresidential Cladding	1	4	4	4	3.7	4	4	3.6
Residential Windows	3	1	4	2	3.3	3	4	3.2
Residential Fencing	1	4	3	3	2.5	4	3	3.0
Solar Installations	4	2	1	4	3.3	4	3	2.9
Residential Roofing	3	2	2	3	2	2	3	2.3
Residential Patio Doors	3	2	2	2	3	1	3	2.3
Nonresidential Entry Door	2	3	1	3	3	2	3	2.3
Residential Siding	3	2	2	2.5	2.3	2	1	2.1
Nonresidential Windows	2	2	1	3	3.3	1	2	1.9
Manufactured Housing	4	1	2	2	1.7	1	1	1.7
Awnings and Canopies	1	2	2	1	3	1	1	1.7
Residential Rainware	3	2	1	4	2	1	1	1.7
Factor Weight	0.12	0.13	0.2	0.05	0.2	0.2	0.1	

*Score out of 4, 1=lowest, 4=highest

Aluminum Nonresidential Cladding and Solar exhibit the highest alignment with end-market material attribute prioritization

Product	Premium Aesthetics Prioritization	Durability/Resistances Prioritization	Strength: Weight Prioritization	Total Market Priority Alignment
Nonresidential Cladding	4	4	3	3.7
Residential Windows	3	3	4	3.3
Nonresidential Windows	3	3	4	3.3
Solar	2	4	4	3.3
Residential Patio Doors	3	2	4	3
Nonresidential Entry Door	3	3	3	3
Awnings and Canopies	4	3	2	3
Residential Fencing	2.5	4	1	2.5
Residential Siding	2	3	2	2.3
Residential Rainware	3	2	1	2
Residential Roofing Panel	2	3	1	2
Manufactured Housing	1	2	2	1.7

Nonresidential and multifamily residential markets prioritize aluminum-aligned **aesthetic** trends the highest

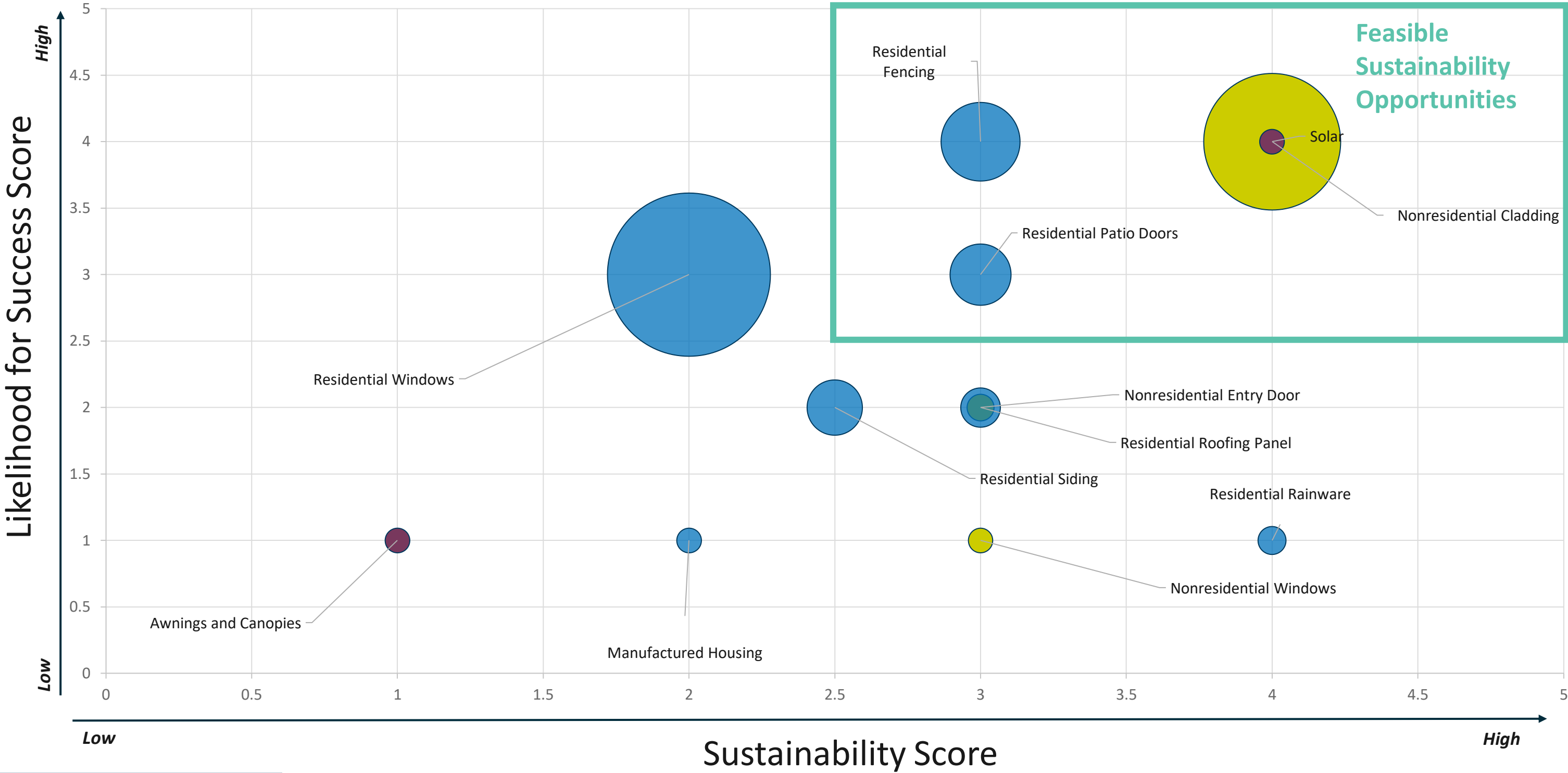
Cladding and siding products prioritize **durability and resistances** the highest, particularly in humid coastal regions

High **strength to weight ratios** are highly prioritized in window and door segments across residential and nonresidential markets

*Score out of 4, 1=lowest, 4=highest

Solar and Nonresidential Cladding represent the most feasible opportunities to penetrate ESG-led markets and increase aluminum's sustainability profile

Opportunity Matrix



*Size of bubble determined by opportunity size score
 **Opp. Size for Solar, Awnings and Canopies, and Manufactured Housing not shown

- Residential
- Nonresidential
- Both

Recycled Aluminum has positive Net-Zero potential due to low production emissions and alignment with insulation use

Negative Sustainability Attributes

Material	Sourcing & Production Emissions	Embodied Carbon
Recycled Aluminum		
Primary Aluminum		
Recycled Steel		
Concrete		
Wood	Variable	Variable
PVC		
Fiberglass		
Glass		
Brick		
Clay		

Positive Sustainability Attributes

Energy Efficiency Properties	Alignment with Insulation Use	Insulation Integrated Product Types
		Insulated panels, Thermal break windows
		Insulated cladding, Facade systems
		Steel framing with insulation, Metal roof panels
		Insulated Concrete Forms (ICFs), Precast insulated wall panels
		Structural Insulated Panels (SIPs), Insulated wooden frames
		Insulated vinyl siding, Window frames with thermal breaks
		Fiberglass batts and rolls, Loose-fill insulation
		Double-glazed windows, Insulated glass units (IGUs)
		Insulated brick systems, Brick veneer with insulation
		Insulated clay tiles, Clay block with internal insulation

High alignment

 No alignment

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