U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Residential Windows and Window Coverings:

A Detailed View of the Installed Base and User Behavior

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EXECUTIVE SUMMARY

Initial analyses by the U.S. Department of Energy and the window covering industry suggested that window coverings—blinds, shades, curtains, and awnings— could save significant energy at low cost. This report characterizes the installed base of windows, the installed base of window coverings, and how users operate window coverings in order to enable precise quantification of energy savings. The research is an essential step toward establishing a voluntary energy performance labeling program for window coverings.

Accurate data is needed to estimate savings. To create such a program the federal government must know how much energy window coverings could save U.S. households and the country as a whole, which types will save the most energy in each U.S. climate zone, and whether savings can be achieved given how U.S. households currently use their window coverings. This report, the first of its kind, is the first stage in a joint government and industry effort to answer these questions. It presents detailed characterization of product shipments, the installed base of residential windows and window coverings, and how households use them.

The window coverings industry, DOE, Lawrence Berkeley National Laboratory (LBNL), and the U.S. Environmental Protection Agency (EPA) have been engaged in understanding the market and the installed base of window coverings for the previous three years. The Window Covering Manufacturers Association **(**WCMA) funded the implementation of the Internet survey to gather data on the installed base of windows, window coverings, and user behavior, and WCMA members provided data on shipments, pricing, retail channels, and manufacturing. DOE, through LBNL, provided funding for analysis of the Internet survey and for preparing this report.

Many assumptions the aforementioned stakeholders had about the installed base of windows have been confirmed. Single and double hung make up 61% of window operator types. Double pane windows represent approximately 60% of the installed base, and the installed base of frames is evenly divided among wood, metal, and vinyl. The Southern climate zone has a higher share of single pane windows than the Mid-Tier and Northern climate zones, while the Northern zone has a higher share of wood and vinyl windows than the Southern zone.

Blinds are the most common window covering product, making up 62% of the installed base. Vinyl and metal horizontal blinds, which dominate shipments in the United States, have a 27% share of the installed base, the largest of any product category. Curtains represent 19%, shades make up 17%, and shutters represent 2% of the installed base. Certain product types, like vinyl and metal horizontal blinds and vertical blinds, are more common in rental housing than in owner-occupied homes, where wood and faux-wood blinds and windows without coverings are more common.

Solar heat gain appears to play a role in window covering choice and operation, leading to notable differences among climate regions. Eighteen percent of the windows in the Northern climate zone did not have a covering, whereas just 12% of windows the Southern zone did not have a covering suggesting that in climates with more intense heat households tend to have more of their windows covered. Households in the Southern climate zone keep their window coverings closed during the summer at much higher rates than in the other climate zones. There is a 20 percentage point difference between the Southern and Northern climate zones in the share of coverings that are closed in the summer. When evaluated at the household level the difference between the share

of window coverings that are closed in the summer in these two zones is statistically significant at the $\alpha=0.05$ level.[1]

People rarely move their window coverings. Approximately half of coverings are closed at all times. Between 75% and 84% of coverings remain in the same position throughout the day, depending on the season (summer or winter) and time of week (weekday or weekend). Moreover, between 56% and 71% of households do not adjust any of the covering in their house on a daily basis, depending on the season and time of week.

ACKNOWLEDGEMENTS

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INTRODUCTION

How much energy could be saved by converting sales of the dominant types of window coverings to energy-efficient window coverings and for which regions and products would such a conversion pay back the additional cost of the efficient product?

This report represents a key milestone in answering those questions at the level of scientific rigor and analysis required by DOE and EPA.

The window coverings industry, LBNL, and D&R International, Ltd., with support from DOE, have been working together since 2010 to develop a pathway to secure a third-party label that identifies energy-efficient products.

Prerequisites for all such programs are a third-party independent energy performance rating program, data and analysis that demonstrate that a subset of products deliver significantly better energy performance at a reasonable cost, and substantial, aggregate potential energy savings from converting the installed base of inefficient window coverings to energy-efficient ones.

In March 2011, the Windows Attachment Consortium (a group of five of the leading window covering manufacturers) made a preliminary presentation encouraging EPA to consider adding window coverings as an ENERGY STAR® product category. EPA agreed to consider expanding the ENERGY STAR program to include window coverings, provided that additional research demonstrated that user behavior was unlikely to affect energy savings, calculated energy savings were significant, and products were available at price points that made them cost-effective alternatives.

The Window Coverings Manufacturers Association (WCMA) engaged D&R to gather the data needed for more rigorous calculations of energy savings and cost-effectiveness, and to assess the relative impact of behavior on those savings.

In 2012, D&R, with input from LBNL and WCMA, designed and implemented a WCMA-funded Internet survey of a geographically representative and demographically diverse population to characterize the installed base of windows and window coverings and identify patterns in household operation of window coverings. The Internet survey was conducted in collaboration with Russell Research, a survey vendor subcontracted by D&R to program and administer the survey.

D&R also collected shipment, pricing, retail, and manufacturing data from WCMA members to gauge the popularity and price points of particular product categories in the marketplace to identify baseline products for energy savings calculations. D&R was then contracted by LBNL with funding from DOE to analyze the collected data set. D&R developed a research plan in consultation with WCMA, with input from LBNL. The dataset collected and detailed here is the first of its kind. It illuminates previously unknown details about the installed base of windows and window coverings and how households operate those coverings on a daily basis. Key findings include the following:

- On a national scale, single hung windows are the most common operator type, double pane are the most common pane type, and the installed base of frames is evenly split among wood, vinyl, and metal.
- Nationwide, more than 60% of all window coverings are blinds, with metal or vinyl horizontal blinds making up almost half of these (27% of the installed base of window coverings).
- Approximately 75% of window coverings are not adjusted on a daily basis.

In the next phase of this project, LBNL will determine the energy savings and cost-effectiveness of energy efficient window coverings and present the findings in a separate report. D&R has provided detailed usage schedules and shipment estimates to LBNL, based on the survey and analysis underlying this report.

STRUCTURE OF THE REPORT

The first section of the report covers the methodologies used to develop the survey and the data collected from manufacturers and presents demographic and house characteristic data. The second section discusses the installed base of windows and presents information on operator type, pane type, and frame type. The third section examines the installed base of window coverings, including differences in the installed base by climate zone and income. The fourth section details findings regarding user operation and presents findings regarding window covering position on a daily basis by climate zone, product type, and room, among others.

The final section covers data on shipment, pricing, retail channels, and domestic manufacturing provided by WCMA members. The Appendix provides additional details about household and demographic characteristics and the methodology for developing shipment estimates and for categorizing shipment estimates by climate zones, along with the glossary included in the Internet survey.

METHODOLOGY

SURVEY METHODOLOGY

INTRODUCTION

With funding from WCMA, from April through July 2012, D&R designed and conducted an online survey to obtain information on the following:

Table 1: Survey Content

Windows/Glass Doors	Window Coverings	Window Covering Operation	House and Demographic Characteristics
Location by side of residence	Type of covering	By season (summer/winter)	Gender, age, rent/own (screening questions)
Operator type	Shade of covering	By time of week (weekday/weekend)	Vintage, year moved in, residence size and orientation
Pane type	Mount type (inside or outside)	By time of day (morning, afternoon, evening)	Education, income, race/ethnicity
Frame type	Ability to adjust from both the top and the bottom		Number of household members, age and sex of household members
Size			Air conditioning, storm windows

SURVEY DESIGN

To draft the initial survey questionnaire, D&R consulted WCMA on window coverings content and LBNL on the input requirements for the window coverings energy savings analysis. LBNL, WCMA, and D&R identified the following information as necessary to conduct the energy savings analysis:

- Window orientation
- Type of window
- Type of window covering
- Positions of window coverings
- Window replacement
- Household and demographic characteristics

The survey was designed to be a self-administered in-home audit of windows and window coverings, where participants could easily remember all of the windows in their home and identify the side of the residence on which each window was located (front, back, left, right). To establish orientation, participants were asked the direction (north, northeast, east, southeast, south, southwest, west, northwest) their front door faced, which was then used to determine the orientation of the rest of the sides of the house along with each window. To ensure that respondents were able to determine which direction their front door faced, a feature was added that allowed

people to select "Orient Me with Google Maps." Selecting this option took respondents to a page where they could enter their home address and view their home using Google Maps so they could determine which direction the front door faced.

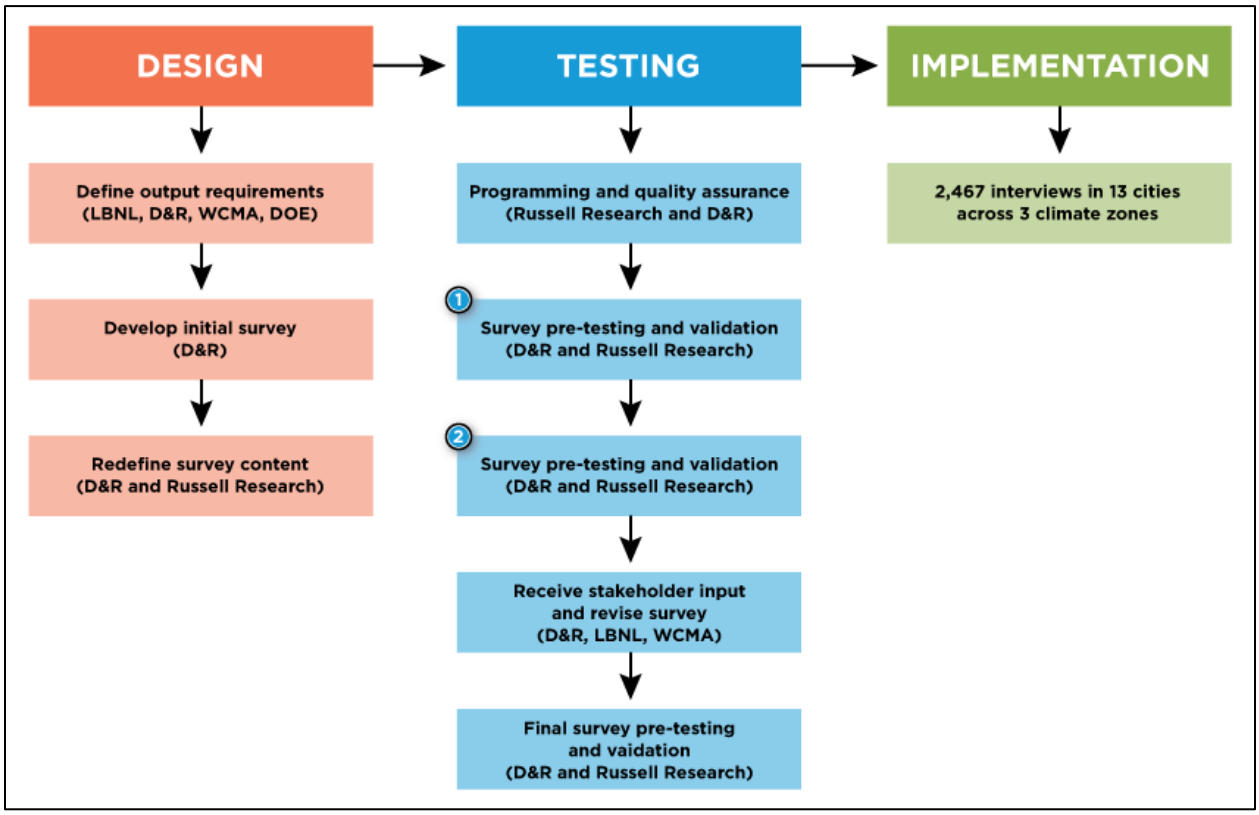
The front door was chosen as the reference point for participants because they could identify it easily. The survey guided people through their home room by room and asked them to place their windows on the appropriate wall in each room based on the location of their front door using a "drag and drop" feature with a variety of window types. D&R wanted the front door to serve as the focal point to make it easier for respondents to remember the windows and window coverings in their home, because providing native cues can improve memory recall. Using familiar concepts and structuring the sequence of questions allows the respondent to map the information that they have stored in their memories to the questions being posed.[2] The side of the house and orientation might affect window covering operation, so it was important to know the position of each window. Once each window was identified, respondents selected from a list the attachment type that best matched the attachment on their window. The list included graphics to help the respondents match the installed window attachments to the options provided.

D&R drafted the initial survey questionnaire, and Russell put it into logic format, which was reviewed by D&R, LBNL, and WCMA. Russell began programming the survey in late April 2012.

SURVEY INSTRUMENT AND RESPONDENT VALIDATION

Self-report surveys are often unreliable, especially with regard to behavior. Therefore, researchers must validate that survey responses are reliable and accurate. For this study, D&R used a three-stage iterative assessment and refinement process (see Figure 1).

Figure 1: Survey Design, Testing, and Implementation Process



After the survey design phase, Russell conducted three rounds of survey pre-testing and validation, along with extensive internal testing by D&R and Russell to ensure the quality and accuracy of responses. Each pre-test round consisted of 10 respondents who took the survey online and agreed to a follow-up in-home interview conducted by a trained interviewer from the Russell team. Interviewers used an interview guide developed by Russell and reviewed by D&R.

The in-home interview included a walk-through of the respondent's home to determine if his/her responses about windows and window coverings matched what was in the home, and if they did not match, to determine how the survey could be improved. The interviewer reviewed survey terminology to make sure the respondent understood all of the terms. Finally, the interviewer and respondent went through the survey together page by page to determine if the respondent understood each question, how questions could be improved, and whether the respondent had any problems when answering.

After each round of pre-testing, D&R and Russell conferred to address issues that had come to light, and Russell made any necessary revisions to the survey instrument. The first round of pre-testing was conducted in East Rutherford, New Jersey in May 2012. For the second round of pre-testing, conducted in the Washington, DC metro area in June 2012, D&R accompanied Russell on two of the in-home audits. After the second round of pre-testing, D&R, LBNL, and Russell reviewed the results of the first two rounds. Russell revised the survey based on LBNL and D&R's feedback and conducted the third pre-test in Phoenix, Arizona in July 2012.

In the first round of testing, five of ten respondents reported results accurately; in the second round, eight of ten reported accurately; in the third round, all respondents reported accurately. The final version of the survey was completed in mid-July 2012. Table 2 outlines the issues encountered and how they were addressed.

Table 2: Pre-Test Issues and Solutions

Issues	Solution
First Pre-Test	
Confusion with terminology	Add glossary with visuals
Problems using "drag and drop" feature	Add additional instructions for "drag and drop" feature
Unaware that using Google Maps was an option for determining orientation	Replace "Don't Know" with "Orient Me with Google Maps"
Second Pre-Test	
Forgot glossary was in survey	Have glossary link float on each page
Unsure how to count transom windows[3]	Add additional options for transom windows
Respondents in apartments did not record windows correctly because of problems remembering to orient to the windows in living room	Have respondents in apartments orient to the front door of their apartment building

SURVEY IMPLEMENTATION

D&R used pre-screened panels, along with representative screening measures, to try to ensure that the population taking the survey closely mirrored the U.S. population. Quotas were created based on data from the U.S. Census to ensure that the distribution matched the population on a few key metrics– gender, age, home ownership/rental status, male or female head of household, and ZIP code – that were thought to affect the installed base. Potential survey respondents from two companies' pools of pre-screened panels of participants were contacted by e-mail. One of these panels recruits online and by telephone and in addition, permits consumers to go directly to its website and sign up. The other panel is invitation only. If respondents passed quotas for representative screening measures, they were asked to take the survey. After completing the survey, respondents received a nominal payment. There is a potential for bias since this was an online survey, and we have noted a couple of instances where this has affected demographic characteristics.

The survey was administered to a sample of 2,467 households in 13 major U.S cities in the Northern, Mid-Tier, and Southern climate zones over a two-week period beginning in late July 2012. The table below shows the targeted number of respondents in each city. Lake Charles, Louisiana, was originally chosen as one of the cities in the Southern climate zone, but due to problems recruiting an adequate number of people in Lake Charles and a high

probability that respondents in New Orleans were more likely to be female, D&R and Russell expanded the survey to cover both cities, with 50 interviews in Lake Charles and 150 interviews in New Orleans.

Table 3: Cities Surveyed

Northern (800)	Mid Tier (800)	Southern (800)
Boston (200)	Atlanta (200)	Lake Charles (50)/ New Orleans (150)
Chicago (200)	Fort Worth (200)	Phoenix (200)
Denver (200)	San Francisco (200)	San Antonio (200)
Minneapolis (200)	Washington, DC (200)	Tampa (200)

SURVEY DATA QUALITY CONTROL

D&R received the survey data from Russell and reviewed it for inconsistencies and unlikely responses. These included, among others, apartments and attached homes that respondents claimed had windows on all four sides, a window with four or more coverings, large numbers of bay or bow[4] windows, and homes lacking bathrooms.

Each of the households identified as having at least one inconsistent piece of information was individually reviewed to determine whether it could be used in the analysis. Responses with two or more inconsistencies were removed from the dataset; some responses with a single particularly egregious issue were also removed. Of the 2,467 households surveyed, 367 households were removed from the dataset, leaving 2,100 households for analysis.

MANUFACTURER DATA COLLECTION METHODOLOGY

INTRODUCTION

To capture an accurate view of the window coverings market as a whole, D&R collected information from WCMA members on the following:

- Shipments
- Pricing
- Retail channels
- Domestic manufacturing

This information was supplemented by data from the U.S. Census Bureau and pricing information from major online retailers.

SURVEY DESIGN AND IMPLEMENTATION

For this manufacturer data collection effort, D&R built on its previous data collection effort with the Window Attachment Coalition. In 2011, D&R worked with manufacturers to develop a data collection template, define product categories, and determine the type and granularity of information that all manufacturers could provide.

For the 2012 effort, D&R made two changes to the data collection template. For better precision, shipment data was collected at the state level rather than having manufacturers estimate shipments at the ENERGY STAR® climate zone level. Additionally, pricing information was collected for low, medium, and high price points rather than for stock, cut-to-fit, and custom, because manufacturers believe this is a more accurate way to capture price points. After WCMA members agreed to the data collection template changes, D&R e-mailed WCMA manufacturer members to request that they submit data via the data collection form. WCMA members and D&R signed non-disclosure agreements to ensure data confidentiality. In total, eight WCMA members provided data, including Newell Rubbermaid, Springs Window Fashions, and Hunter Douglas, the three largest manufacturers.

SURVEY INTERVIEWS

D&R followed up with some manufacturers via e-mail and telephone to discuss retail channels, size and growth in the market, exterior products, and motorization and automation. When appropriate, this information is attributed to a specific manufacturer; if the information is confidential, the manufacturer is listed as anonymous.

INTERNET SURVEY: DEMOGRAPHIC AND HOUSING CHARACTERISTICS

The goal of the Internet survey was to gain an understanding of the installed base of windows and window coverings and the operation of window coverings across the United States by gathering information from residents of 12 major metropolitan areas, which included urban, suburban and rural areas. In general, the demographic and housing characteristic data show that the survey data are mostly comparable to the nation as a whole.

The tables below present the survey data or compare survey data to U.S. Census data or U.S. Department of Energy Residential Energy Consumption Survey 2009 (RECS) data. Additional demographic and housing characteristics information is provided in Appendix A: Additional Housing and Demographic Characteristics.

DEMOGRAPHICS

The income distribution of survey households, which has the potential to affect house size as well as types and numbers of windows and coverings, is slightly skewed toward higher incomes than the U.S. population, except within the highest income bracket. Additionally, households in the lowest income brackets (less than $20,000 annually) are underrepresented compared to the U.S. population.

Due to the underrepresentation of the highest and lowest income brackets, a weighting factor was applied to the survey sample to determine if these differences could impact the installed base of windows and window coverings. Appendix D: Weighting details the methodology and findings from weighting certain measures to income.

Table 4: Household Annual Income

Income Level	Percent	
	Survey	Census[5]
Under $10,000	3.6	7.6
$10,000 - $19,999	6.5	11.6
$20,000 - $29,999	10.0	11.3
$30,000 - $39,999	11.4	10.6
$40,000 - $49,999	10.6	8.9
$50,000 - $59,999	11.3	7.8
$60,000 - $69,999	8.0	6.8
$70,000 - $79,999	8.1	5.8
$80,000 - $89,999	6.0	4.6
$90,000 - $99,999	7.0	4.0
$100,000 - $149,999	12.4	11.9
$150,000 or More	5.1	9.1
Total	100.0	100.0

*Survey “Rather Not Answer” responses (8% of responses) were removed to enable better comparison to Census data.

HOUSE CHARACTERISTICS

The share of single-family detached homes, which represent the majority of U.S. residences, is slightly underrepresented when compared to the proportions measured by RECS. The survey overrepresents apartment buildings with 5 or more units, but the share of apartment buildings as a whole is close to that shown in RECS.

Table 5: Residence Types

Residence Type	Survey (%)	RECS[6] (%)
Single-Family Detached	62.1	67.4
Single-Family Attached	9.4	6.3
2-4 Unit Apartment Buildings	6.1	8.4
5 or More Unit Apartment Buildings	22.4	17.9

The size of owned residences in the survey aligns closely with owned residences in Census data after removing the "Don't Know" responses for both, with slight underrepresentation of larger homes (3,000 square feet or more). Approximately 10% of survey respondents and 5% of census respondents reported that they did not know the size of their residence.

Table 6: Size of Home

Size of Residence (gross square feet)	Survey (%)	Census[7] (%)
Less than 1,000 sq. ft.	8	8
1,000-1,999 sq. ft.	50	48
2,000-2,999 sq. ft.	30	29
3,000 or more sq. ft.	12	16
Total	100	100

Overall, 12% of survey respondents were unsure when their residence was constructed. Table 7 presents vintage for residences that are owned to better compare to RECS data. Homes constructed before 1950 are underrepresented in the survey dataset and homes built in 2000 or later are overrepresented, compared to RECS. Some of the overrepresentation may be because the survey includes information for homes constructed between 2009 and 2012, while the RECS data stop at 2009.

Table 7: Vintage: Owned Residence

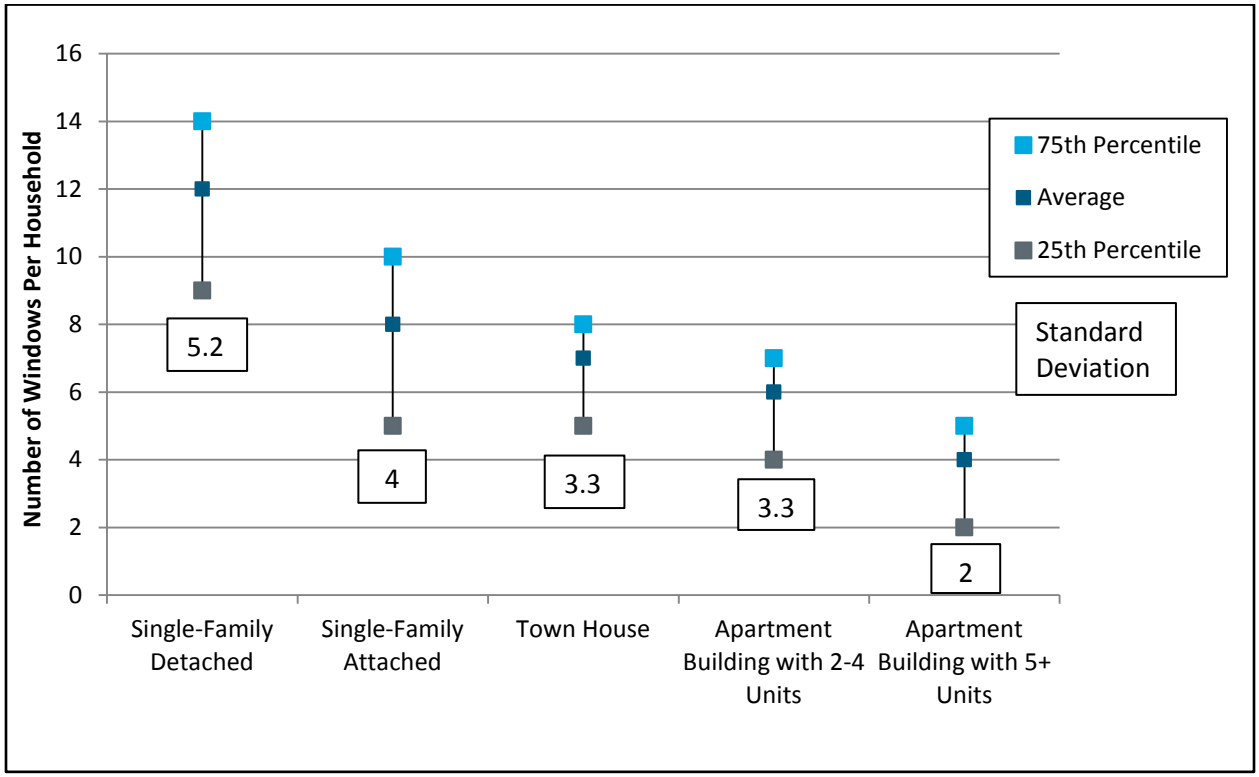
Year Constructed	Survey (%)	RECS[8] (%)
Before 1950	8	17
1950 to 1959	9	12
1960 to 1969	9	12
1970 to 1979	15	16
1980 to 1989	18	15
1990 to 1999	13	14
2000 to 2012	25	14
Don't Know	1.5	0
Total	100	100

WINDOWS

The survey data on windows offer a nuanced picture of the installed base of windows in the United States. The average household has nine windows, with single-family detached homes having the most windows and apartments with five or more units having the fewest. Overall, single hung windows are the most common operator type, followed closely by double hung. Double pane windows are the most common pane type, and frames are evenly divided among wood, vinyl, and metal.

Single pane metal windows are more common in the South, whereas double pane wood and vinyl windows are more common in the North, and the Mid-Tier zone has a mix; nationwide there was a trend toward double hung, double pane vinyl windows. The survey responses are consistent with data from RECS and from Ducker Research Company reports, the primary industry source for aggregate industry sales and distribution data.

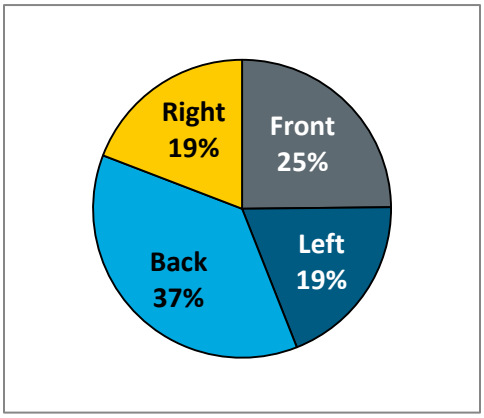
Figure 2: Number of Windows per Household by Residence Type



Among survey respondents, the number of windows per household is related to the type of residence. Single-family detached homes, the largest proportion of residence types in the sample, have 12 windows on average, while apartment buildings with five or more units have the fewest, averaging four windows per unit. The standard deviations closely match the spread between the 25th and 75th percentile. The averages are skewed toward the 75th percentile which means, in general, that the distributions are slightly skewed to the right by the subset of homes and apartments that have larger number of windows.

WINDOW POSITION AND ORIENTATION

Figure 3: Window Location on Home



Two other variables important to understanding energy usage in connection with user behavior are the position of the window on the house (front, back, left, right) and the orientation of the window. For respondents in houses, the "front" was the side of the house where the front door was located, which we assumed would be on the street-facing side of the house in most instances. For apartments, the "front" was the main windows in the living room or for studio apartments the main windows in the living area. The survey results suggest that most homes are rectangular since a higher share of the windows are on the front and back of the home, while the left and right sides have just 19% each.

Table 8: Windows by Room and Side of Home

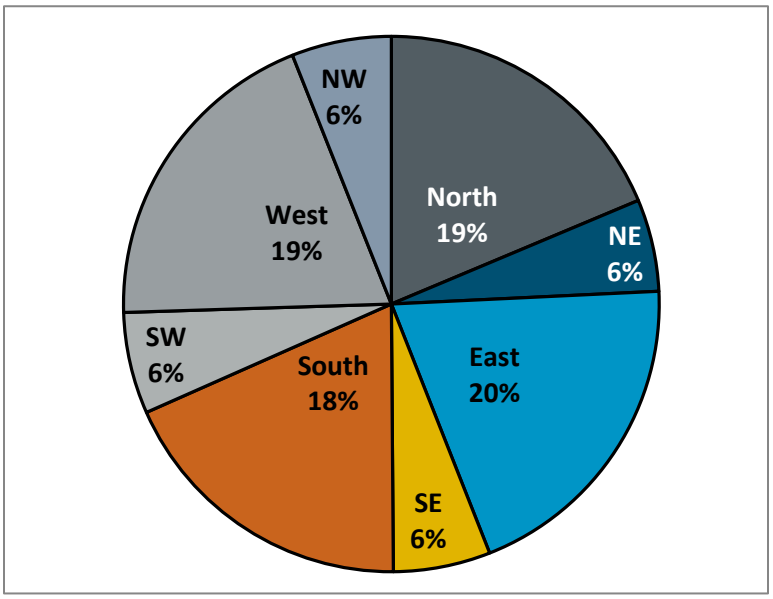
Room	Number of Windows	Front (%)	Left (%)	Back (%)	Right (%)
Master Bedroom	3654	20	21	39	19
Child Bedroom	2120	30	20	30	20
Guest Bedroom	1868	30	19	31	21
Kitchen	2233	13	18	49	20
Living Room	3167	39	17	28	16
Dining Room	1591	25	19	37	19
Family Room	1428	21	16	46	18
Bathroom	1984	13	22	43	22
Home Office	754	37	21	24	18
Den	294	26	18	36	20
Other Room	531	20	21	39	19
Living Area	37	22	14	49	16
Total	19661	25	19	37	19

As Table 9 shows, the distribution of sizes of windows among small, medium, and large, as judged by occupants, is not appreciably different between the front and the back.

Table 9: Size of Window by Side of Home

Window Size	Front (%)	Left (%)	Back (%)	Right (%)	Total (%)
Small	20.5	25.4	22.0	24.6	22.8
Average	58.7	57.6	55.0	59.4	57.2
Large	20.8	17.0	23.0	16.1	20.0

Figure 4: Window Orientation



Unlike the differences in window position on the home, window orientation is evenly distributed. Not unexpectedly, home orientation appears to be dictated by factors other than maximizing solar gain. If homes were constructed in that manner, the dataset would show a higher proportion of windows and larger windows on the south and west sides of homes. Window orientation is likely a function of house orientation.

WINDOW CHARACTERISTICS

OPERATOR TYPE

The survey asked respondents to indicate the operator type for each window in the home. Overall, single hung windows are the most common operator type in the installed base, followed by double hung windows (see Figure 5). However, the data show that operator types are unevenly distributed among climate zones (see Table 10).

Single hung windows are more common in the Southern climate zone, where their share of the installed base is 48%, 15 percentage points higher than the average. Single hung windows in the Mid-Tier zone have a 33% share of the installed base, while they are less common in the Northern climate zone, having just a 19% share, 14 percentage points below the average. The reverse is true for double hung windows, which are more common in the Northern and Mid-Tier zones (shares of 36% and 33%, respectively) and less common in the Southern zone

(15% of the installed base). Casements are most prevalent in the Northern climate zone with a 16% share of the installed base (7 percentage points above the national average). These proportions can be largely explained by the relative prevalence in the southern regions of aluminum frame windows that are predominantly single hung, and of wood frame windows which are typically double hung in the northern U.S.

Figure 5: Installed Base by Operator Type

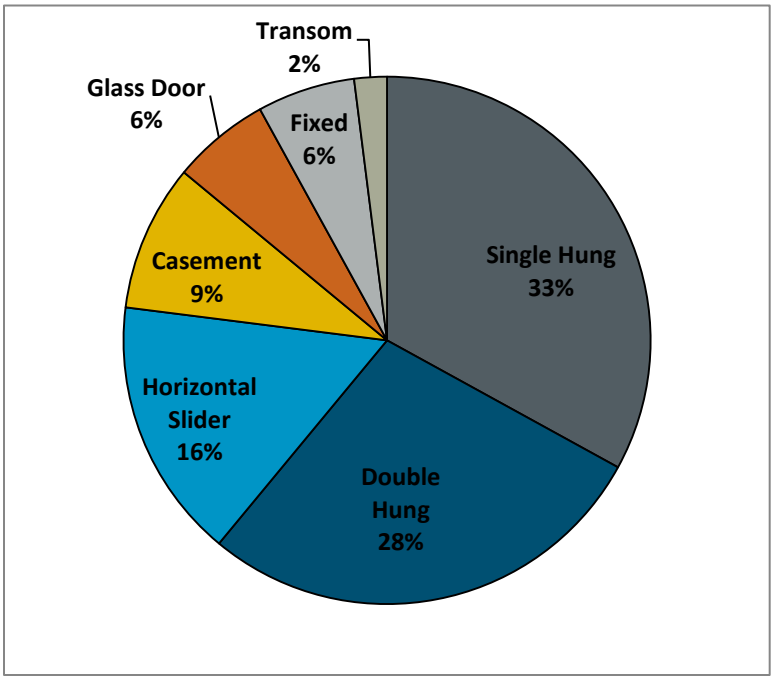


Table 10: Operator Type by Climate Zone

Operator Type	U.S. (%)	Difference from U.S. Average (percentage point)		
		Northern	Mid Tier	Southern
Single Hung	33	-14	0	+15
Double Hung	28	+8	+5	-13
Horizontal Slider	16	+2	-2	0
Casement	9	+7	-4	-3
Glass Door	6	-1	0	+1
Fixed	6	-1	+1	0
Transom	2	0	0	0

The composition of the dataset was also compared to biannual shipment data published by Ducker Research Company.[9] Relative proportions are similar but not identical. Internet survey respondents report a higher proportion of single hung windows and horizontal sliders in homes built or with windows replaced since 2005 than reported by Ducker for the same period. Whether these differences are a function of the broader geographic coverage of the Ducker report or gaps in the survey data capture cannot be determined at this time.

Table 11: Operator Type Comparisons to Ducker

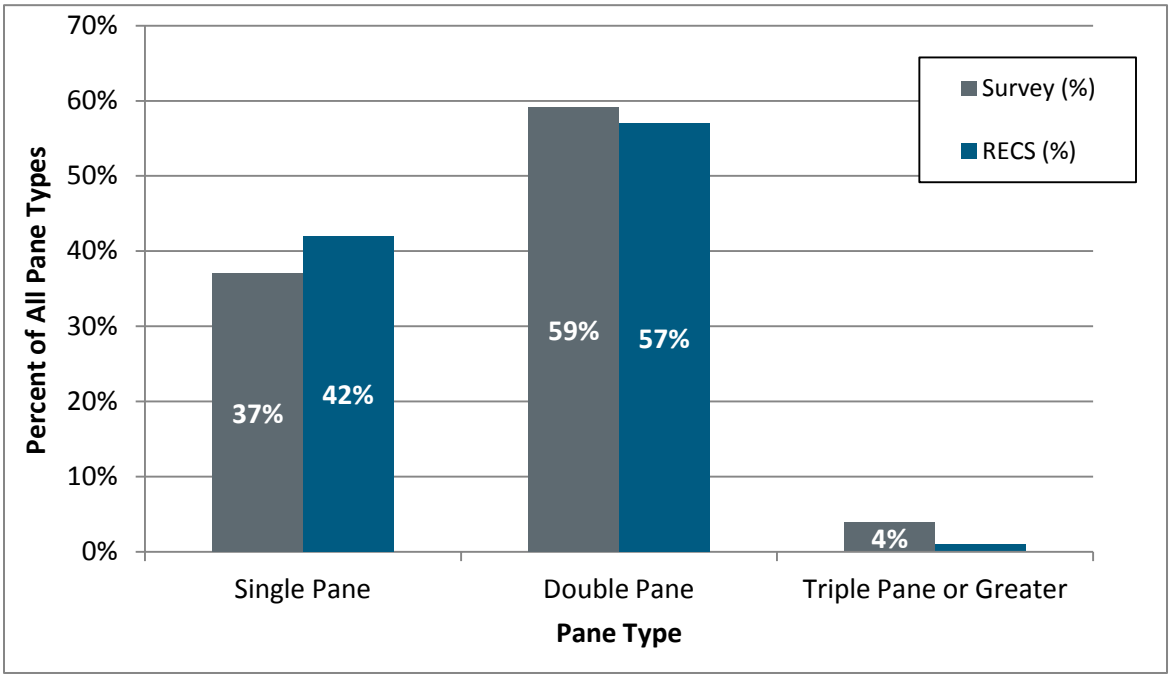
Operator Type	Survey All (%)	Survey Homes Constructed or Windows Replaced 2005 or Later (%)	Ducker 2005 2011 (%)
Single Hung	35	33	23
Double Hung	30	35	37
Horizontal Slider	17	16	11
Casement	10	8	14
Fixed	7	5	8
Other	2	3	6

***The survey distribution is slightly different from the distribution in Table 3 because some product categories have been removed. Ducker data cover 2005, 2007, 2009, and 2011.

PANE TYPE

Survey results for pane type show that regional differences drive the type of panes most commonly found in homes. Overall, the distribution of pane types in the survey closely matches the distribution of pane types found in RECS 2009. However, single pane windows are slightly underrepresented in the survey compared to RECS.

Figure 6: Window Pane Type



The Northern and Mid-Tier climate zones are dominated by double pane windows. In the Southern zone, 52% of windows are double pane; the South has the most even mix of single and double pane and the highest proportion of single pane windows (46%) of all the climate zones. The North, where better-insulating windows are more important, has the highest proportion of double pane and triple pane windows. These distributions are expected, as double pane windows were initially installed primarily in cold climates to provide insulation from the cold.

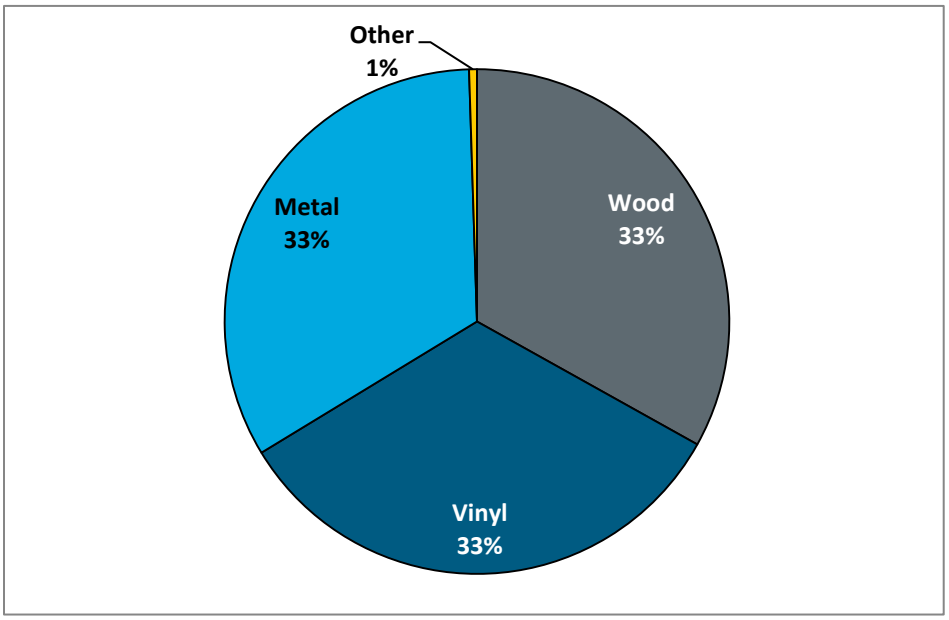
Table 12: Pane Type by Climate Zone

Pane Type	Northern (%)	Mid Tier (%)	Southern (%)	All Zones (%)
Single Pane	29	37	46	37
Double Pane	66	60	52	59
Triple Pane or Greater	6	3	3	4

FRAME TYPE

Climate differences also drive the distribution of frame types. Overall, frame types are split evenly among metal, wood, and vinyl, with "Other" making up only 1%. This finding is not surprising, as wood frames were the only option until the 1950s, when aluminum windows grew in popularity. Vinyl windows were introduced in the 1980s, and have become the dominant window type over the past 15-20 years.

Figure 7: Window Frame Type



Looking at frame type by climate zone produces a very different picture. The Northern climate zone, which has an older housing stock than the other climate zones, as well as building codes that have effectively excluded metal frame windows in recent years, is dominated by wood and vinyl windows (47% and 39%, respectively), while only 14% of the windows have metal frames. The distribution in the Mid-Tier zone is much closer to the average results, with a relatively even distribution among the three major frame types. The Southern zone is dominated by metal windows (54%), with the remainder of the frames split between wood and vinyl. There is not a strong correlation between income and frame type, even after accounting for climate zone differences.

Table 13: Frame Type by Climate Zone

Frame Type	Northern (%)	Mid Tier (%)	Southern (%)
Wood	47	31	21
Vinyl	39	36	24
Metal	14	33	54
Other	0.4	0.3	0.9

WINDOW CHARACTERISTICS WITHIN HOUSEHOLDS

In addition to examining the overall distributions of pane, frame, and operator types, the survey provides insight into those characteristics within individual households. Do most households have only one operator type? Do they tend to have just single or double pane or a combination of the two?

Table 14 shows the number of operator types per household, while Table 15 shows the distribution of households with one pane type. Not surprisingly, the North had the greatest share of homes with all double pane windows (49%), and the South had the greatest proportion of homes with only single pane windows (40%). Interestingly, possibly due to the steady increase in home sizes and number of windows per home in recent years, the percentage of homes in the South with only single pane windows is higher than the proportion with only double pane (40% to 36%, respectively), even though the overall proportion of double pane windows is greater than single pane windows in the South overall (52% and 46%, respectively).

Table 14: Household Distribution by Number of Operator Types

Number of Operator Types	Households (%)
1	35
2	33
3	19
4	9
5	3
6	1

Table 15: Households with One Pane Type by Climate Zone

Pane Type	Northern (%)	Mid Tier (%)	Southern (%)
Single Pane	23	32	40
Double Pane	49	43	36
Triple Pane or Greater	3	1	2
Multiple Pane Types	25	24	22

The high number of households with just one frame type (75%) was also expected, because uniformity keeps builders' costs low. In the Northern climate zone, 58% of homes have either only wood or only vinyl windows; this declines to 47% of homes in the Mid-Tier zone and 31% of homes in the Southern zone. The Southern zone has the largest proportion of homes with only metal frame windows – 42%.

Table 16: Households with One Frame Type by Climate Zone

Frame Type	Northern (%)	Mid Tier (%)	Southern (%)
Wood	30	21	15
Vinyl	28	26	16
Metal	16	31	42
Other	0	0	1
Multiple Frame Types	26	22	26

FREQUENCIES OF FRAME, OPERATOR, AND GLASS PACKAGE COMBINATIONS

Examining operator type by pane type, the data show that three combinations account for 51% of windows. Double hung, double pane windows are the most common combination, making up 19% of windows overall (Table 17); 70% of double hung windows are double pane (Table 18).

Single hung windows are fairly evenly split between single and double pane (45% and 53%, respectively).

Table 17: Operator Type by Pane Type: Overall Distribution

Operator Type	Single Pane (%)	Double Pane (%)	Triple Pane or Greater (%)	Total (%)
Single Hung	15	17	1	33
Double Hung	7	19	1	27
Horizontal Slider	6	9	0	15
Casement	3	5	1	9
Glass Door	2	4	0	6
Fixed	3	3	0	6
Transom	1	1	0	2
Total	37	58	5	100

Table 18: Operator Type by Pane Type

Operator Type	Single Pane (%)	Double Pane (%)	Triple Pane or Greater (%)	Total (%)
Single Hung	45	53	2	100
Double Hung	25	70	5	100
Horizontal Slider	39	59	3	100
Casement	36	57	7	100
Glass Door	36	59	5	100
Fixed	44	49	8	100
Transom	34	59	7	100

Among operator and frame type combinations, single hung metal frame (14%), double hung wood frame (12%), and double hung vinyl frame (12%) are the most common.

Table 19: Operator Type by Frame Type: Overall Distribution

Operator Type	Wood (%)	Vinyl (%)	Metal (%)	Other (%)	Total (%)
Single Hung	9	9	14	0	32
Double Hung	12	12	4	0	28
Horizontal Slider	3	6	7	0	16
Casement	4	2	3	0	9
Glass Door	2	2	3	0	7
Fixed	3	1	2	0	6
Transom	0	1	1	0	2
Total	33	33	34	0	100

Table 20: Operator Type by Frame Type

Operator Type	Wood (%)	Vinyl (%)	Metal (%)	Other (%)	Total (%)
Single Hung	29	27	43	1	100
Double Hung	42	45	13	0	100
Horizontal Slider	20	37	44	0	100
Casement	47	22	30	0	100
Glass Door	27	27	44	2	100
Fixed	41	23	35	1	100
Transom	25	39	35	1	100

Table 21 shows pane type and frame type by operator type. Thirty-nine percent of double hung windows are double pane with a vinyl frame. This is the largest proportion among operator types. The next highest concentration is double pane wood frame windows, which have a 32% share among casements. Single hung metal frame windows are evenly divided between single and double pane (21% each).

Table 21: Operator Type by Pane and Frame Type

Operator Type	Frame Type	Pane Type			
		Single Pane (%)	Double Pane (%)	Triple Pane or Greater (%)	Total (%)
Single Hung	Wood	16	12	0	28
	Vinyl	8	19	1	28
	Metal	21	21	1	43
	Other	1	0	0	1
	Total	46	52	2	100
Double Hung	Wood	19	22	1	42
	Vinyl	3	39	3	45
	Metal	3	10	0	13
	Other	0	0	0	0
	Total	25	71	4	100
Horizontal Slider	Wood	10	10	0	20
	Vinyl	7	28	2	37
	Metal	22	21	1	44
	Other	0	0	0	0
	Total	39	59	3	100
Casement	Wood	13	32	3	48
	Vinyl	6	14	3	23
	Metal	18	11	1	30
	Other	0	0	0	0
	Total	37	57	7	100
Glass Doors	Wood	12	14	1	27
	Vinyl	5	20	2	27
	Metal	18	25	1	44
	Other	1	1	0	2
	Total	36	60	4	100
Fixed	Wood	22	15	3	40
	Vinyl	6	16	2	24
	Metal	16	17	2	35
	Other	0	0	0	0
	Total	44	48	7	100
Transoms	Wood	8	15	2	25
	Vinyl	11	25	3	39
	Metal	14	19	2	35
	Other	0	1	0	1
	Total	33	60	7	100

WINDOW REPLACEMENT

Overall, at least 30% of households report having at least one window replaced. Twenty-one percent of respondents indicate that they have replaced some of their windows, while 9% report that at least one window was replaced before they moved into the residence. The 30% figure is framed as a minimum because 32% of households are unsure if the windows were replaced before they moved in.

Single family homes and town houses are more likely than apartments to report having their windows replaced (36% and 15%, respectively), but because of lower ownership levels among apartment dwellers, the "Don't Know" response rate is much higher than for those living in single family homes and town houses (52% to 24%).

Figure 8 and Figure 9 demonstrate that, in general, the older the home, the more likely it is to have replacement windows. Figure 9 shows the replacement rate by house vintage, excluding "Don't Know" responses. The proportion of homes with replacement windows jumps rather dramatically between those homes less than 20 years old and those 20 years old or older.

Figure 8: Window Replacement by House Vintage

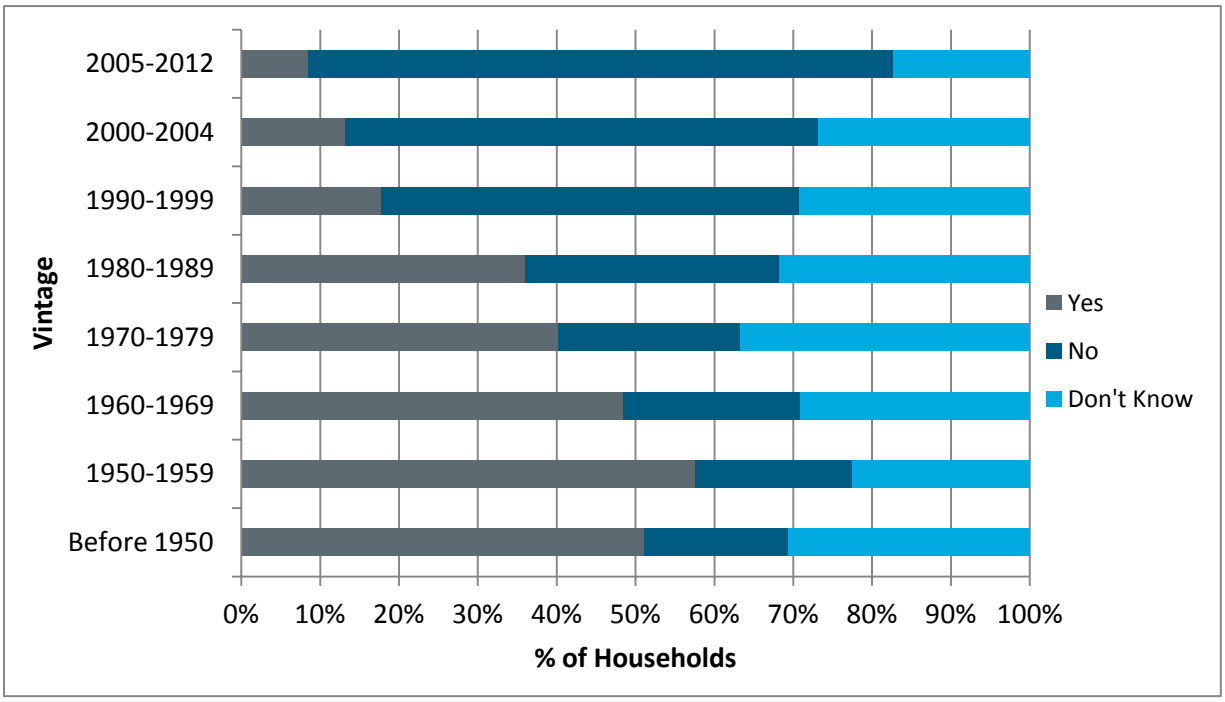
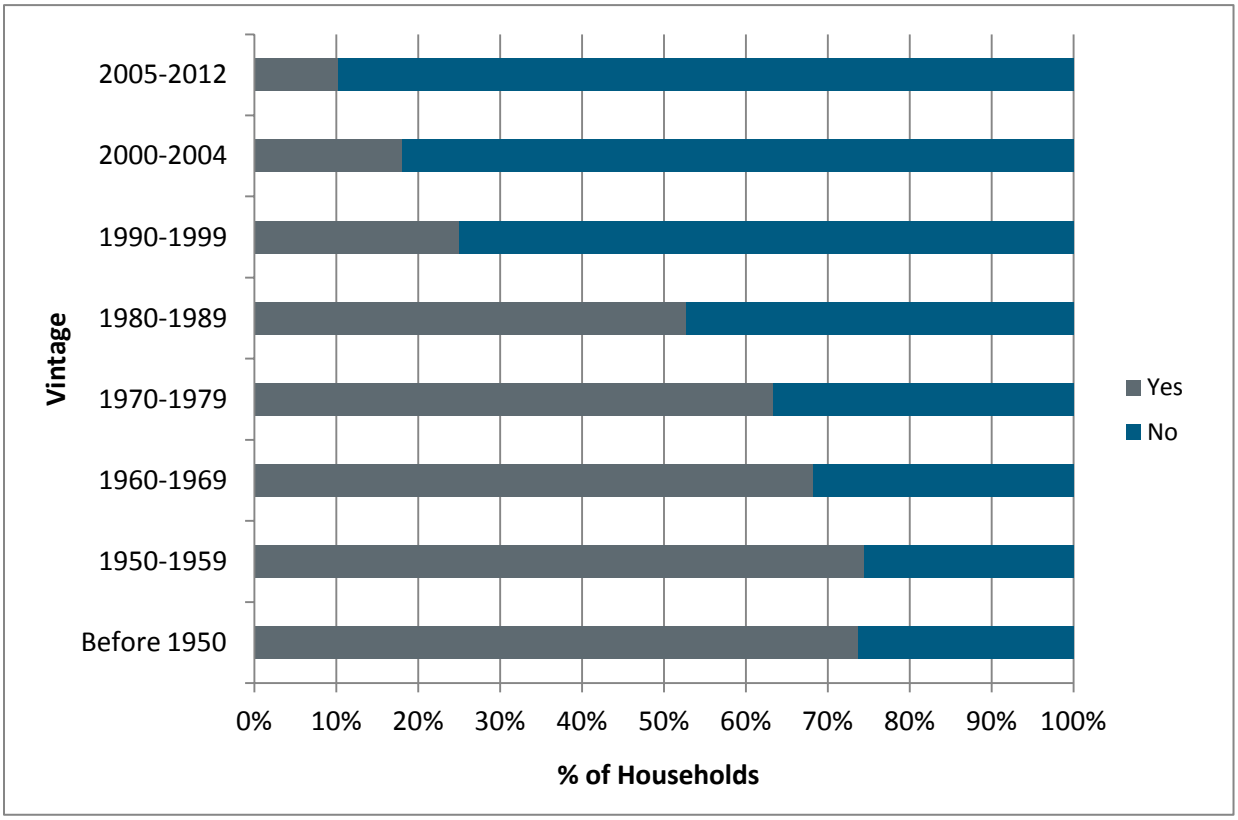


Figure 9: Window Replacement by House Vintage: Certain of Replacement



For the subset of respondents who indicate that their windows have been replaced, 55% indicate that all of their windows have been replaced, 36% indicate that some of their windows have been replaced, and 8% do not remember how many windows have been replaced.

Of that same subset, 54% indicate that at least one of the replacement windows is ENERGY STAR® qualified, 14% report that none of their replacement windows are ENERGY STAR qualified, and 32% report being unsure, making it difficult to accurately estimate the households with ENERGY STAR windows.

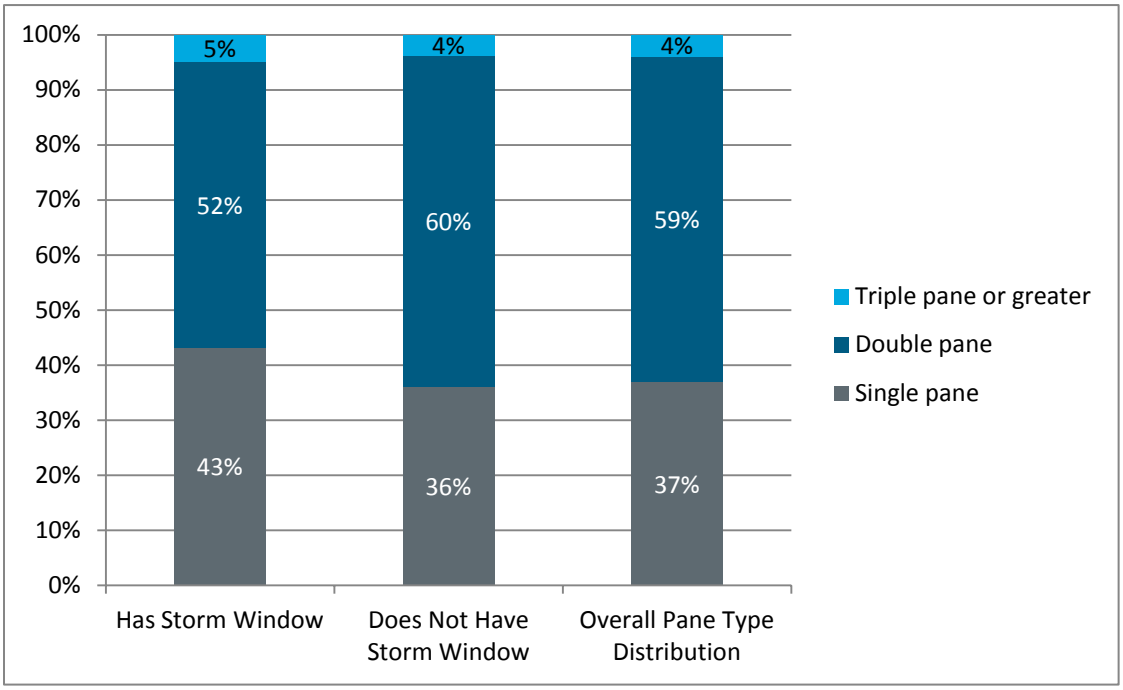
STORM WINDOWS

Another important characteristic for accurately estimating energy savings is the frequency and usage of storm windows. Eighteen percent of the households in the survey report having at least one storm window, although overall only 13.5% of windows have storm windows. Not surprisingly, the Northern climate zone has the highest proportion of windows paired with storm windows (20%), compared to 12% in the Mid-Tier climate zone and 8% in the Southern climate zone.

There appears to be some correlation between storm windows and pane type, but not as strong as expected. Of windows with storms, 43% are single pane, while single pane windows make up just 37% of the installed base, which means that storm windows are on single pane windows at higher levels than single pane windows appear in the installed base. It is possible that a large proportion of the double pane windows with storms are double pane clear windows would benefit from the addition of storm windows.

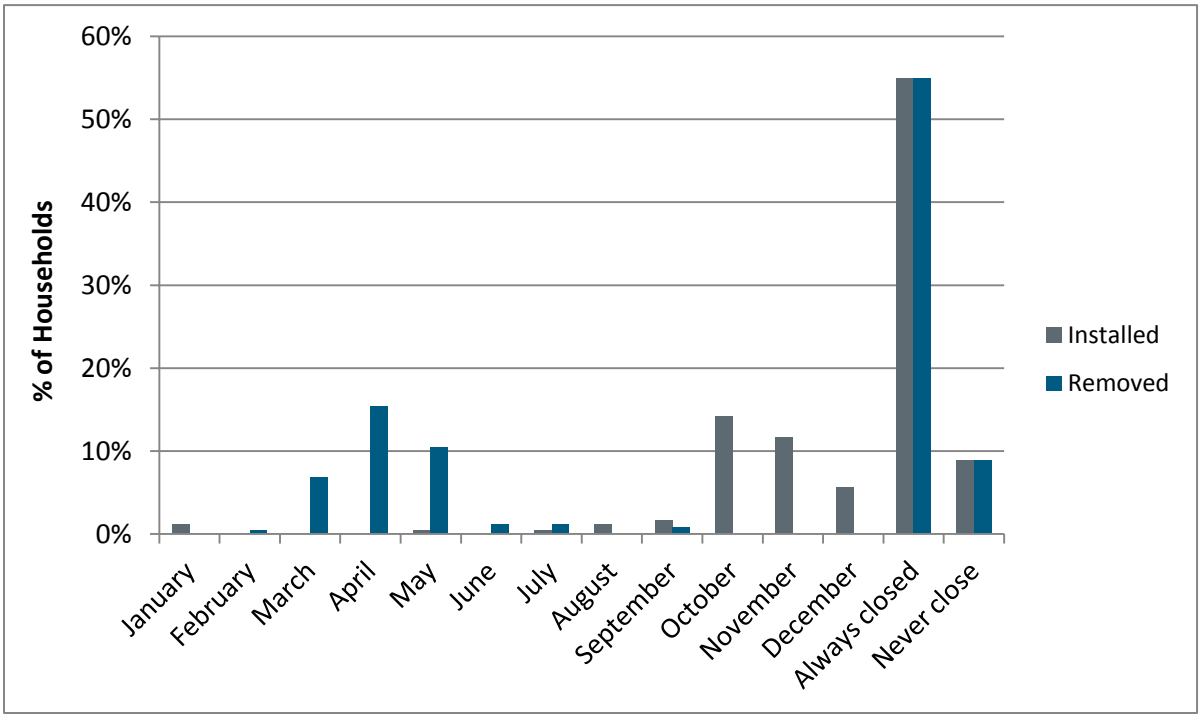
It is also possible that some people with double pane windows with storm windows mistakenly reported having a triple pane window and also reported having a storm window when asked directly about storm windows. This potential error could have affected responses for no more than 130 windows.

Figure 10: Presence of Storm Window by Pane Type



The average number of storm windows per residence is seven. In comparison, the average number of windows per residence is nine. The 25th percentile has two storm windows and the 75th percentile has 11, which means there is a fairly wide spread in the number of storm windows per household. On average, single-family detached homes report 9 storm windows and 12 windows total. Approximately 55% of households report having their storm windows installed and closed year round.

Figure 11: Month Storm Windows Installed and Removed



EXTERIOR OBJECTS BLOCKING LIGHT

The survey also asked respondents about objects near the home that might block light from coming through the windows, including trees, awnings, solar screens, or other houses or buildings. Approximately 52% of households report having at least one window blocked by one of these objects and 17% report having more than one of these objects blocking light. Trees are the most common light blocker.

Table 22: Number of Light-Blocking Objects

Number of Objects Blocking Light	Percent of Windows	Percent of Households
None	78	47
1	20.6	35.6
2	1.2	13.1
3	0.1	3.3
4	0.0	0.5
5	0.0	0.3

Table 23: Type of Light-Blocking Objects

Type of Light Blocking Objects	Percent
Large Deciduous Trees	16
Large Year-Round Green Trees	3
Exterior Awnings	2
Houses or Buildings	2
Solar Screens	1

WINDOW COVERINGS

The survey provided the first view of the installed base of window coverings in the United States and the characteristics of those coverings. The survey shows that blinds, metal and vinyl horizontal blinds in particular, dominate the installed base. There are clear differences in the frequency of covering types by climate zone, income, and home ownership status, and in some cases, by the type of window.

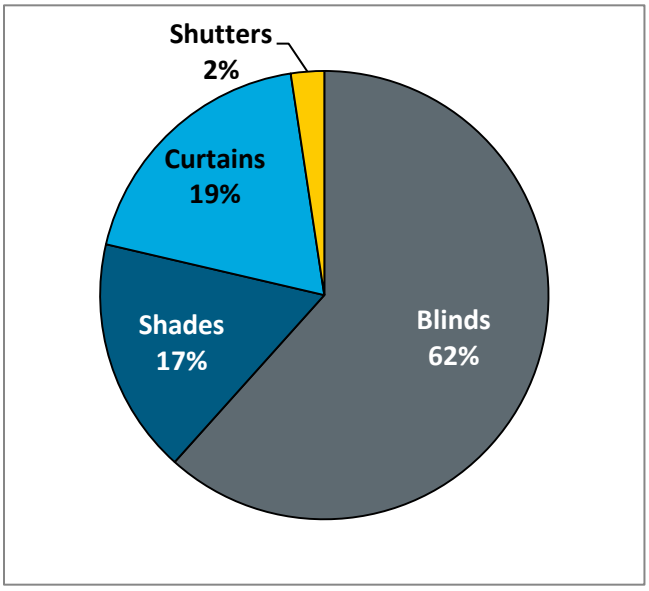
WINDOW COVERINGS BY HOUSEHOLD

Overall, 78% of windows have one covering, 6% have multiple coverings, and 16% have no coverings. The average household reports 8.5 coverings and 2 covering types (e.g., all coverings in a household are either cellular shades or vertical blinds).

WINDOW COVERING TYPE

More than 60% of all window coverings in U.S. homes are blinds. The remaining windows are nearly all covered by shades and curtains in relatively even proportions, with shutters making up just 2% and awnings less than 0.7%.

Figure 12: Window Coverings by Product Group



Despite their sizable aggregate share of the base, no individual type of shade represents more than 5% of the installed base.

Table 24: Window Coverings Share of the Installed Base

Product Type	Percent
Metal or vinyl horizontal blinds	27
Wood or faux wood horizontal blinds	16
Curtains/drapery	15
Vertical blinds	13
Cellular shades	5
Pleated shades	5
Roller shades	4
Sheer drapery	4
Soft sheer blinds (non-transparent)	4
Interior shutters	2
Roman shades	2
Soft sheer blinds (transparent)	1

OWN OR RENT

Owned and rented homes have distinct distributions of window covering products. Metal or vinyl horizontal blinds are substantially more common among renters, accounting for about a third of all rental property coverings, compared to just a fifth of coverings in owner-occupied homes. In contrast, wood and faux wood blinds are much more common in owner-occupied residences, accounting for about 15% of coverings among these homes, double the proportion of these products in rentals. The relative price points of metal and vinyl blinds (low) compared to wood and faux wood (higher) may be the primary factor driving these differences.

There are also differences in the categories of vertical blinds and windows without coverings; vertical blinds represent a larger portion of the base in rental properties and uncovered windows represent a larger portion of the base in owner-occupied homes. The former may simply reflect the fact that sliding glass doors and horizontal sliding windows represent a larger portion of the installed window base in rental properties (30% in rentals, compared to 18% in owned residences). Owner-occupied homes have an average of 14 windows, whereas rental units have 8 windows on average. It may be that in units with fewer windows (rental or owner-occupied), windows are more likely to serve multiple functions (view, light, etc), whereas in larger homes with more windows, those functions can be separated; accordingly, larger homes tend to have more windows uncovered.

Table 25: Installed Base of Coverings by Residence Ownership Status

Product Type	Percent	
	Own	Rent
Metal or vinyl horizontal blinds	20.5	31.7
Wood or faux wood horizontal blinds	15.4	7.3
Curtains/drapery	13.4	10.6
Vertical blinds	9.5	16.4
Cellular shades	5.1	2.7
Pleated shades	3.6	7.8
Roller shades	4.0	2.4
Sheer drapery	3.2	2.7
Soft sheer blinds	2.5	4.6
Interior shutters	2.4	0.6
Roman shades	1.7	0.8
Soft sheer blinds	1.1	0.6
Awnings	0.3	0.1
Frosted glass	1.9	1.8
No covering	15.6	9.8

CLIMATE ZONE

Examining data through a regional lens suggests that control of solar heat gain is currently a stronger driver of window covering installation than insulation. Windows in colder climates tend to have fewer coverings. In the Northern climate zone, 17.6% of windows do not have a covering. In the Mid-Tier zone that proportion is 13%, and in the Southern zone it drops to 12.1%. The average percentage of uncovered windows per household in the Northern climate zone is 13.5%, 10.8% in the Mid-Tier zone, and 10.4% in the Southern climate zone. The differences in the share of uncovered windows by household between the Northern and Southern climate zones is statistically significant ($p=0.007$). The difference between the Northern and Mid-Tier zones is statistically significant at the $\alpha=0.05$ level ($p=0.018$) and the difference between the Mid-Tier and Southern zone falls short of the $\alpha=0.05$ level of significance ($p=0.733$). The full results of this statistical analysis can be found in Appendix J.

The other distinct difference among the climate zones is that wood and faux wood blinds are more prevalent in the Southern (18.7%) and Mid-Tier (15.2%) climate zones than in the Northern zone (7.6%). This trend is also evident in shipments of these product types (see Shipments Section). Whether this preference is climate, culture, or fashion driven is unclear.

Table 26: Installed Base of Coverings by Climate Zone

Product Type	Climate Zone		
	Northern (%)	Mid Tier (%)	Southern (%)
Metal or vinyl horizontal blinds	20.1	25.2	23.5
Wood or faux wood horizontal blinds	7.6	15.2	18.7
Curtains/drapery	14.9	11.7	11.5
Vertical blinds	10.5	9.2	13.3
Cellular shades	6.5	4.4	2.7
Pleated shades	3.9	6.1	3.7
Roller shades	6.4	2.5	1.8
Sheer drapery	3.5	3.5	2.2
Soft sheer blinds (non-transparent)	3.5	2.7	2.7
Interior shutters	0.8	2.3	3.0
Roman shades	1.7	1.4	1.4
Soft sheer blinds (transparent)	1.6	0.7	0.6
Awnings	0.3	0.3	0.2
Frosted glass	1.2	2.0	2.6
No covering	17.6	13.0	12.1

INCOME

Most product categories do not show discernible trends based on income, particularly among the middle income groups where the sample sizes are the largest. Figure 13 shows the few categories in which there are notable trends associated with income.

Most noteworthy are the curvilinear trend in the in the dominant metal and vinyl horizontal blind category, the strong positive correlation of wood and faux wood blinds with income through the $90,000-$99,000 income group and a sharp decline thereafter, and the compensating increase in both cellular shade and uncovered windows among higher income households.

The high proportion of cellular shades in the $10,000 or lower income group is likely an anomaly due to the small sample size of this subpopulation in the dataset.

Figure 13: Select Window Coverings by Income

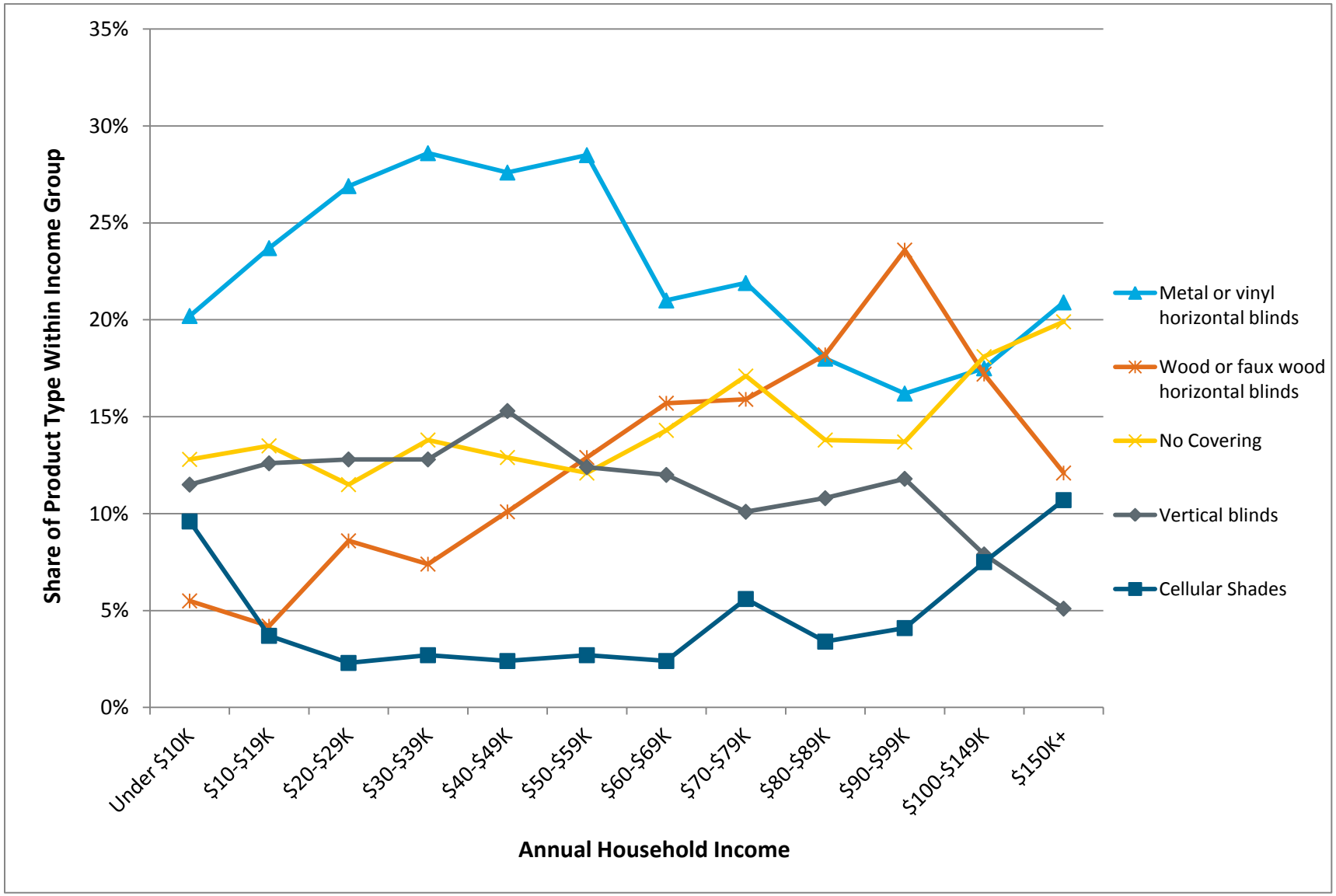


Table 27: Window Coverings by Income

Covering Type	Income Range (%)											
	Under $10K	$10 19K	$20 29K	$30 39K	$40 49K	$50 59K	$60 69K	$70 79K	$80 89K	$90 99K	$100 149K	$150K +
Metal or vinyl horizontal blinds	20.2	23.7	26.9	28.6	27.6	28.5	21.0	21.9	18.0	16.2	17.5	20.9
Wood or faux wood horizontal blinds	5.5	4.2	8.6	7.4	10.1	12.9	15.7	15.9	18.2	23.6	17.2	12.1
Curtains/drapery	16.3	17.1	17.6	13.5	14.4	10.3	13.5	11.3	15.8	8.8	11.3	8.8
Vertical blinds	11.5	12.6	12.8	12.8	15.3	12.4	12	10.10	10.8	11.8	7.9	5.1
Cellular shades	9.6	3.7	2.3	2.7	2.4	2.7	2.4	5.6	3.4	4.1	7.5	10.7
Pleated shades	5.5	8.7	5.7	7.9	1.6	4.0	5.6	3.0	4.8	3.3	3.3	2.2
Roller shades	6.7	3.1	4.2	2.9	3.6	3.2	1.9	2.5	3.8	5.3	3.7	4.9
Sheer drapery	3.0	6.0	3	2.0	4.0	2.0	4	2	4	2	3.0	3
Soft sheer blinds (non-transparent)	2.5	1.5	3.6	2.8	2.7	5.7	2.5	3.2	0.8	4.4	2.9	2.1
Interior shutters	1.0	0.0	0.0	1.0	1.0	3	2.0	3	2	1.0	3.0	5
Roman shades	0.9	2.6	0.3	1.2	0.9	0.9	2.5	1.4	2.6	1.0	1.7	2.2
Soft sheer blinds (transparent)	0.2	0.1	0.8	1.0	0.9	1.4	0.4	1.5	0.7	1.8	0.9	1.6
Awning	1.6	0.2	0.5	0.2	0.3	0.1	0.6	0.1	0.1	0.1	0.1	0.2
Frosted Glass	2.5	2.8	2.0	2.2	1.8	1.4	1.9	1.6	2.1	2.5	1.8	1.0
No covering	12.8	13.5	11.5	13.8	12.9	12.1	14.3	17.1	13.8	13.7	18.1	19.9
Total	100	100	100	100	100	100	100	100	100	100	100	100

COVERING CHARACTERISTICS

SHADE OF COVERING

Respondents were also asked about the shade of the outward-facing side of each of their coverings. Approximately 73% of coverings have a light shade on their outward-facing side, 19% have a medium shade, and just 8% are dark. At least 49% of each covering type is light shaded. Metal and vinyl horizontal blinds have the highest share of light-shaded coverings (83%). Curtains and drapery have the lowest share of light-shaded coverings (49%) and the highest share that are dark (22.5%).

Figure 14: Window Covering Shade

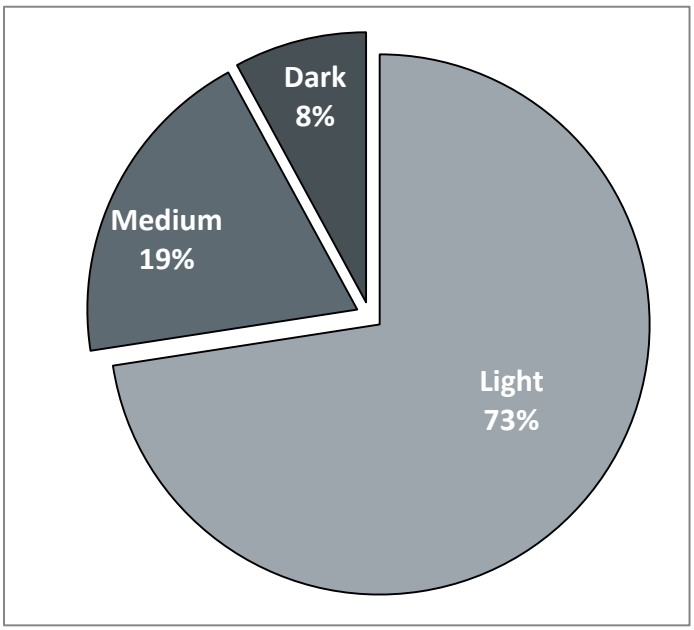


Table 28: Shade of Covering by Product Type

Covering Type	Shade of Covering (%)		
	Light	Medium	Dark
Metal or vinyl horizontal blinds	82.7	13.9	3.4
Wood or faux wood horizontal blinds	70.6	21.6	7.7
Curtains/drapery	48.7	28.8	22.5
Vertical blinds	77.7	18.3	4.0
Cellular shades	78.7	17.7	3.7
Pleated shades	71.9	22.2	5.9
Roller shades	76.8	16.6	6.6
Sheer drapery	72.4	17.5	10.1
Soft sheer blinds (non-transparent)	64.2	30.7	5.1
Interior shutters	76.4	15.0	8.6
Roman shades	54.9	30.7	14.3
Soft sheer blinds (transparent)	71.5	20.7	7.8

MOUNT TYPE

Interior window coverings can be mounted either inside or outside the window frame (see Appendix F: Glossary for image). Although overall about a third of coverings are mounted outside, there is a strong divergence between curtains and blinds/shades, with 67%-75% of the former being mounted outside, compared to 20%-40% of the latter.

Figure 15: Window Covering Mount Type

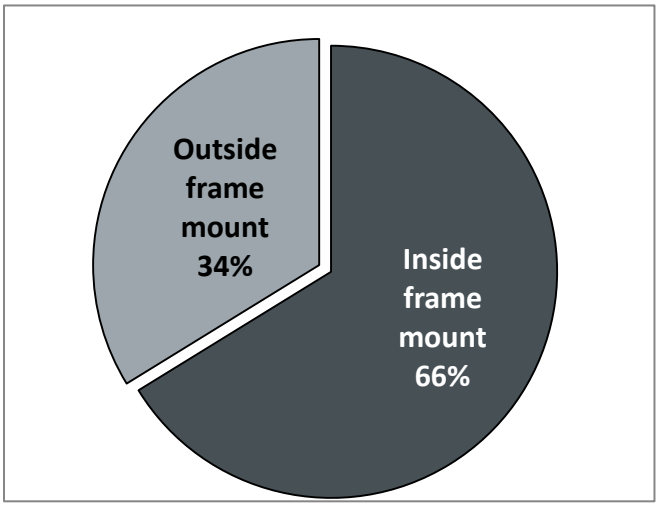


Table 29: Mount Type by Product Type

Covering Type	Mount Type (%)	
	Inside	Outside
Metal or vinyl horizontal blinds	79.0	21.0
Wood or faux wood horizontal blinds	81.6	18.4
Curtains/drapery	25.6	74.4
Vertical blinds	59.6	40.4
Cellular shades	74.7	25.3
Pleated shades	79.2	20.8
Roller shades	73.6	26.4
Sheer drapery	32.1	67.9
Soft sheer blinds (non-transparent)	73.6	26.4
Interior shutters	60.2	39.8
Roman shades	67.9	32.1
Soft sheer blinds (transparent)	70.5	29.5

TOP-DOWN/BOTTOM-UP ADJUSTMENT

A relatively new feature for shades and blinds is the ability to adjust the product height both by lowering the top and raising the bottom. Not surprisingly, the penetration of this feature in the installed base remains quite small overall, but is as high as 23% within cellular shades.

Figure 16: Window Coverings with Top-Down/Bottom-Up Adjustment

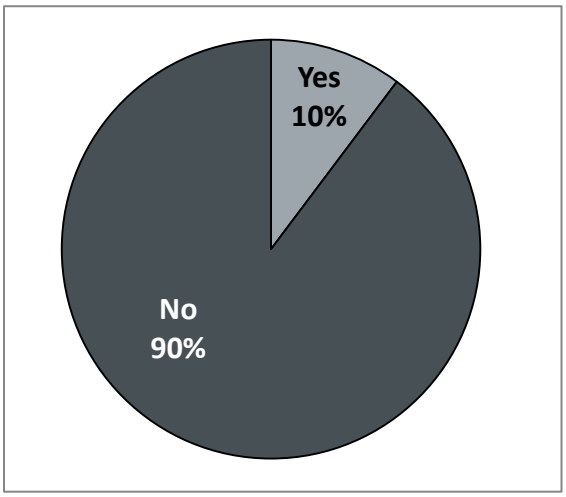


Table 30: Top/Bottom Adjustment by Product Type

Covering Type	Top/Bottom Adjustment (%)	
	Yes	No
Metal or vinyl horizontal blinds	8.6	91.4
Wood or faux wood horizontal blinds	8.3	91.7
Curtains/drapery	4.5	95.5
Vertical blinds	13.3	86.7
Cellular shades	23.1	76.9
Pleated shades	18.3	81.7
Roller shades	9.4	90.6
Sheer drapery	5.6	94.4
Soft sheer blinds (non-transparent)	20.0	80.0
Interior shutters	13.2	86.8
Roman shades	12.3	87.7
Soft sheer blinds (transparent)	19.7	80.3

WINDOW COVERINGS ON WINDOWS

In general, covering types appear fairly randomly distributed across window types, with the exception of cellular shades and to a lesser extent, wood and faux wood horizontal blinds, roman shades, metal or vinyl horizontal blinds, and vertical blinds. Cellular shades, wood and faux wood blinds, pleated shades, and roman shades are disproportionately associated with double pane windows. Metal or vinyl horizontal blinds, vertical blinds, and pleated shades are disproportionately associated with single pane windows. These deviations could reflect differences in income, with less expensive coverings being more likely associated with older housing stock and single pane windows and more expensive coverings associated with newer and renovated housing stock that has a higher prevalence of double pane windows.

Table 31: Window Covering by Pane Type

Product Type	Single (%)	Double (%)	Triple Pane or Greater (%)
Window	**37**	**59**	**4**
Metal or vinyl horizontal blinds	44	54	2
Wood or faux wood horizontal blinds	26	70	5
Curtains/drapery	39	58	3
Vertical blinds	44	54	2
Cellular shades	21	71	8
Pleated shades	43	53	3
Roller shades	35	63	2
Sheer drapery	31	62	6
Soft sheer blinds (non-transparent)	36	59	5
Interior shutters	31	66	2
Roman shades	28	63	9
Soft sheer blinds (transparent)	39	55	5
No covering on this window	40	54	6

Table 32: Window Covering by Frame Type

Product Type	Wood (%)	Vinyl (%)	Metal (%)	Other (%)
Metal or vinyl horizontal blinds	30	33	37	0
Wood or faux wood horizontal blinds	25	36	39	0
Curtains/drapery	38	27	35	0
Vertical blinds	23	33	42	1
Cellular shades	34	41	25	0
Pleated shades	39	37	23	1
Roller shades	43	41	16	0
Sheer drapery	37	34	28	0
Soft sheer blinds (non-transparent)	34	42	25	0
Interior shutters	41	23	35	1
Roman shades	34	38	26	2
Soft sheer blinds (transparent)	46	35	20	0
No covering on this window	42	30	27	1

In general, coverings seem randomly distributed by pane and frame type, with the exception of a few product types. Cellular and roller shades are installed on double pane wood and double pane vinyl windows at higher rates

than average (see Table 33). Metal or vinyl horizontal blinds and vertical blinds appear on single pane metal windows with greater frequency than average.

Table 33: Window Covering by Pane and Frame Type

Product Type	Wood			Vinyl			Metal			Other (%)	Total (%)
	Single Pane (%)	Double Pane (%)	Triple Pane + (%)	Single Pane (%)	Double Pane (%)	Triple Pane + (%)	Single Pane (%)	Double Pane (%)	Triple Pane + (%)		
Metal or vinyl horizontal blinds	16	13	1	7	25	1	20	16	0	0	100
Wood or faux wood horizontal blinds	8	16	1	5	28	2	12	25	2	0	100
Curtains/drapery	20	17	1	2	23	2	17	17	1	0	100
Vertical blinds	9	14	0	9	23	1	20	22	0	1	100
Cellular shades	8	24	1	2	35	3	10	11	3	0	100
Pleated shades	18	20	1	13	21	2	12	12	0	1	100
Roller shades	22	20	1	4	36	1	9	7	1	0	100
Sheer drapery	13	21	2	3	28	3	15	13	0	0	100
Soft sheer blinds (non-transparent)	16	16	2	10	29	2	10	14	1	0	100
Interior shutters	20	22	0	2	21	1	9	24	1	1	100
Roman shades	17	14	2	2	33	3	9	15	3	2	100
Soft sheer blinds (transparent)	18	26	2	15	18	3	7	12	1	0	100
No covering on this window	21	19	3	5	23	2	13	13	1	0	100
Total	15	17	1	6	26	2	15	17	1	0	100

WINDOW COVERING OPERATION

Analysis of households' operation of their window coverings reveals that at least 75% of window coverings remain in the same position on a daily basis, depending on the season and time of the week. Almost no coverings are adjusted between the morning and afternoon (1-2 percentage point difference in covering position), regardless of season or time of the week. Climate zone appears to have an impact on covering position, with a 10-20 percentage point difference among coverings in a closed position between the Northern and Southern climate zones, depending on the season.

Because the substantial majority of products do not move, the default state of coverings that are not adjusted is likely to be the principal determinant of household and aggregate energy savings. An image from the survey which defined covering position for respondents can be found in Appendix H: Window Covering Position Survey Image.

COVERING POSITION

Knowledge of the position of window coverings throughout the day is an essential input for accurate estimates of window covering impact on energy use and potential energy savings. Table 34 and Table 35 show that the proportion of coverings that are open, half open, and closed is largely constant. Slightly less than half of coverings are closed in the morning and afternoon, and slightly more than half are closed in the evening. In general, slightly more coverings are open in the winter than in the summer during the morning and afternoon (3-6 percentage point difference). The difference between the share of open coverings by household in the summer and winter is statistically significant (all p-values ≤0.001; see Appendix I: Statistical Significance for full results).

One possible explanation for this difference is that at least some households choose to open their coverings in the winter in the morning and afternoon, possibly for natural light and heating. Based on known impacts of solar heat gain in summer and winter, the opening and closing behavior with an energy-efficient covering would be expected to improve the aggregate energy performance of U.S. homes.

Table 34: Window Covering Position in the Summer

Covering Position	Summer Weekday (%)			Summer Weekend (%)		
	Morning	Afternoon	Evening	Morning	Afternoon	Evening
Open	22	20	18	22	21	19
Half Open	31	30	28	32	31	29
Closed	47	49	54	46	48	52
Total	100	100	100	100	100	100

Table 35: Window Covering Position in the Winter

Covering Position	Winter Weekday (%)			Winter Weekend (%)		
	Morning	Afternoon	Evening	Morning	Afternoon	Evening
Open	25	26	19	25	26	19
Half Open	29	30	26	30	30	26
Closed	46	44	55	45	44	54
Total	100	100	100	100	100	100

The great majority of window coverings (75%-84%) are not adjusted on a given day even when segregated into summer and winter weekday and weekend (Table 36). This phenomenon occurs not just at the window level, but also at the household level. Approximately, 56% to 71% of households do not adjust any of their window coverings on a daily basis (Table 37). In both cases, coverings and homes are most likely to see adjustment on summer weekdays and least likely on winter weekends.

One possible explanation is that because in the winter it is dark when people wake up and dark when they return home from work there is no reason to adjust coverings, whereas in the summer, when it is hot and already light when people wake up and still light when they return home from work, the need to provide light or block heat may stimulate adjustment.

Table 36: Window Coverings in the Same Position throughout the Day

Time Week and Season	Percent Unchanged
Summer Weekday	75
Summer Weekend	81
Winter Weekday	82
Winter Weekend	84

Table 37: Households with Window Coverings in the Same Position throughout the Day

Time Week and Season	Percent Unchanged
Summer Weekday	56
Summer Weekend	66
Winter Weekday	69
Winter Weekend	71

POSITION BY CLIMATE ZONE

Meaningful differences emerge when covering position and operation are segregated by climate zone (see Tables 38-40). Most notable is the difference in the share of coverings that are closed. There is, on average, a 20 percentage point difference between the Northern and Southern climates' shares of coverings closed during the summer. A possible explanation for this difference is that the more extreme heat in the South leads people to have more of their window coverings closed at all times of day than in the more temperate Mid-Tier and Northern zones. These differences extend through the winter, but are not as extreme, with a 10-12 percentage point difference during that season.

The differences between the proportion of windows closed by household in the Northern and Southern climate zones between summer morning, afternoon and evening and winter morning, afternoon, and evening both on weekdays and weekends are statistically significant at the α=0.05 level (see Appendix J for full results). The differences between the Northern and Mid-Tier climate zones are also statistically significant at the α=0.05 level. The differences between the Mid-Tier and Southern climate zones are statistically significant at the α=0.05 level with the exception of the differences for the winter weekend morning, afternoon, and evening which were not found to be statistically significant between the climate zones. Appendix E: Internal Consistency of the Sample details the methodology and findings from examining the consistency of cities within climate regions.

WINDOW COVERING POSITION BY ORIENTATION AND SIDE OF HOUSE

The orientation of the window appears to have no impact on window covering position or user behavior (see Tables 41-44). The distribution of window covering position is almost completely uniform by orientation within each time period.

The side of the home, on the other hand, appears to have at least a minimal effect on window covering position (see Tables 45-48). The left and right of the homes consistently have more window coverings closed throughout the day than the front and back of the homes (3-7 percentage point difference). The higher levels of closed coverings on the right and left may have to do with maintaining privacy from neighbors; conversely, the greater proportion of open window coverings in front and back may reflect a desire to access pleasant views or admit light into more frequently occupied living spaces.

WINDOW COVERING POSITION BY RESIDENCE TYPE

There are no clear trends in window covering position by residence type.

WINDOW COVERING POSITION BY CLIMATE ZONE

Table 38: Window Coverings Position in the Northern Climate Zone

Covering Position	Summer Weekday			Summer Weekend			Winter Weekday			Winter Weekend		
	Morning	Afternoon	Evening	Morning	Afternoon	Evening	Morning	Afternoon	Evening	Morning	Afternoon	Evening
Open	26	24	23	26	25	23	29	30	23	28	29	22
Half Open	35	34	32	36	36	33	32	33	28	32	33	29
Closed	39	41	45	38	39	44	39	38	49	40	38	49
Total	100	100	100	100	100	100	100	100	100	100	100	100

Table 39: Window Coverings Position in the Mid-Tier Climate Zone

Covering Position	Summer Weekday			Summer Weekend			Winter Weekday			Winter Weekend		
	Morning	Afternoon	Evening	Morning	Afternoon	Evening	Morning	Afternoon	Evening	Morning	Afternoon	Evening
Open	23	21	20	23	22	20	25	25	19	24	24	18
Half Open	31	32	29	33	32	30	30	30	28	30	30	27
Closed	46	47	52	45	46	50	45	45	53	46	45	54
Total	100	100	100	100	100	100	100	100	100	100	100	100

Table 40: Window Coverings Position in the Southern Climate Zone

Covering Position	Summer Weekday			Summer Weekend			Winter Weekday			Winter Weekend		
	Morning	Afternoon	Evening	Morning	Afternoon	Evening	Morning	Afternoon	Evening	Morning	Afternoon	Evening
Open	17	15	13	18	17	14	23	23	17	23	23	17
Half Open	26	25	23	26	25	24	25	26	22	27	27	23
Closed	57	60	65	56	58	62	52	51	61	51	50	59
Total	100	100	100	100	100	100	100	100	100	100	100	100

WINDOW COVERING POSITION BY ORIENTATION

Table 41: Window Coverings Position by Orientation: Summer Weekday

Covering Position	Summer Weekday (%)											
	Morning				Afternoon				Evening			
	North	East	South	West	North	East	South	West	North	East	South	West
Open	23	22	22	21	22	22	20	18	19	20	18	16
Half Open	30	30	31	31	30	30	31	30	28	27	28	28
Closed	46	48	47	49	48	48	49	52	53	53	54	55
Total	100	100	100	100	100	100	100	100	100	100	100	100

Table 42: Window Coverings Position by Orientation: Summer Weekend

Covering Position	Summer Weekend (%)											
	Morning				Afternoon				Evening			
	North	East	South	West	North	East	South	West	North	East	South	West
Open	23	23	22	21	22	23	21	19	19	20	19	18
Half Open	32	30	32	32	31	30	32	31	29	28	29	30
Closed	45	47	46	47	46	47	48	50	52	52	52	53
Total	100	100	100	100	100	100	100	100	100	100	100	100

Table 43: Window Coverings Position by Orientation: Winter Weekday

Covering Position	Winter Weekday (%)											
	Morning				Afternoon				Evening			
	North	East	South	West	North	East	South	West	North	East	South	West
Open	25	26	24	26	26	27	25	26	19	21	19	19
Half Open	29	29	30	29	29	29	30	30	26	26	26	26
Closed	46	45	46	45	45	44	45	44	55	54	55	55
Total	100	100	100	100	100	100	100	100	100	100	100	100

Table 44: Window Coverings Position by Orientation: Winter Weekend

Covering Position	Winter Weekend (%)											
	Morning				Afternoon				Evening			
	North	East	South	West	North	East	South	West	North	East	South	West
Open	25	26	24	25	25	27	24	25	18	21	18	19
Half Open	29	29	30	30	30	30	30	31	27	26	26	27
Closed	46	44	46	45	45	43	45	44	55	53	56	54
Total	100	100	100	100	100	100	100	100	100	100	100	100

WINDOW COVERING POSITION BY SIDE OF HOME

Table 45: Window Coverings Position by Side of Home: Summer Weekday

Covering Position	Summer Weekday (%)											
	Morning				Afternoon				Evening			
	Front	Left	Back	Right	Front	Left	Back	Right	Front	Left	Back	Right
Open	23	20	24	19	22	18	22	17	19	17	20	16
Half Open	30	30	30	32	30	29	30	33	28	27	27	29
Closed	47	51	46	48	48	52	48	50	53	56	53	55
Total	100	100	100	100	100	100	100	100	100	100	100	100

Table 46: Window Coverings Position by Side of Home: Summer Weekend

Covering Position	Summer Weekend (%)											
	Morning				Afternoon				Evening			
	Front	Left	Back	Right	Front	Left	Back	Right	Front	Left	Back	Right
Open	23	19	25	19	23	19	23	18	20	17	21	16
Half Open	31	32	31	33	30	31	31	33	28	29	29	30
Closed	46	49	44	48	47	50	46	49	52	55	50	54
Total	100	100	100	100	100	100	100	100	100	100	100	100

Table 47: Window Coverings Position by Side of Home: Winter Weekday

Covering Position	Winter Weekday (%)											
	Morning				Afternoon				Evening			
	Front	Left	Back	Right	Front	Left	Back	Right	Front	Left	Back	Right
Open	26	23	28	22	27	24	29	23	19	18	22	17
Half Open	29	28	29	30	30	28	29	31	26	25	26	26
Closed	45	49	42	48	44	48	42	47	54	57	52	57
Total	100	100	100	100	100	100	100	100	100	100	100	100

Table 48: Window Coverings Position by Side of Home: Winter Weekend

Covering Position	Winter Weekend (%)											
	Morning				Afternoon				Evening			
	Front	Left	Back	Right	Front	Left	Back	Right	Front	Left	Back	Right
Open	26	23	28	21	27	24	28	22	19	18	21	17
Half Open	30	29	29	31	30	29	30	32	26	25	26	28
Closed	45	49	43	48	43	47	42	47	54	57	52	56
Total	100	100	100	100	100	100	100	100	100	100	100	100

WINDOW COVERING POSITION BY ROOM

Common rooms in the house (kitchen, living room, dining room, and family room) tend to have higher proportions of coverings open or half open than bedrooms and bathrooms. Among the major room types, coverings in bathrooms and bedrooms are most frequently closed throughout the day. This result is expected, since common rooms are where families are most likely to be occupied during the day and daylight is generally beneficial, while privacy tends to be more important in bedrooms and bathrooms.

Of the common rooms, kitchens have the highest share of coverings open throughout the day and living rooms tend to have coverings closed at slightly higher rates in the evening (3-6 percentage points) than coverings in other common rooms. This could be related to the fact that certain rooms tend to have more windows on certain sides of the house. For example, 39% of windows in living rooms are on the front of homes. Den, home office, and other rooms are excluded from these tables because they had sample sizes of fewer than 200 coverings.

Table 49: Window Coverings Position by Room: Summer Weekday

Rooms	Morning (%)			Afternoon (%)			Evening (%)		
	Open	Half Open	Closed	Open	Half Open	Closed	Open	Half Open	Closed
Bedroom	17	28	55	16	27	57	14	25	61
Kitchen	32	36	32	30	36	34	27	33	40
Living Room	25	34	41	23	33	44	20	29	52
Dining Room	27	35	38	25	33	42	24	32	45
Family Room	26	32	42	22	33	44	21	32	47
Bathroom	19	25	55	18	26	56	17	25	58
Living Area	11	54	34	9	49	43	17	20	63

Table 50: Window Coverings Position by Room: Summer Weekend

Rooms	Morning (%)			Afternoon (%)			Evening (%)		
	Open	Half Open	Closed	Open	Half Open	Closed	Open	Half Open	Closed
Bedroom	17	28	55	17	28	55	15	27	59
Kitchen	31	37	32	30	36	34	26	33	40
Living Room	26	34	40	24	34	42	20	30	49
Dining Room	27	36	36	27	35	38	25	33	42
Family Room	24	37	39	23	36	41	21	33	46
Bathroom	20	28	52	18	27	54	18	26	55
Living Area	23	43	34	17	51	31	14	31	54

Table 51: Window Coverings Position by Room: Winter Weekday

Rooms	Morning (%)			Afternoon (%)			Evening (%)		
	Open	Half Open	Closed	Open	Half Open	Closed	Open	Half Open	Closed
Bedroom	20	28	55	16	27	57	14	25	61
Kitchen	32	35	33	33	36	31	25	31	44
Living Room	29	31	39	30	32	38	21	26	53
Dining Room	31	34	35	32	34	34	25	30	45
Family Room	28	34	38	29	34	37	21	32	47
Bathroom	23	26	51	23	27	51	20	24	55
Living Area	40	23	37	31	37	31	23	11	66

Table 52: Window Coverings Position by Room: Winter Weekend

Rooms	Morning (%)			Afternoon (%)			Evening (%)		
	Open	Half Open	Closed	Open	Half Open	Closed	Open	Half Open	Closed
Bedroom	20	27	54	21	27	52	15	24	61
Kitchen	32	35	33	33	36	32	25	31	44
Living Room	30	31	39	31	32	38	22	26	52
Dining Room	31	34	35	32	34	34	24	31	45
Family Room	28	33	38	29	34	37	22	31	48
Bathroom	22	27	52	21	27	52	19	25	56
Living Area	40	29	31	29	43	29	29	17	54

WINDOW COVERING POSITION BY COVERING TYPE

There are differences in covering position based on covering type. On average, regardless of season or time of the week, a larger proportion of horizontal blinds are closed throughout the day than any other product category. The differences are more apparent in the summer, particularly in the evening, when horizontal blinds are closed at approximately 7-10 percentage points more than other product groups. The reason for this difference is unclear. Perhaps because they admit more light during the day even with slats in the closed position, occupants are less motivated to open them. Vertical blinds, shades, and curtains and drapery are, on average open, half open, and closed at similar frequencies. Appendix G: Window Covering Position by Product Type presents a breakdown of covering position by product type.

WINDOW COVERING POSITION BY PRODUCT GROUP

Table 53: Window Coverings Position during Summer Weekday by Product Group

Covering Position	Morning (%)					Afternoon (%)					Evening (%)				
	Vertical Blinds	Horizontal Blinds	Shades	Curtains/ Drapery	Interior Shutters	Vertical Blinds	Horizontal Blinds	Shades	Curtains/ Drapery	Interior Shutters	Vertical Blinds	Horizontal Blinds	Shades	Curtains/ Drapery	Interior Shutters
Open	26	19	23	25	23	24	18	22	26	15	21	15	21	22	18
Half Open	32	30	32	29	41	31	29	32	29	44	29	26	30	27	40
Closed	43	51	45	46	36	45	54	47	47	41	50	59	49	52	42
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Table 54: Window Coverings Position during Summer Weekend by Product Group

Covering Position	Morning (%)					Afternoon (%)					Evening (%)				
	Vertical Blinds	Horizontal Blinds	Shades	Curtains/ Drapery	Interior Shutters	Vertical Blinds	Horizontal Blinds	Shades	Curtains/ Drapery	Interior Shutters	Vertical Blinds	Horizontal Blinds	Shades	Curtains/ Drapery	Interior Shutters
Open	26	19	24	24	38	26	18	20	24	18	23	16	21	22	15
Half Open	32	29	35	31	23	31	29	32	31	48	28	26	32	30	48
Closed	41	52	42	45	38	43	53	48	45	34	49	58	48	48	37
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Table 55: Window Coverings Position during Winter Weekday by Product Group

Covering Position	Morning (%)					Afternoon (%)					Evening (%)				
	Vertical Blinds	Horizontal Blinds	Shades	Curtains/ Drapery	Interior Shutters	Vertical Blinds	Horizontal Blinds	Shades	Curtains/ Drapery	Interior Shutters	Vertical Blinds	Horizontal Blinds	Shades	Curtains/ Drapery	Interior Shutters
Open	32	23	26	28	36	31	23	23	29	20	25	17	20	21	14
Half Open	31	28	29	28	17	32	28	30	29	50	28	25	26	26	46
Closed	37	50	45	44	47	36	49	47	42	30	47	58	55	53	40
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Table 56: Window Coverings Position during Winter Weekend by Product Group

Covering Position	Morning (%)					Afternoon (%)					Evening (%)				
	Vertical Blinds	Horizontal Blinds	Shades	Curtains/ Drapery	Interior Shutters	Vertical Blinds	Horizontal Blinds	Shades	Curtains/ Drapery	Interior Shutters	Vertical Blinds	Horizontal Blinds	Shades	Curtains/ Drapery	Interior Shutters
Open	29	23	25	28	36	29	23	22	29	20	23	17	19	23	16
Half Open	30	28	31	28	26	31	29	32	29	49	26	25	27	26	45
Closed	42	49	44	44	38	40	48	46	42	31	51	58	54	51	39
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

WINDOW COVERING POSITION BY PANE TYPE

Window covering operation patterns suggest that the insulating capability of the window influences how people operate the associated window covering- consciously or unconsciously. Single pane windows have the greatest proportion of closed coverings, double pane the second largest proportion, and triple pain the smallest proportion of closed coverings, regardless of time of day, week, or season. This behavior is consistent with a comfort/stimulus-driven model of user behavior in which coverings are opened or closed when occupants feel too warm or too cold.

Table 57: Window Coverings Position by Pane Type: Summer Weekday

Covering Position	Summer Weekday (%)								
	Morning			Afternoon			Evening		
	Single Pane	Double Pane	Triple+ Pane	Single Pane	Double Pane	Triple+ Pane	Single Pane	Double Pane	Triple+ Pane
Open	20.4	22.9	24.7	19.6	20.7	24.3	17.5	19.0	19.5
Half Open	28.7	31.3	38.2	28.8	30.8	35.7	25.8	28.5	35.2
Closed	51.0	45.9	37.1	51.6	48.5	40.0	56.7	52.5	45.3
Total	100	100	100	100	100	100	100	100	100

Table 58: Window Coverings Position by Pane Type: Summer Weekend

Covering Position	Summer Weekend (%)								
	Morning			Afternoon			Evening		
	Single Pane	Double Pane	Triple+ Pane	Single Pane	Double Pane	Triple+ Pane	Single Pane	Double Pane	Triple+ Pane
Open	20.7	22.9	23.6	19.9	22.0	24.5	17.8	19.6	19.5
Half Open	28.9	32.4	44.2	29.1	31.5	41.4	27.0	29.6	40.7
Closed	50.4	44.7	32.1	50.9	46.5	34.1	55.2	50.8	39.8
Total	100	100	100	100	100	100	100	100	100

Table 59: Window Coverings Position by Pane Type: Winter Weekday

Covering Position	Winter Weekday (%)								
	Morning			Afternoon			Evening		
	Triple+ Pane	Single Pane	Double Pane	Triple+ Pane	Single Pane	Double Pane	Triple+ Pane	Double Pane	Triple+ Pane
Open	23.4	26.7	24.0	23.6	27.6	24.5	17.2	20.7	19.5
Half Open	27.7	29.3	39.6	28.6	29.5	39.8	25.4	25.9	33.2
Closed	48.9	44.1	36.4	47.9	42.9	35.7	57.4	53.4	47.2
Total	100	100	100	100	100	100	100	100	100

Table 60: Window Coverings Position by Pane Type: Winter Weekend

Covering Position	Winter Weekend (%)								
	Morning			Afternoon			Evening		
	Single Pane	Double Pane	Triple+ Pane	Single Pane	Double Pane	Triple+ Pane	Single Pane	Double Pane	Triple+ Pane
Open	22.6	26.5	24.7	23.0	27.1	25.4	16.6	20.8	20.4
Half Open	28.5	29.7	39.4	29.3	30.3	39.4	25.9	26.5	33.4
Closed	48.8	43.8	35.9	47.6	42.5	35.2	57.5	52.8	46.2
Total	100	100	100	100	100	100	100	100	100

WINDOW COVERING OPERATION AT THE HOUSEHOLD LEVEL

A majority of households do not alter the position of their coverings throughout the day, and a majority of households do not alter the position of any of their coverings between weekday and weekend (Table 61). Slightly less than half of households do not alter the position of their coverings between summer and winter (Table 62).

Table 61: No Changes Regardless of Weekday/Weekend

Season	Percent of Homes
Summer	51%
Winter	64%

Table 62: No Changes Regardless of Season

Season	Percent of Homes
Weekday	48%
Weekend	59%

The majority of homes do not alter the position of any of their coverings on a daily basis. A subset of households alters at least one covering in their home daily. The survey reveals that even among this subset, half alter no more than one-third of their coverings; even the households that change their coverings most frequently adjust only about two-thirds of their coverings. The population can be divided into three general categories: no changers (56%), low changers (30%), and high changers (14%). In addition, a majority of households have all of their coverings in the same position; while approximately 35% have coverings in multiple positions (see Tables 64-66). These categories should help in calculating energy savings and targeting and measuring communication strategies and messages.

Table 63: Percent of Coverings Changed Daily for Homes that Change Position of Their Coverings

Time	50th Percentile (Median) Households	90th Percentile Households
Summer Weekday	27%	66%
Summer Weekend	29%	67%
Winter Weekday	33%	67%
Winter Weekend	33%	67%

Table 64: Covering Position by Proportion of Household: Northern Zone

Covering Position	Summer Weekday (%)			Summer Weekend (%)			Winter Weekday (%)			Winter Weekend (%)		
	Morning	Afternoon	Evening	Morning	Afternoon	Evening	Morning	Afternoon	Evening	Morning	Afternoon	Evening
All Open	17	14	13	18	15	12	22	24	12	20	23	12
All Half Open	23	21	16	19	19	15	17	19	12	18	20	12
All Closed	23	26	34	20	23	32	24	20	43	23	19	42
Open and Half Open	10	8	7	9	8	7	9	10	6	10	10	6
Half Open and Closed	12	14	14	16	16	17	13	12	13	14	13	14
Open and Closed	7	7	6	7	7	6	5	5	5	6	6	5
Open, Half Open, and Closed	9	9	9	11	11	11	10	10	8	9	8	8
Total Households	100	100	100	100	100	100	100	100	100	100	100	100

Table 65: Covering Position by Proportion of Households: Mid-Tier Zone

Covering Position	Summer Weekday (%)			Summer Weekend (%)			Winter Weekday (%)			Winter Weekend (%)		
	Morning	Afternoon	Evening	Morning	Afternoon	Evening	Morning	Afternoon	Evening	Morning	Afternoon	Evening
All Open	16	13	11	16	14	10	19	21	9	19	21	10
All Half Open	21	23	16	21	22	17	19	20	14	18	19	14
All Closed	28	29	40	26	27	38	29	29	45	29	26	45
Open and Half Open	6	6	5	8	7	6	7	7	5	6	6	3
Half Open and Closed	14	14	15	14	14	15	13	12	14	14	13	14
Open and Closed	5	6	5	6	6	5	5	5	4	5	5	5
Open, Half Open, and Closed	10	10	8	10	9	8	8	8	8	9	9	9
Total Households	100	100	100	100	100	100	100	100	100	100	100	100

Table 66: Covering Position by Proportion of Households: Southern Zone

Covering Position	Summer Weekday (%)			Summer Weekend (%)			Winter Weekday (%)			Winter Weekend (%)		
	Morning	Afternoon	Evening	Morning	Afternoon	Evening	Morning	Afternoon	Evening	Morning	Afternoon	Evening
All Open	14	11	6	13	11	6	17	18	9	17	17	9
All Half Open	21	18	14	16	16	13	17	18	12	16	17	10
All Closed	32	36	50	33	35	47	30	27	49	29	27	46
Open and Half Open	7	5	3	6	6	3	6	7	3	7	8	5
Half Open and Closed	13	16	15	16	17	16	15	14	15	16	16	17
Open and Closed	7	7	6	7	8	8	7	8	7	8	8	7
Open, Half Open, and Closed	6	6	5	8	8	7	7	7	6	8	7	6
Total Households	100	100	100	100	100	100	100	100	100	100	100	100

IMPACT ON ENERGY USE

As noted throughout this section, a minimum of 75% of coverings remain in the same position each day and at least 56% of households do not alter any of their coverings on a daily basis. As a result, the impact of window coverings on energy performance will be much easier to model and estimate and savings will not be dependent on changing operating behaviors.

AIR CONDITIONING AND THERMOSTAT USE

Respondents were asked to provide information about how they operate central or room air conditioning and thermostats during particular seasons and times of day. As expected, the Southern Climate zone has the highest share of homes with air conditioning, nearly 97%. The Northern and Mid-Tier climate zones have almost identical proportions of homes with air conditioning, about 84%.

Table 67: Homes with Air Conditioning

Air Conditioning in Home	Climate Zones			
	Northern (%)	Mid Tier (%)	Southern (%)	All (%)
Number of Households	690	702	708	2100
Have Air Conditioning	84.6	83.9	96.6	88.4
Do Not Have Air Conditioning	15.4	16.1	3.4	11.6

Table 68: Air Conditioning Use in Hot Weather

Use of Air Conditioning in Hot Weather	Climate Zone		
	Northern (%)	Mid Tier (%)	Southern (%)
Number of Households	584	589	685
Once I turn it/them on, they stay on all the time until the weather cools down	24.1	41.8	54.6
Leave the air conditioning on most of the time	36.0	36.2	34.6
Only use air conditioning at night	4.6	3.6	3.8
Only use air conditioning during the day	6.5	3.9	2.3
Only use it once in a while when it gets really hot	28.8	14.6	4.7
Total	100.0	100.0	100.0

There is some variation in air conditioning use in hot weather across the climate zones. As expected, more than half of Southern zone respondents report that they have their air conditioning on all the time, while in the North, where the temperature is not as hot on average, only one-quarter of respondents report this behavior.

A much higher proportion of Northern Zone respondents (nearly 30%) selected the option, “Only use it once in a while when it gets really hot”.

Table 69: Air Conditioning Use at Night in Hot Weather

Use of Air Conditioning in Hot Weather at Night	Climate Zone		
	Northern (%)	Mid Tier (%)	Southern (%)
Number of Households	584	589	685
At a cooler temperature than during the day	25.7	26.1	38.1
At a warmer temperature than during the day	16.3	18.7	13.0
No change, keep the house at the same temperature all the time	58.0	55.2	48.9
Total	100.0	100.0	100.0

Across all climate zones, about half of respondents keep their home at the same temperature all day, although the Southern zone has a higher proportion of respondents who keep their homes cooler at night. This suggests that AC energy use may increase at night in the South; the overall impact on the grid is not likely to be significant, as this use likely occurs during non-peak hours.

Table 70: Thermostat Use at Night during the Winter

Thermostat Use at Night During the Winter	Climate Zone		
	Northern (%)	Mid Tier (%)	Southern (%)
At a cooler temperature than during the day	43.0	29.8	29.9
At a warmer temperature than during the day	12.9	20.1	23.3
No change, keep the house at the same temperature all the time	44.1	50.1	46.8
Total	100.0	100.0	100.0

The Mid-Tier and Southern climate zones have nearly identical distributions for thermostat use during the winter at night. A smaller number of Northern households indicate that they keep their home warmer during the day than in the other two zones. It is possible that Northern households set their thermostats back at night because they may have their homes set at a warmer temperature than other regions of the country during the day.

MANUFACTURER DATA COLLECTION

SHIPMENTS OVERVIEW

Blinds, metal and vinyl horizontal blinds in particular, dominate annual shipments of residential window coverings, with an estimated 104-116 million units shipped annually. However, these products are the only class for which available U.S. Census Bureau data are sufficient to allow for a relatively precise estimate. For other product types, only calculations of low, medium, and high estimates of market share and shipments are possible. Among WCMA member shipments, cellular shades were shipped most frequently to the Northern climate zone and faux-wood blinds were shipped most frequently to the Southern climate zone, which is consistent with the differences in the installed base described in Section 3.

ANNUAL SHIPMENTS

Shipment estimates are based on three datasets: U.S. Census Bureau reports of vinyl blind imports, shipment data supplied by WCMA members, and the installed base of coverings from the survey. These data are sufficient to enable reasonably precise estimates of shipments for blinds and WCMA member shipments, but not of the total number of window covering shipments in the United States or for other product categories, because data on imports of other product types and shipments of non-WCMA members were not available. However, D&R was able to combine available shipment data, data collected on the installed base, and estimates of product lifetimes to develop low, medium, and high estimates of the total number of products shipped annually and in each product category. The methodology for these estimates is described briefly below and is explained in more detail in the Appendix.

D&R used information on the average number of window coverings per household to estimate the total installed base of window coverings in the United States and used the data on each product's proportion of the installed base to estimate the total installed base of each product category. D&R then developed three shipment scenarios by estimating short, medium, and long lifetimes for each of the product categories (see Table 71) with the exception of vinyl blinds, because official data were available for this product category. The total installed base for each product category was divided by the product's lifetime to determine the annual shipments for that product category. D&R also compared the shipment estimates to WCMA shipment data to determine if the estimates appeared to be in the right order of magnitude.

D&R estimates that between 154 million and 235 million window coverings are shipped in the United States each year, with the majority or plurality of those shipments (85 million units) being vinyl or metal horizontal blinds. The medium shipments estimate is 175 million units. As a simplifying assumption, the estimates assume that the relative proportion of each window covering type is static over time, which the data suggest is reasonable for horizontal vinyl blinds. As Figure 17 shows, the estimates are quite sensitive to changes in product lifetime. WCMA shipment data established a ceiling for each product lifetime estimate such that the lifetime value cannot result in calculating a shipment volume that is lower than the aggregate WCMA shipments for that product category. To generate more precise annual shipment estimates, additional data on non-WCMA shipments or product lifetime will be needed.

Figure 17: Estimated Annual U.S. Shipments

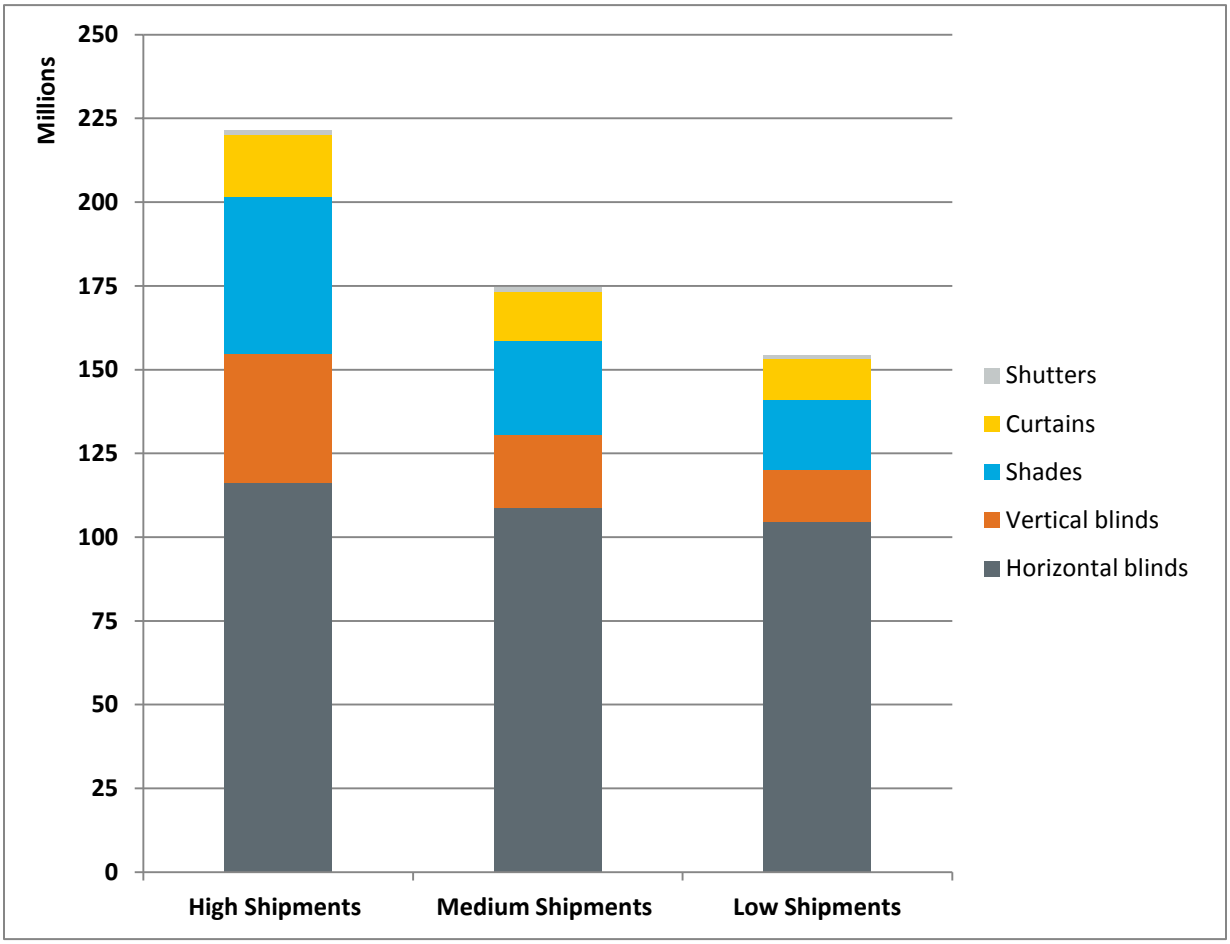
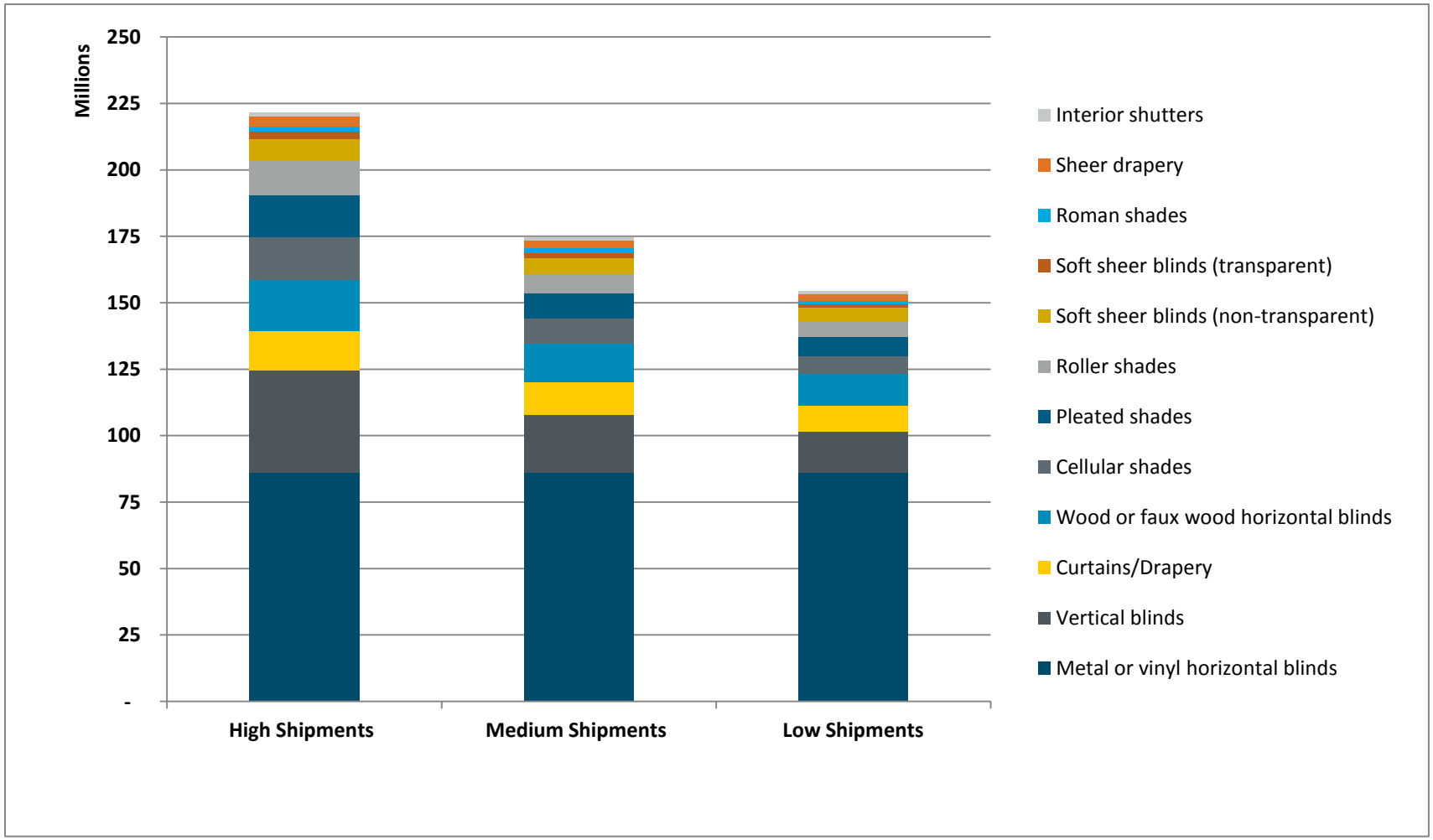


Table 71: Average Estimated Lifetime by Product Lifetime

Product Type	Average Estimated Lifetime (years)		
	High Shipments	Medium Shipments	Low Shipments
Metal or vinyl horizontal blinds	4.25	4.25	4.25
Vertical blinds	4	7	10
Curtains/Drapery	12	15	18
Wood or faux wood horizontal blinds	10	13	16
Cellular shades	4	7	10
Pleated shades	4	7	8.5
Roller shades	4	7	9
Soft sheer blinds (non-transparent)	5	7	8
Soft sheer blinds (transparent)	5	7	9.5
Roman Shades	10	13	16
Sheer Drapery	12	15	18
Interior Shutters	20	23	26

Figure 18: Estimated Annual U.S. Shipments by Product Category



WCMA SHIPMENTS

Figures 19 and 20 show shipments by WCMA members. Shipments by WCMA members were not as heavily dominated by horizontal blinds as the national estimates. Among WCMA members, shades represented 36% of shipments in 2011, while in the scenarios above the market share of shades in the entire market does not exceed 21%. Unlike the national estimates, cellular shades are the most commonly shipped product among WCMA members, followed by metal horizontal blinds.

Figure 19: Annual Interior Product Shipments by WCMA Members

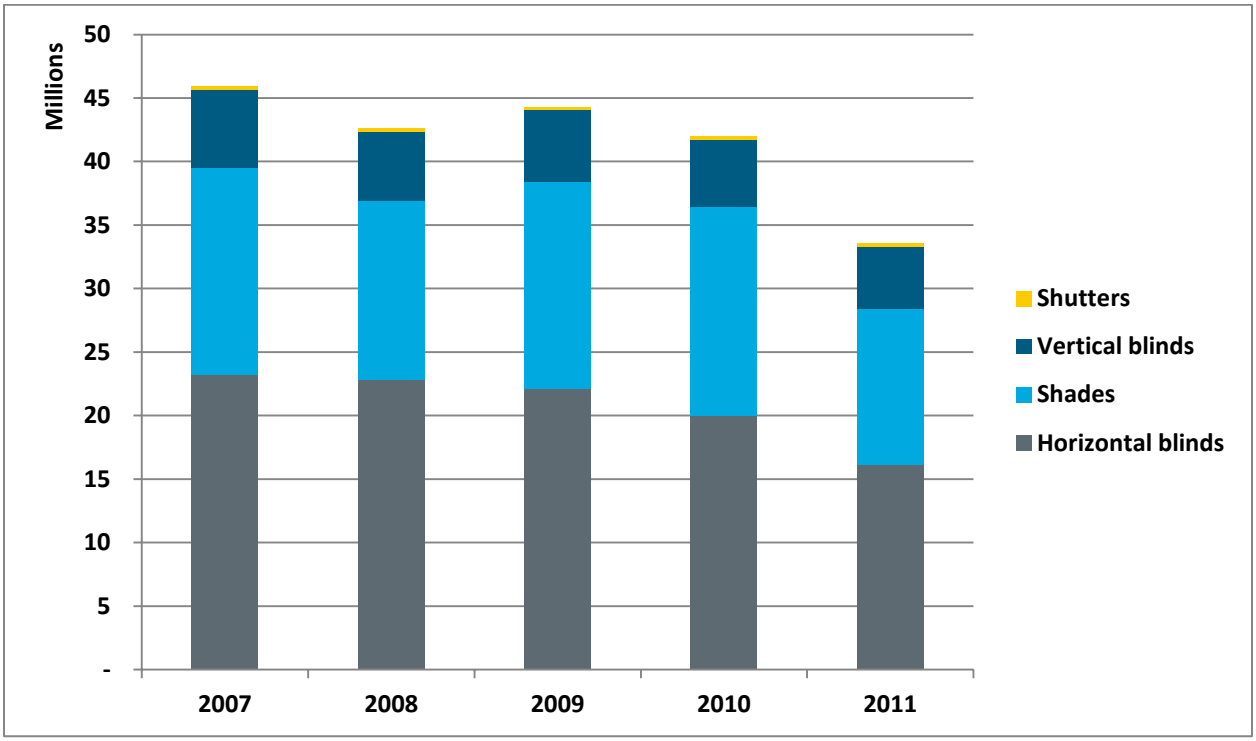
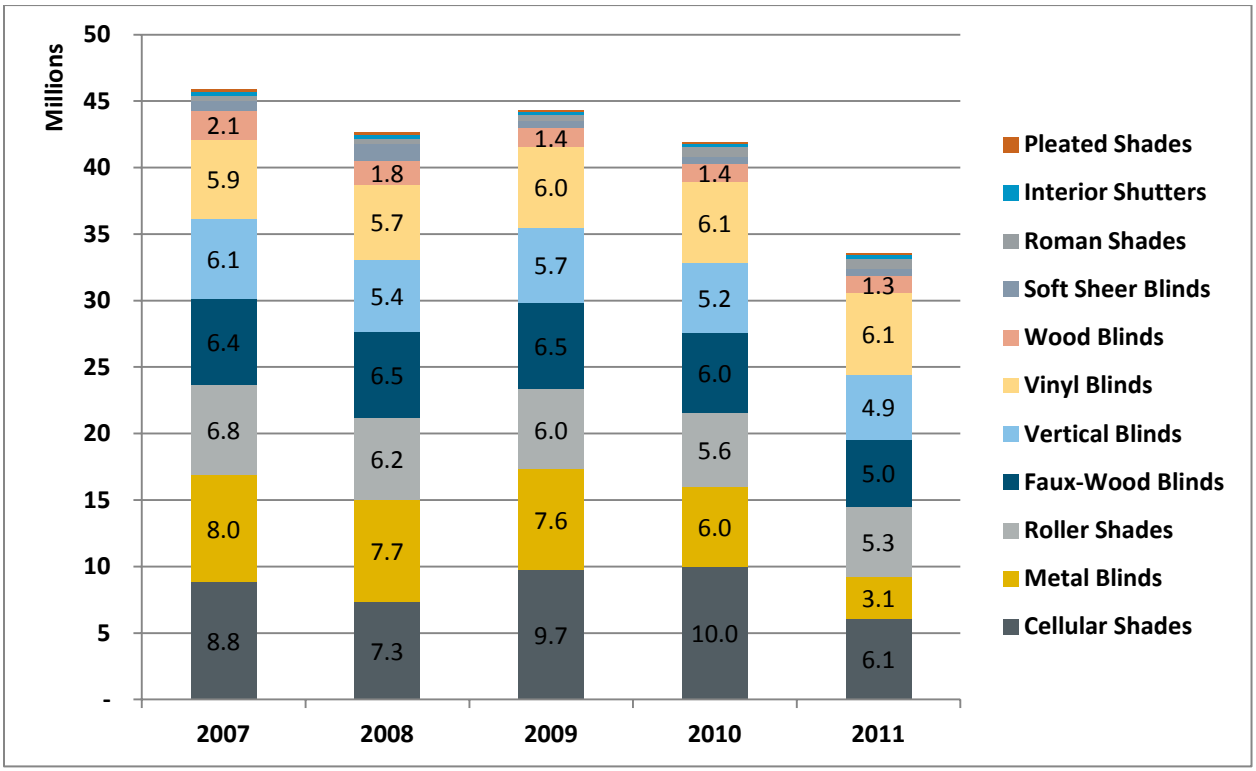


Figure 20: Annual WCMA Member Shipments by Interior Product Type



When looking at WCMA member shipments by climate zone, it is clear that shipments are roughly proportional to the population (Figure 21). Across climate zones, the proportion of products is fairly consistent, with a few exceptions. Faux-wood blinds are more popular in the South Central and Southern climate zones, a trend that was present in the installed base data. Cellular shades represent a higher proportion of products sold in the Northern climate zone, a development also seen in the survey dataset.

Figure 21: WCMA Member Interior Product Shipments by Climate Zone

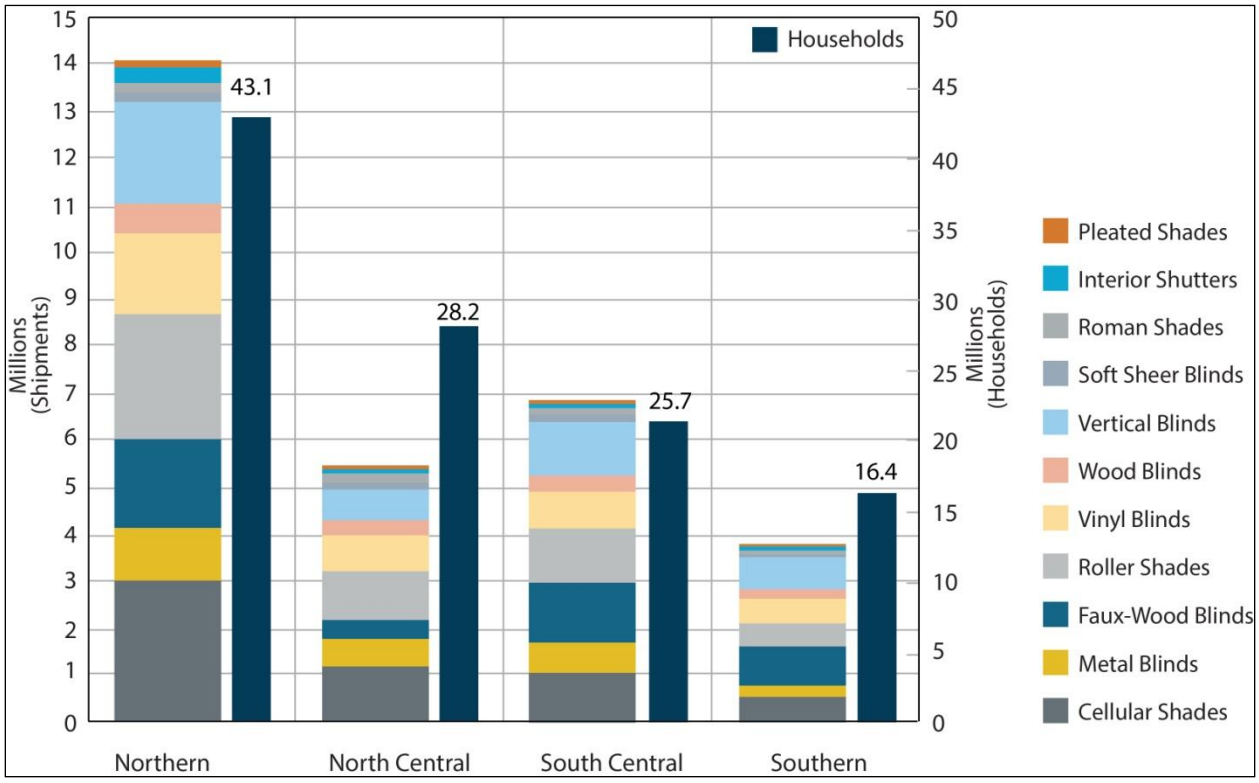


Figure 22: WCMA Member Shipments by Interior Product Type by Climate Zone

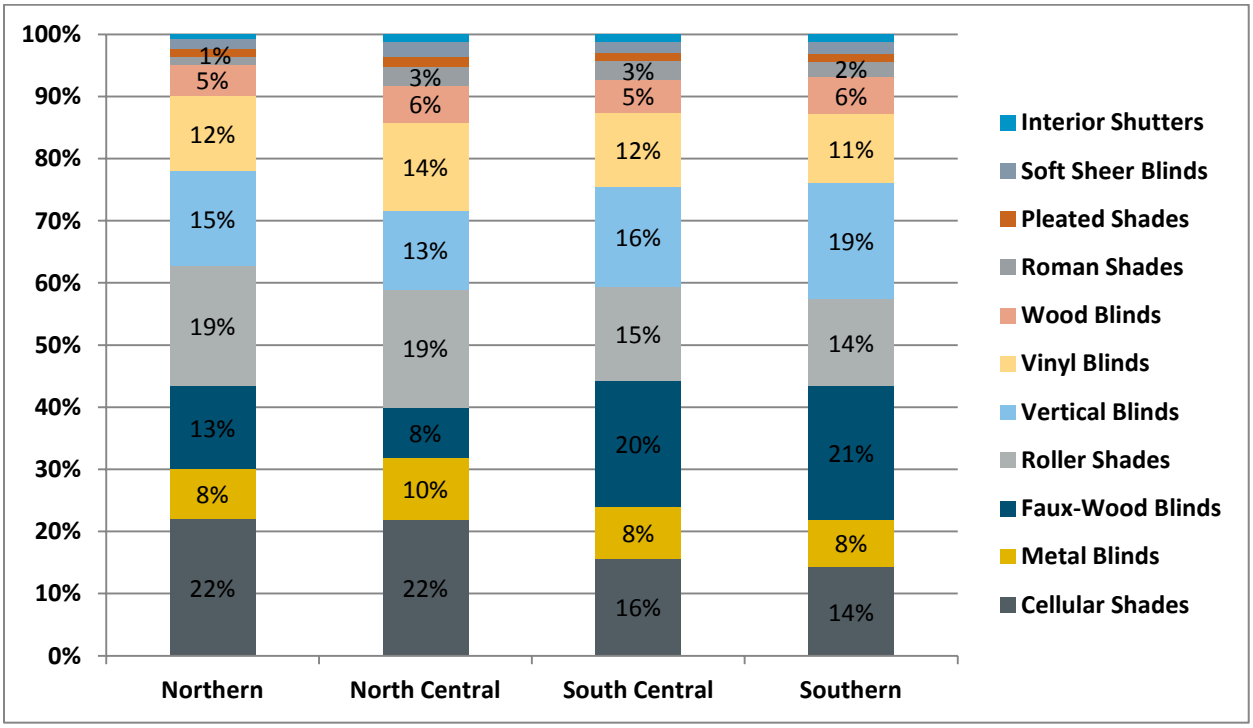
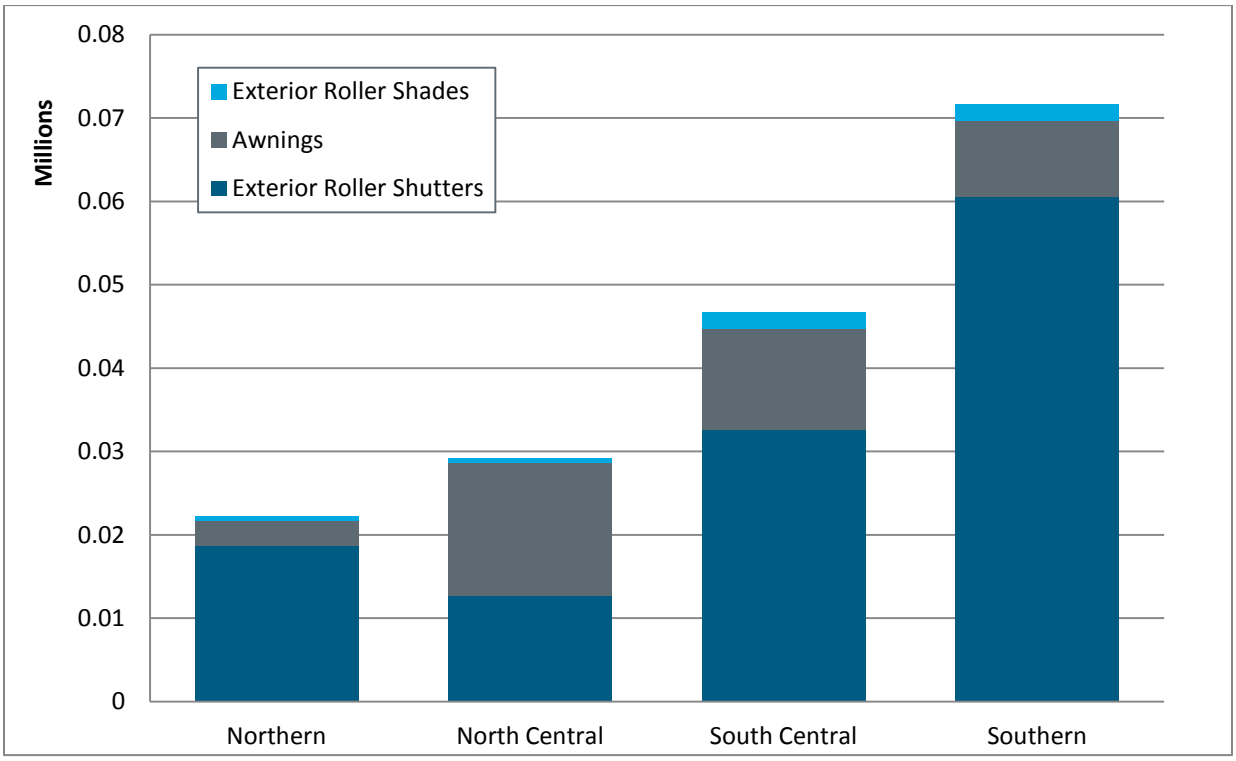


Figure 23: WCMA Member Shipments by Exterior Product Type by Climate Zone



Exterior products represent a very small proportion of the window covering market. The exterior product market is also highly segmented making it difficult to accurately capture product shipments. Figure 23 represents shipment information provided by WCMA members, although similar to interior products the total number of shipments is known to be larger than what is represented here, but at this time we do not know by how much.

PRICING

Pricing data collected from WCMA members and major retailers show that interior products are available at low, medium, and high price points.

INTERIOR PRODUCT PRICING

Table 72 shows the average opening, medium and high price points of all interior window covering product types.

Table 72: Interior Product Average Price Points

Product Category	Low/Opening Price Point ($)	Medium Price Point ($)	High Price Point ($)
Vinyl Blinds	11	29	41
Metal Blinds	42	53	97
Faux-Wood Blinds	82	95	163
Vertical Blinds	69	120	360
Wood Blinds	66	99	206
Soft Sheer Blinds	448	562	700
Cellular Shades	54	100	167
Roller Shades	49	97	142
Roman Shades	201	233	434
Pleated Shades	47	92	116
Interior Shutters	184	339	426

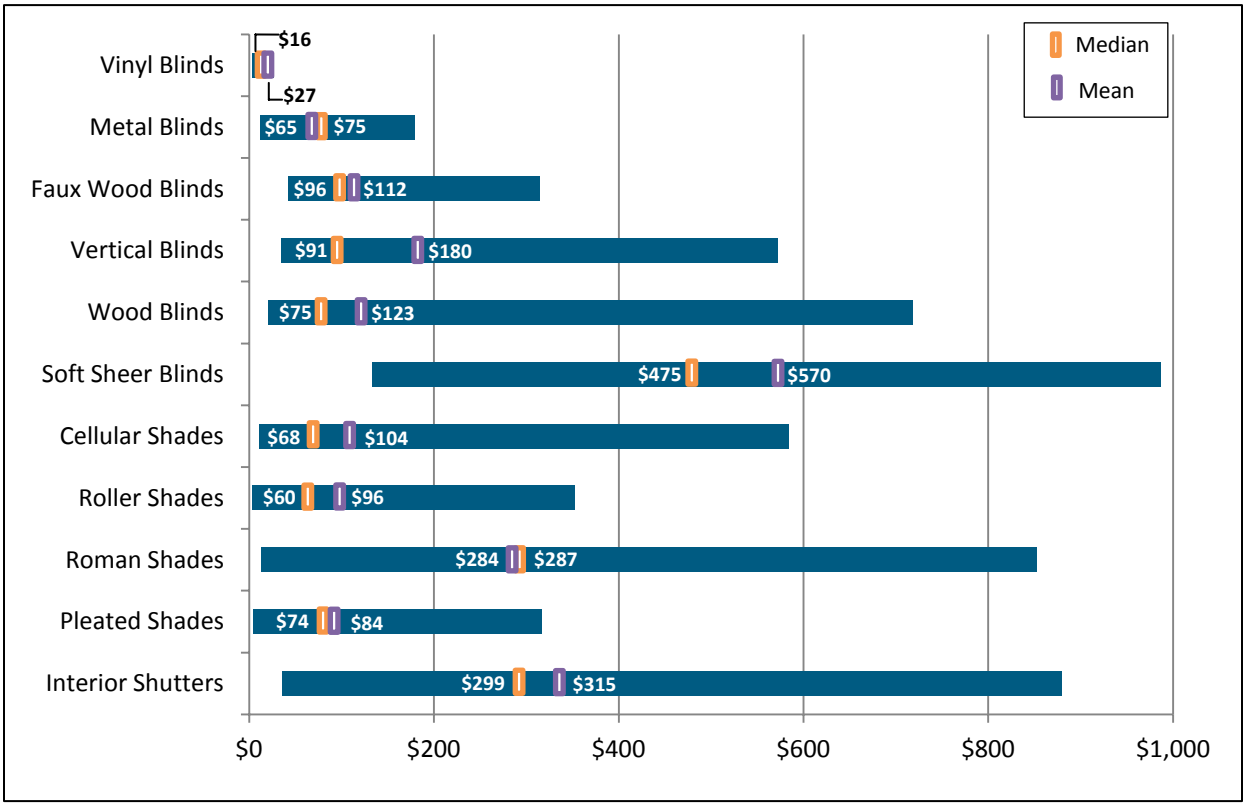
Vinyl blinds and metal blinds, which have the lowest average opening, medium and high price points across all interior products, together represent 26% of all installed coverings. Blinds typically have lower price points than shades, but if roman shades and soft sheer blinds are excluded, the average prices of blinds and shades are nearly equal. Data collected from the installed base and behavioral research survey show that products with lower price points have greater shares of the installed base of window coverings and products with higher price points have smaller shares of the installed base.

On average, soft sheer blinds and interior shutters are among the most expensive window covering categories. Interior shutters are very labor intensive and soft sheer blinds are patent protected in both the design and manufacturing process.[10]

Interior shutters and soft sheer blinds are typically custom-made products and are generally not sold in big box chain stores, which also helps explain their higher price points. Together they represent just 6% of the installed base of window coverings.

Figure 24 shows the total range of prices for interior products, as well as the mean and median price point for each product category.

Figure 24: Interior Product Pricing



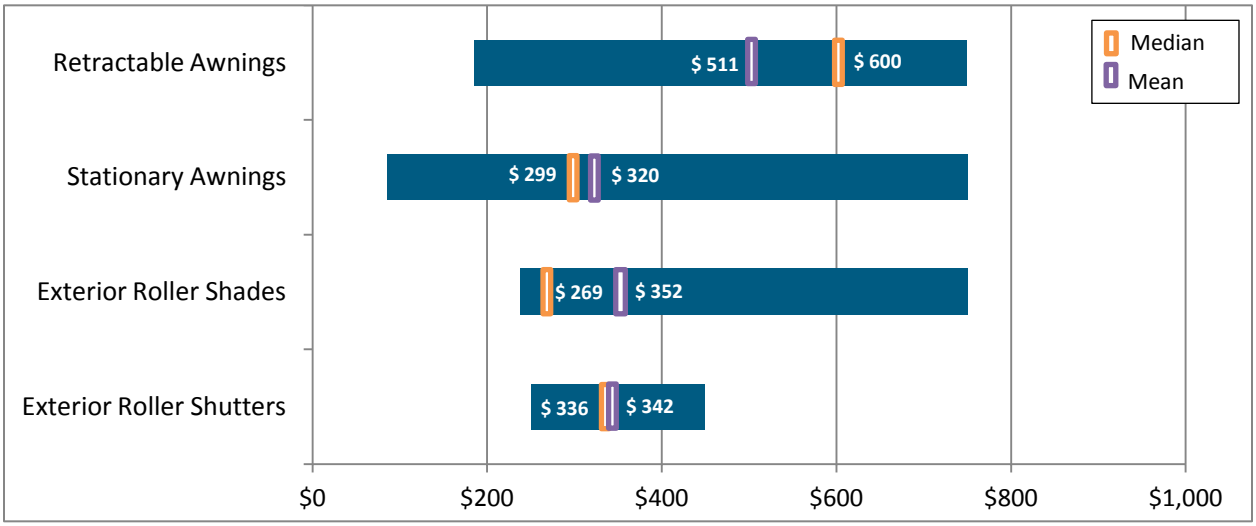
EXTERIOR PRODUCT PRICES

Figure 25 shows the range of prices for all interior products, as well as the mean and median prices for each product type.

One manufacturer estimates that when homeowners purchase exterior roller shutters, approximately 50% will purchase shutters for all of their windows at once, while the other half will purchase two or three shutters, often for bedrooms or south-facing windows, and then will gradually add shutters to all of their windows.[11]

Manufacturers estimate that 60% of residential roller shutters are motorized, which adds, on average, an additional cost of $250 per shutter.[12]

Figure 25: Exterior Product Pricing



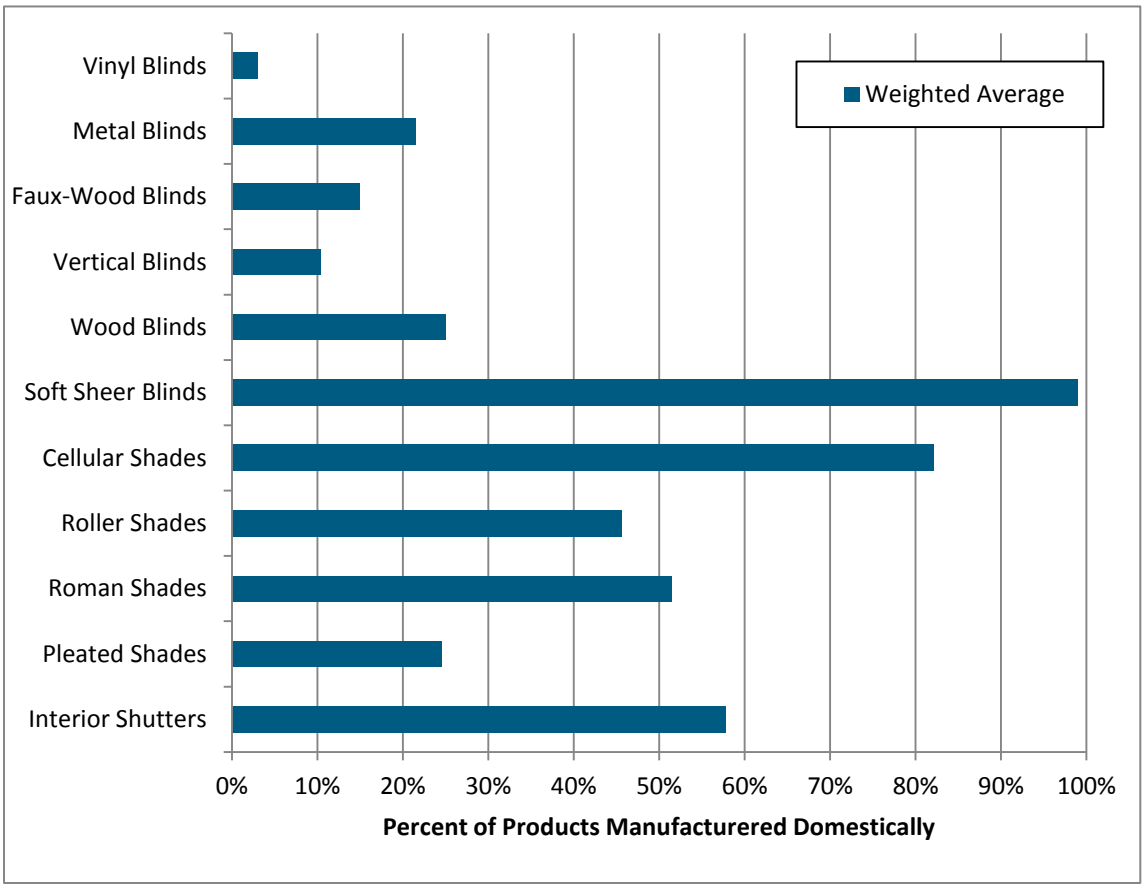
DOMESTIC MANUFACTURING

Manufacturers were asked to provide information on the share of their products manufactured in the United States. This has given insight into product pricing and the potential growth of U.S. jobs in this sector. Data collected from WCMA members show clear differences in the share of domestically manufactured products across interior product types. In general, blind products are manufactured outside the United States at higher rates than shades. Nearly all exterior products sold by WCMA members are manufactured domestically.

Products manufactured at higher rates outside the U.S. have lower average price points and make up a greater proportion of the installed base. Vinyl blinds, 97% of which are manufactured outside the United States, represent 26% of the installed base when coupled with metal blinds, and have the lowest average price points among all interior products. For interior blind products, no more than 25% of products are manufactured domestically. Conversely, at least 25% of shades are manufactured domestically. Cellular shades, which represent 5% of the installed base of window coverings, have the second highest share of products manufactured in the United States, with an average of 80%.

Nearly all exterior window coverings are manufactured domestically. Exterior roller shutters and awnings are manufactured exclusively in the United States, as are 95% of exterior roller shades. These product types are less common, representing less than 1% of the installed base.

Figure 26: Interior Products Manufactured Domestically

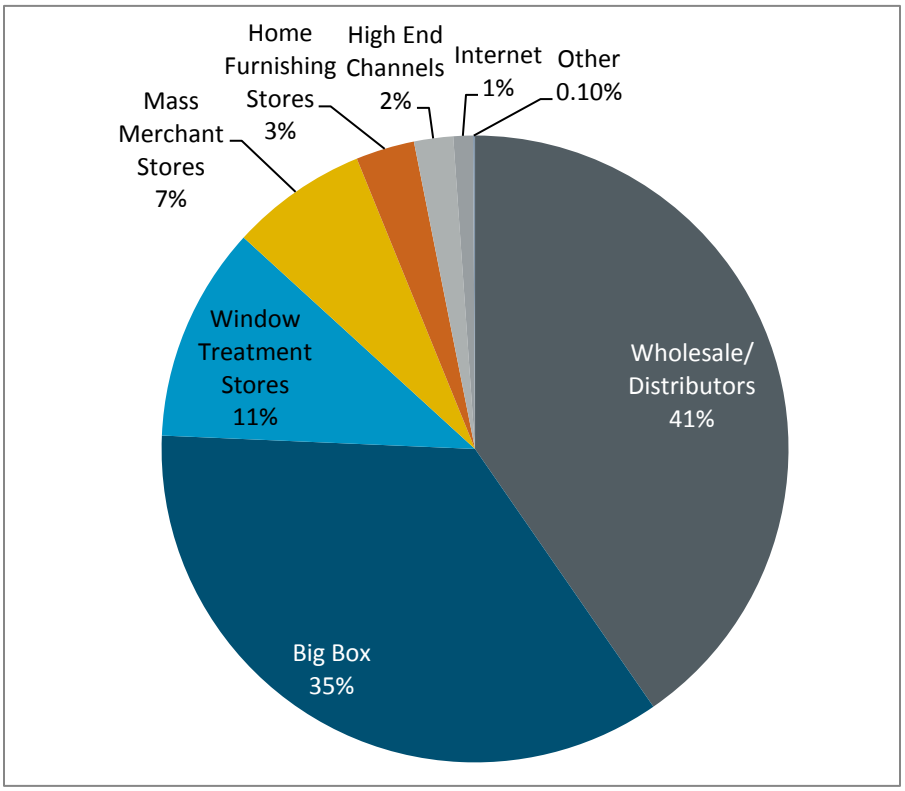


RETAIL CHANNELS

Approximately 60% of coverings are distributed through retail channels, while the remaining 40% are sold through wholesale or distributors. Big box stores were the second largest channel, making up 35% of shipments, while window treatment, mass merchant, and home furnishing stores received 21% of all shipments.

Big box chains, which tend to carry stock and lower priced products, are likely to be the primary retail location for most types of interior blinds, including metal and vinyl horizontal blinds, wood and faux-wood horizontal blinds, and vertical blinds, which collectively represent 54% of the installed base.

Figure 27: Retail Channels



There is a growing trend in the industry to sell directly to customers.[13] Some manufactures have shifted to selling only to certified dealers and product installers.[14] Consumer education has also affected the window coverings market. Manufacturers see consumers becoming more educated about features and options for window treatments through the Internet and social media, leading some manufacturers to sell more products online.[15]

It is important to note that retail channels differ greatly within the industry. Some manufacturers view selling directly to customers as a more stable sales channel, as retail chains are subject to changes that can affect which product lines are sold in stores.[16] Other manufacturers have consistently sold the majority of their products through big box stores, mass merchant, and home furnishing stores, because this can provide an opportunity for high sales volumes. Sales channels also differ by product type. Draperies, roman shades, and interior shutters tend to sell through specialized stores and interior designer channels, whereas stock and cut-to-fit products like vinyl blinds and vertical blinds are more popular in larger retail chains.[17]

APPENDICES

APPENDIX A: ADDITIONAL HOUSING AND DEMOGRAPHIC CHARACTERISTICS

This section describes demographic and housing characteristics not covered in Methodology section.

DEMOGRAPHICS

Because respondents were screened to meet gender and age quotas, the distributions for age and gender closely mirror Census data on those two variables. However, when examining the distribution of age by gender, males 55 and older and females age 35 to 54 are overrepresented (5 percentage point difference and 7-percentage point difference, respectively); females 55 and older and males 18 to 34 are slightly underrepresented (10-percentage point difference and 6-percentage point difference, respectively). We do not believe this over- and underrepresentation affects the survey results in any significant way, as we looked at the installed base of products, which people of either gender could report, and the overall behavior of households — not individuals — with regard to window coverings.

Table 73: Gender

Gender	Survey (%)	Census[18] (%)
Male	49	49
Female	51	51
Total	100	100

Table 74: Age

Age	Survey Total	
	Survey (%)	Census[19] (%)
18-34	29	31
35-54	40	37
55 or Older	31	33
Total	100	100

Table 75: Respondent Age by Gender

Age	Survey (%)		Census[20] (%)	
	Male	Female	Male	Female
18-34	26	33	32	29
35-54	37	43	37	36
55 or Older	37	25	31	35
Total	100	100	100	100

Home ownership was a screening question, so the survey results match the national population exactly.

Table 76: Home Ownership

Ownership Status of Home	Percent	
	Survey	Census[21]
Own	65	65
Rent	35	35

Overall, survey data matches Census data on household size, though 2-person households are slightly overrepresented and larger households (5 or more persons) are slightly underrepresented. No correlation emerged between household size and window covering operation, making the slight deviations even less of a concern.

Table 77: Household Size

Household Size	Survey (%)	Census[22] (%)
1-person household	24.5	26.7
2-person household	37.3	32.8
3-person household	17.9	16.1
4-person household	13.1	13.4
5-person household	4.8	6.5
6-person household	1.5	2.6
7-or-more-person household	.8	1.9
Average household size	2.45	2.58

Although the survey did not screen for marital status, the distribution of respondents' marital status matches Census data almost exactly, deviating by only 1-2 percentage points in any category.

Table 78: Marital Status

Marital Status	Survey (%)	Census[23] (%)
Married	52	51
Never Married	31	31
Divorced	12	10
Separated	1	2
Widowed	4	6
Rather Not Answer	0.4	N/A
Total	100	100

EMPLOYMENT STATUS, EDUCATION, INCOME, AND RACE

The employment status of survey respondents was compared to data from the Bureau of Labor Statistics (BLS) for August 2012. The share of people unemployed was 6.7 percentage points more than the figure reported by BLS; note that 2% of survey respondents declined to answer.[24] The higher unemployment rate is likely due to the fact that unemployed persons may have more time than employed persons and may be looking for alternative ways of making money (like participating in online survey panels).

Table 79: Employment Status of Household Members

Employment Status	Frequency	Percent
Work full-time (more than 30 hours per week)	1321	45
Work part-time (30 hours or less per week)	324	11
Homemaker	211	7
Student	299	10
Retired	448	15
Unemployed	286	10
Rather Not Answer	67	2
Total	2956	100

Table 80: Employment Status Comparison to BLS Data

Employment Status	Number of People (Survey)	Survey (%)	BLS August 2012[25] (%)	Percentage Point Difference
In Labor Force	1,931	66.8	63.5	3.3
Employed	1,645	56.9	58	-1.5
Unemployed	286	14	8	6.7
Not in Labor Force	958	33.2	36.5	-3.4
Rather Not Answer	67	2	-	2

*Household members identified as Homemaker, Student, and Retired included in the "Not in the Labor Force" category, because it is unlikely that they are actively seeking work.

Educational attainment is one dimension where the survey population diverges from the U.S. population as a whole. The survey sample contains an overrepresentation of people with college and graduate degrees and an underrepresentation of people with high school diplomas or less education. These deviations are unlikely to affect survey results, as operating window coverings is not a skill that requires education.

Table 81: Educational Attainment for Household Members Age 25 and Older

Educational Attainment	Survey (%)	Census[26] (%)
Less Than High School	1	6%
Some High School	2	8%
High School Graduate/GED	19	29%
Some College	21	21%
2-Year College (Associate's Degree)	10	8%
4-Year College (Bachelor's Degree)	29	18
Post-Graduate	16	10
Rather Not Answer	2	0
Total	100	100

Table 82: Educational Attainment for Household Members Ages 18-24

Educational Attainment	Survey (%)	Census[27] (%)
Less than High School Graduate	4	17
High School Graduate	27	29
Some College or Associate's Degree	47	45
Bachelor's Degree or Higher	20	9
Rather Not Answer	3	0
Total	100	100

In terms of race/ethnicity, whites are overrepresented and African-Americans/Black and Hispanics are underrepresented in the survey in comparison to the national population. Some of these differences may be because Blacks and Hispanics report lower rates of Internet access than white, non-Hispanics (56.1% at home for whites, compared to 41.7% for blacks and 35.4% for Hispanics).[28] However, race and ethnicity are not expected to drive differences in preferences for window, window coverings, or covering operation.

Table 83: Race/Ethnicity

Ethnicity	Percent	
	Survey	Census[29]
African-American/Black	6.7	13.1
American Indian	1.1	1.2
Asian/Native Hawaiian or Pacific Islander	4.1	5.2
Mixed Ethnic	1.7	2.3
Hispanic	6.5	16.7
White, non-Hispanic	76.6	63.4

The rural population is somewhat underrepresented, though since the population area terms are not formally defined in the survey and are not congruent with Census terms, it difficult to assess the extent to which this impacts the survey results, particularly as the survey respondents are concentrated in 13 metro regions.

Table 84: Urban/Rural Areas

Population Area	Survey (%)
City	30
Town	10
Suburbs	50
Rural	11

Table 85: Census Comparison for Urban/Rural Areas

Population Area	Survey (%)	Census[30] (%)
Urban	89	79
Inside urbanized areas	79	69
Inside urban clusters	10	10
Rural	11	21

***** City and Suburbs are grouped into urbanized areas and Town is identified as an urban cluster.

HOUSE CHARACTERISTICS

The distribution of the year respondents moved into their homes in the survey closely matches the RECS 2009 distribution, particularly for renters. For homeowners, slightly more people in the survey moved into their homes since 2000 compared to the nation as a whole. Some of this overrepresentation may be due to the fact that the RECS data stop at 2009, while the survey records information for homes constructed through 2012.

Table 86: Year Respondent Moved into Home

Year Householder Moved Into Unit	Own (%)		Rent (%)	
	Survey	RECS	Survey	RECS
1969 or earlier	2	5	0	1
1970-1979	4	7	0	1
1980-1989	12	11	1	2
1990-1999	20	25	5	7
2000-present	61	53	92	89
Don't Know	0	0	1	0
Total	100	100	100	100

Overall, 88% of homes surveyed have air conditioning, which tracks closely to Census data on air conditioning, though more residents report having central air conditioning and fewer reported having room air conditioners in the survey than in the Census.

Table 87: Households with Air Conditioning

Type of AC	Survey (%)	Census (%)[31]
Air Conditioning	88	92
Central Air Conditioning	82	70
Room Air Conditioners	15	22
Both	3	N/A

Table 88: Households with Air Conditioning by Climate Zone

Air Conditioning In Home	Climate Zones			
	Northern (%)	Mid Tier (%)	Southern (%)	All (%)
Count	690	702	709	2101
Yes	84.6	83.9	96.6	88.4

APPENDIX B: METHOD FOR ESTIMATING U.S. ANNUAL SHIPMENTS

The following steps were used to estimate window coverings shipments in the U.S.:

1. Calculate total installed base of window coverings.
    a. Multiply average number of coverings per house by total number of houses in the U.S.[32]
    b. Multiply the average number of coverings per apartment by total number of apartment in the U.S.[33]
    c. Add total number of window coverings by houses and apartments together.
2. Calculate the installed base of vinyl blinds.
    a. Use U.S. Department of Commerce data for vinyl blind.[34]
    b. Assume that 65% of shipments go to the residential market.[35]
3. Subtract the installed base of vinyl blinds from the total installed base of coverings.
4. Multiply the share of each product category by the remaining installed base of coverings other than horizontal vinyl blinds to calculate the installed base for each product category.
    a. Share of each product category:

Product Type	Percent
Wood or faux wood horizontal blinds	16
Curtains/drapery	15
Vertical blinds	13
Cellular shades	5
Pleated shades	5
Roller shades	4
Sheer drapery	4
Soft sheer blinds	4
Interior shutters	2
Roman shades	2
Soft sheer blinds	1

5. Estimate lifetime for each product category:

Product Type	Average Estimated Lifetime (years)		
	High Shipments	Medium Shipments	Low Shipments
Metal or vinyl horizontal blinds	4.25	4.25	4.25
Vertical blinds	4	7	10
Curtains/Drapery	12	15	18
Wood or faux wood horizontal blinds	10	13	16
Cellular shades	4	7	10
Pleated shades	4	7	8.5
Roller shades	4	7	9
Soft sheer blinds (non-transparent)	5	7	8
Soft sheer blinds (transparent)	5	7	9.5
Roman Shades	10	13	16
Sheer Drapery	12	15	18
Interior Shutters	20	23	26

Products that were made of more durable materials or that did not have cords or other mechanisms that could fail, such as shutters or drapes were estimated to have longer lifetimes. A number of manufacturers estimated that the average product lifetime was seven years and that products were commonly replaced not when products broke, but when people redecorated or moved into a new residence.[36]

6. Divide the installed base for each product by the lifetime estimate for that category to determine annual shipments.

Product Type	Shipment Scenarios (millions)		
	High Shipments	Medium Shipments	Low Shipments
Metal or vinyl horizontal blinds	86.0	86.0	86.0
Vertical blinds	38.6	22.1	15.4
Curtains/Drapery	14.9	11.9	10.0
Wood or faux wood horizontal blinds	19,.1	14.6	12.0
Cellular shades	16.0	9.2	6.4
Pleated shades	15.8	9.7	7.4
Roller shades	12.8	7.3	5.7
Soft sheer blinds (non-transparent)	8.3	6.0	5.2
Soft sheer blinds (transparent)	2.8	2.0	1.5
Roman Shades	2.1	1.6	1.3
Sheer Drapery	3.6	2.9	1.4
Interior Shutters	1.4	1.2	1.1
Total	202.3	174.5	153.4

APPENDIX C: METHOD FOR CATEGORIZING SHIPMENTS BY CLIMATE ZONE

Manufacturers provided D&R with shipment data at the state level. To generate analysis consistent with the ENERGY STAR Windows, Doors, and Skylights program, D&R divided the shipments into climate zones (Northern, North Central, South Central, Southern) based on the population in each state. The ENERGY STAR Climate Zones are based on a simplified version of the International Energy Conservation Code climate zones.

Figure 28: ENERGY STAR for Windows, Doors, and Skylights Climate Zone Map[37]

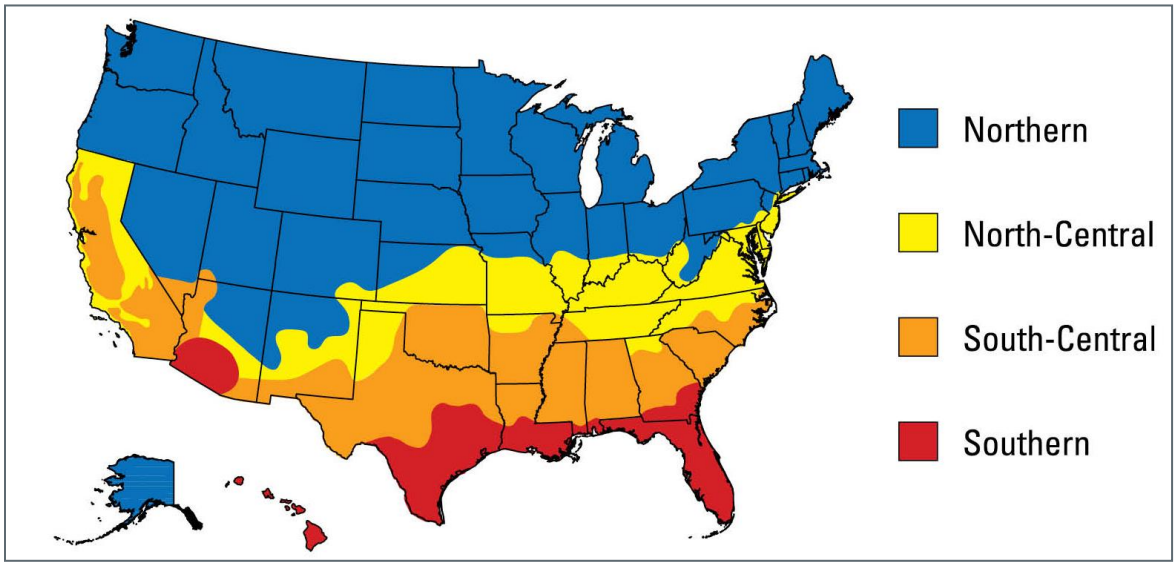
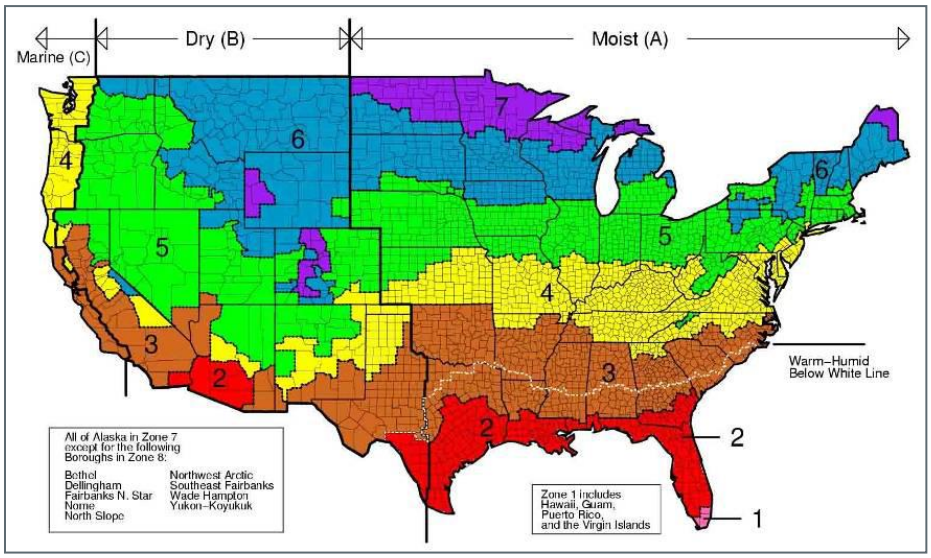


Figure 29: Climate Zones for the 2012 IECC[38]



D&R used the following methodology to classify WCMA member shipments into climate zones:

1. Collected shipments by state for each product category from WCMA members.
2. Used the ENERGY STAR Climate Zone Spreadsheet to determine which states had counties in more than one climate zone. The spreadsheet lists the climate zone associated with each county in the U.S.
3. For state with counties in more than one ENERGY STAR Climate zone:
    a. Used US Census population data to find the population of each county in each state.
    b. Aligned the population data by county with the climate zone for each county.
    c. Aggregated the population in each climate zone for each state.
    d. Determined the percentage of the population that fell within each climate zone in each state.
    e. Multiplied the shipments for each product category for each state by the percentage of the population in that state that fell within a particular climate zone.
        i. Repeated Step e. for each climate zone in that state.
4. Aggregated all shipments for each climate zone including shipments for states that fell within only one climate zone.

D&R also used U.S. Census data on foreign trade to account for imports of vinyl blinds.

APPENDIX D: WEIGHTING

Income questions are typically challenging because of social desirability bias and concerns about privacy.[39] Likely because this was an online survey using an online panel, undercoverage was an issue for households with annual incomes of less than $20,000 and $150,000 or more. Among adults with household incomes under $30,000 per year, only 62% use the Internet, compared to 83% of adults in the $30,000-$49,999 income bracket.[40]

Due to undercoverage of populations at both ends of the income spectrum, D&R wanted to see if there were differences among these populations in terms of the distribution of pane types or frame types, which would require applying sample weights to ensure the overall distributions more accurately reflected the U.S. population. D&R examined a variety of metrics, including pane type by income level, and based on those analyses determined that income was an appropriate weighting factor (see Table 89). Because the Current Population Survey, which was the data source D&R used for benchmarking to income, did not include a "Rather Not Answer" category, D&R excluded the "Rather Not Answer" category from weighting. Before D&R decided to exclude this category, it verified that the pane type distribution of the "Rather Not Answer" subset closely mirrored the overall distribution, implying that the "Rather Not Answer" category was not biased toward any particular income level.

Table 89: Pane Type Distribution by Income

Income Level	Unweighted Distribution			
	% Single Pane	% Double Pane	% Triple Pane	Total
Under $10,000	50	50	1	100
$10,000-$19,999	66	32	2	100
$20,000-$29,999	46	32	3	100
$30,000-$39,999	45	52	4	100
$40,000-$49,999	43	55	2	100
$50,000-$59,999	38	58	4	100
$60,000-$69,999	32	66	3	100
$70,000-$79,999	34	66	1	100
$80,000-$89,999	30	66	4	100
$90,000-$99,999	35	57	8	100
$100,000-$149,999	29	66	6	100
$150,000 or More	24	59	7	100
Rather Not Answer	36	60	3	100

Weighting Formula:

> *Weight factor for each income level = Average number of windows per household by income class* ((% income class Current Population Survey (CPS))-(% income class survey))*total households*

The "(% income class CPS)-(% income class survey)" segment of the formula determine how significantly each income level was over- or undersampled. The "(% income class census)-(% income class survey)*total households" factor ensured that the appropriate number of households were added to or subtracted from each income class, while the "average number of windows per household" was meant to ensure that the appropriate number of windows were added to or removed from each income class. Table 90 outlines the information and the calculations used to develop the weighting factor for each income level.

Table 90: Weighting Factor Calculations

Income Level	CPS[41] (%)	Survey (%)	%Census % Survey	Total Households	Average Number of Windows	Weighting Factor
Under $10,000	8	4	4	77.56	6.23	483.10
$10,000-$19,999	12	7	5	97.87	6.48	634.61
$20,000-$29,999	11	10	1	24.71	7.25	179.25
$30,000-$39,999	11	11	-1	-16.39	8.0	-131.14
$40,000-$49,999	9	11	-2	-33.37	8.36	-278.88
$50,000-$59,999	8	11	-3	-67.46	9.28	-625.73
$60,000-$69,999	7	8	-1	-21.88	9.16	-200.33
$70,000-$79,999	6	8	-2	-44.21	10.10	-446.35
$80,000-$89,999	5	6	-1	-27.49	10.25	-281.71
$90,000-$99,999	4	7	-3	-57.57	10.85	-624.78
$100,000-$149,999	12	12	0	-9.24	12.43	-114.78
$150,000 or More	9	5	4	77.47	13.81	1069.63
Total	100	100				

A review of the weighting factor values reveals that even with weighting, changes to the overall distributions were likely to be small because of two factors. The survey most significantly undersampled at both ends of the income spectrum, where differences in the installed base were the greatest. The survey undersampled by a combined nine percentage points compared to the CPS for households making less $20,000 annually and undersampled by four percentage points for households making $150,000 or more, which implies that the lower income groups are likely to have a larger weighting factor (see Table 90).

Because D&R looked at metrics at the window level, not just the household level, there also needed to be an adjustment for the number of windows. The highest income group had 13.81 windows per household on average, compared to 6.23 and 6.48 windows per household among the lowest two income groups, which means that the weighting factor for the highest income group needed to be larger than originally anticipated because of the higher average number of windows. When all of those factors were combined, the weighting values for the highest income group and the lowest two income groups were almost equal (1069.63 compared to 1117.71 for the lowest two levels). The evenness of the weighting factors means that the proportions at the highest and lowest levels, where differences are the greatest, are shifting almost proportionally, leading to very small changes in the overall distributions.

Tables 91 and 92 demonstrate this phenomenon. D&R calculated new weighted distributions for pane type, frame type, operator type, and window coverings and, as expected, found little to no change in the overall distributions. The distribution across income classes by pane type shifted substantially whereas the overall distribution of pane type had only a one percentage point shift from double to single pane (see Table 91).

Table 91: Unweighted and Weighted Pane Type Overall Distribution

Pane Type	Unweighted Distribution	Weighted Distribution
Single Pane (%)	37	38
Double Pane (%)	59	58
Triple Pane (%)	4	4

Table 92: Unweighted and Weighted Pane Type Distribution by Income

Income Level	Unweighted Distribution			Weighted Distribution		
	% Single Pane	% Double Pane	% Triple Pane	% Single Pane	% Double Pane	% Triple Pane
Under $10,000	3	2	0	7	4	1
$10,000-$19,999	8	2	3	14	5	5
$20,000-$29,999	10	7	6	11	8	6
$30,000-$39,999	12	8	9	11	8	9
$40,000-$49,999	11	9	4	9	8	4
$50,000-$59,999	11	11	12	8	8	8
$60,000-$69,999	7	9	6	6	8	5
$70,000-$79,999	8	10	1	6	7	1
$80,000-$89,999	5	7	7	4	6	6
$90,000-$99,999	8	8	17	4	5	10
$100,000-$149,999	13	18	23	12	18	23
$150,000 or More	5	9	13	9	16	23
Total	100	100	100	100	100	100

Similarly, the overall frame type distribution shifted very slightly (less than one percentage point across categories), while the distribution across income levels shifted more considerably (see Table 93 and Table 94). Based on these results, D&R concluded that weighting was unlikely to change distributions at the window level in meaningful ways.

Table 93: Unweighted and Weighted Frame Type Overall Distribution

Pane Type	Unweighted Distribution	Weighted Distribution
Wood (%)	33.1	33.1
Vinyl (%)	33.2	32.6
Metal (%)	33.2	33.7
Other (%)	0.5	0.6

Table 94: Unweighted and Weighted Frame Type Distribution by Income

Income Level	Unweighted Distribution				Weighted Distribution			
	% Wood	% Vinyl	% Metal	% Other	% Wood	% Vinyl	% Metal	% Other
Under $10,000	2	2	3	2	5	3	6	4
$10,000-$19,999	4	3	7	11	6	5	12	18
$20,000-$29,999	7	5	11	4	7	6	12	4
$30,000-$39,999	11	8	9	6	10	7	8	5
$40,000-$49,999	7	9	12	28	5	7	9	22
$50,000-$59,999	8	14	11	5	5	9	7	3
$60,000-$69,999	8	8	7	5	7	6	6	4
$70,000-$79,999	11	8	8	1	7	6	5	1
$80,000-$89,999	7	7	6	2	5	5	4	1
$90,000-$99,999	9	9	7	2	5	5	4	1
$100,000-$149,999	18	17	14	27	16	16	12	24
$150,000 or More	8	10	4	6	14	16	7	10
Total	100	100	100	100	100	100	100	100

APPENDIX E: INTERNAL CONSISTENCY OF THE SAMPLE

The sample for this survey was not drawn randomly; it was based on pre-screened panels of participants. Because the sample was not random, D&R wanted to evaluate the internal consistency of the sample results relating to behavior. D&R assessed the similarity in window covering operation by comparing window covering positions among the city subsamples that make up the total survey population.

Window covering position among cities in the same climate zone should be more similar to one another than to position in cities in different climate zones. Specifically, D&R examined the proportion of cases in which the position of window coverings at a given time of day, time of the week, and season scored as significantly different from a statistical standpoint in each pair-wise comparison of cities.

If the dataset is internally consistent, there would be fewer significant differences among cities in the same climate zone than among cities in different climate zones. For example, analysis showed that the difference between the share of window coverings that are closed in the summer in the Northern and Southern climate zones was statistically significant. If there was consistency among cities in the same climate zones, then the differences between pairs of cities in the Southern climate zone would be smaller than the differences between pairs of cities in the Northern and Southern climate zones.

PROCESS

D&R used the following process to assess the internal consistency of the sample:

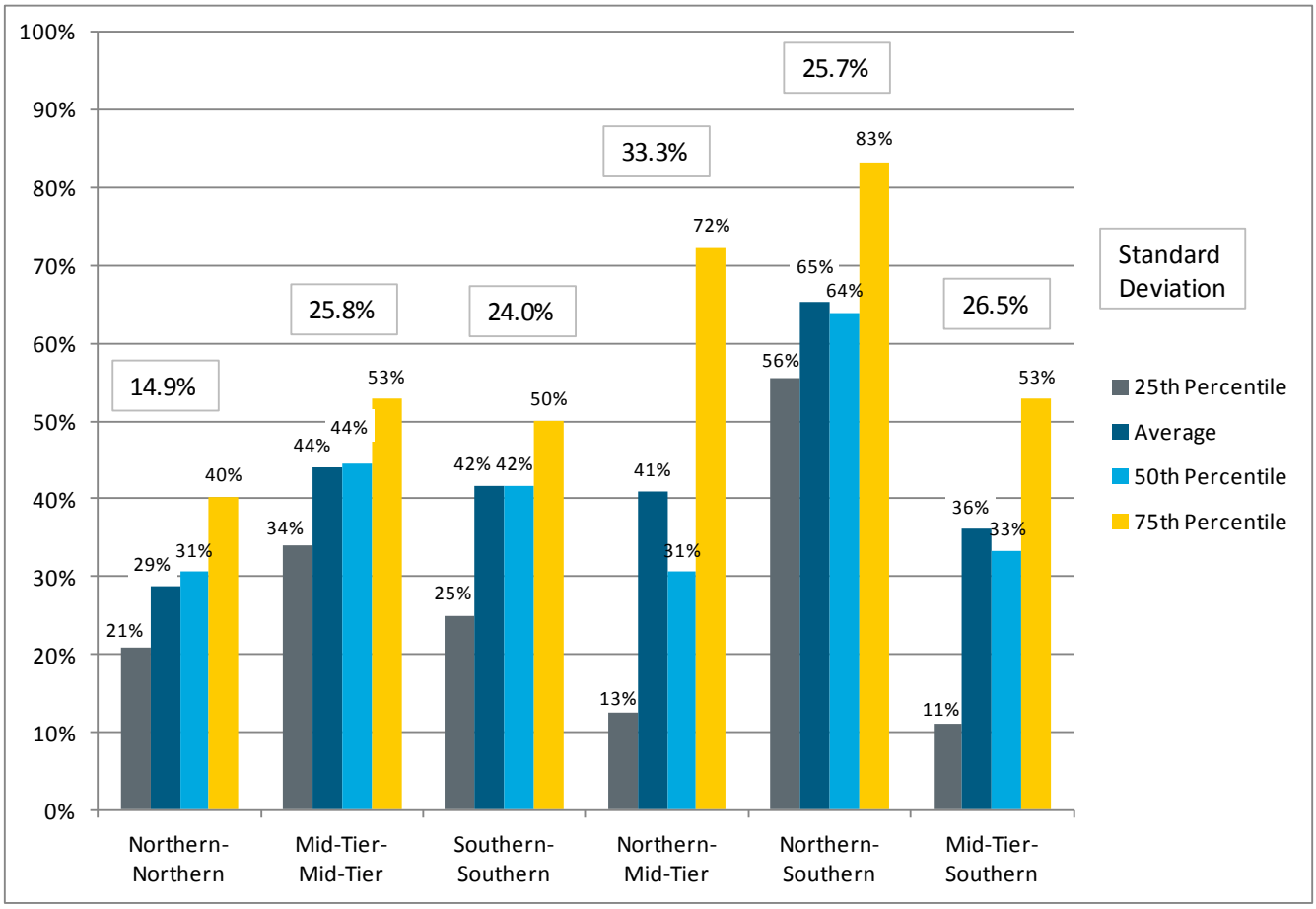
1. Calculated the percent of coverings in each household that were open, half-open, and closed at a particular time of day (morning, afternoon, evening), season (summer or winter), and time of the week (weekday or weekend).
2. Ran the Mann-Whitney U test to see if the difference in the share of window coverings in a particular position (e.g., % open) between two cities was significant. For example, was the percent of coverings closed among households in Atlanta on a summer weekday evening significantly different from the percent of closed coverings among households in Boston on a summer weekday evening?
3. Ran the Mann-Whitney U test for each city combination (12 total cities) and for each time, season, time of the week combination (36 combinations).
4. For each city combination (e.g., Atlanta and Boston), summed the total number of instances (of the 36 combinations) where the differences were significant at the α=0.1 level and then calculated what percent of scenarios were significantly different. For example, there were 21 scenarios that were significantly different between Boston and Atlanta, so 21/36=58% of scenarios were significantly different.
5. Assigned each city to its respective climate zone.
6. Calculated the percent of scenarios that were significantly different for each regional combination (e.g., Northern-Northern, Northern-Mid-Tier, Northern-Southern, etc.) at the 25th percentile, the average, the 50th percentile, and the 75th percentile.

ANALYSIS AND RESULTS

As noted earlier, if there is consistency between cities in the same climate zones, then the differences between cities in the Southern climate zone would be smaller than the differences between cities in the Northern and Southern climate zones, and in general, cities in the same climate zone would have a smaller number of significant differences than cities from different climate zones. Cities in the same climate zone should have tighter distributions and thus smaller ranges between quartiles, meaning the variation in percent differences is smaller than the variation in cities across two climate zones.

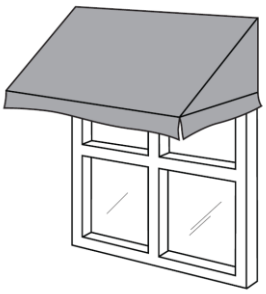
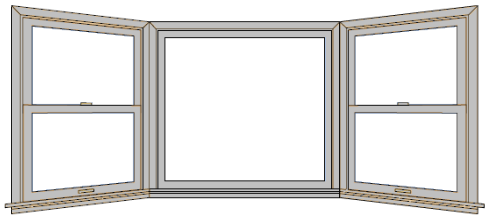
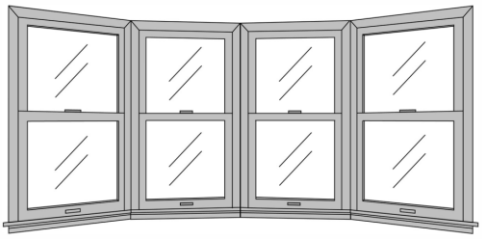
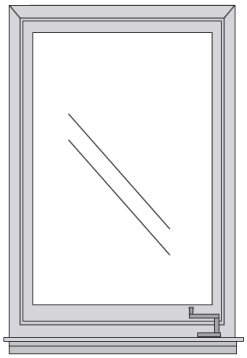
As expected, the analysis showed that the largest differences were between the Northern and Southern climate zones (see Figure 30). Cities in the same climate zones (Northern-Northern, Mid-Tier-Mid-Tier, Southern-Southern) had the narrowest spreads between the 25th and 75th percentiles. The differences among cities in the Mid-Tier-Southern climate zones were somewhat anomalous, but not strikingly so; these cities showed fewer instances of significant differences than the Mid-Tier-Mid-Tier comparison and the Southern-Southern comparison, but had a greater degree of internal variance. This is possibly related to the fact that the Mid-Tier climate zone is made up of the ENERGY STAR Windows, Doors, and Skylights North-Central and the South-Central climate zones, which cover a wide range of climatic areas.

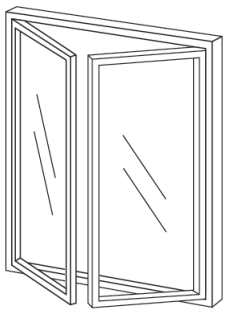
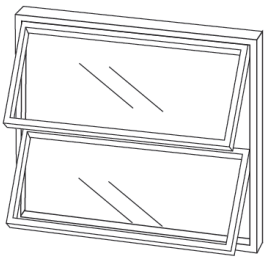
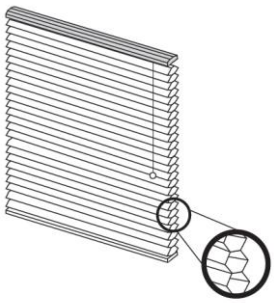
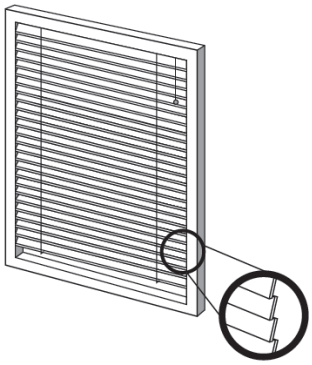
Figure 30: Percent Significant Differences Between Climate Zones

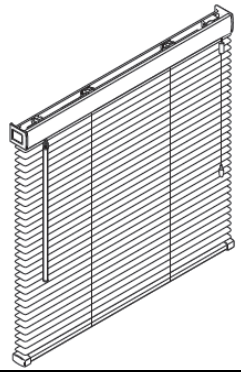
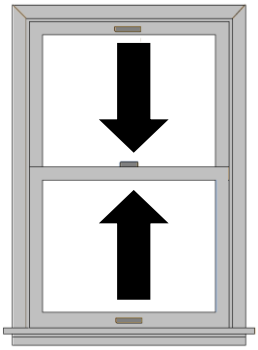
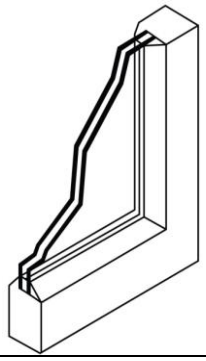
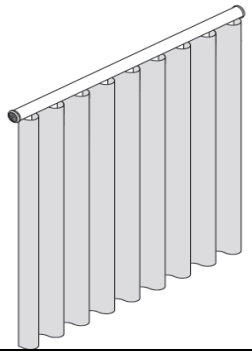


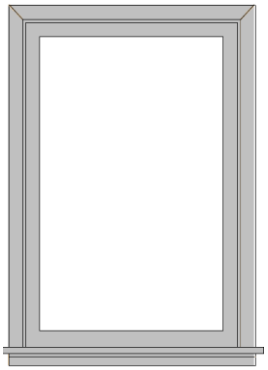
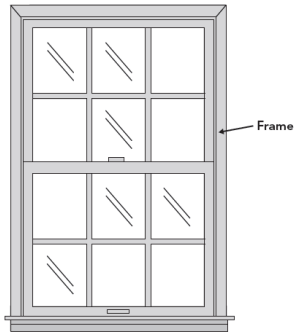
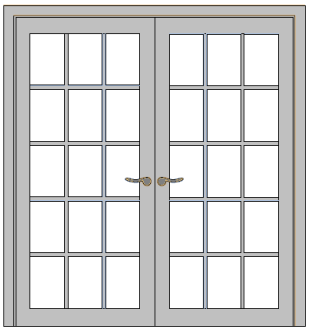
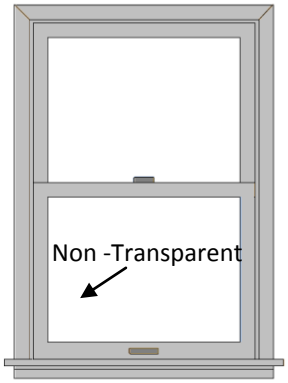
APPENDIX F: GLOSSARY

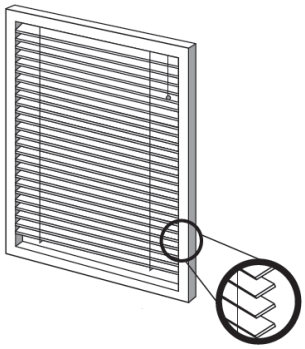
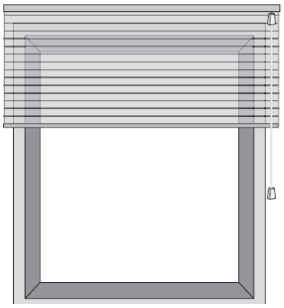
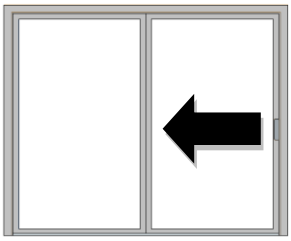
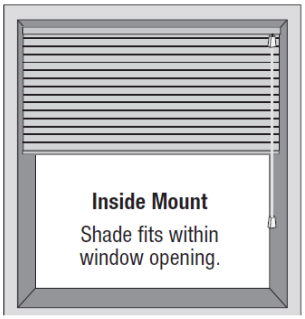
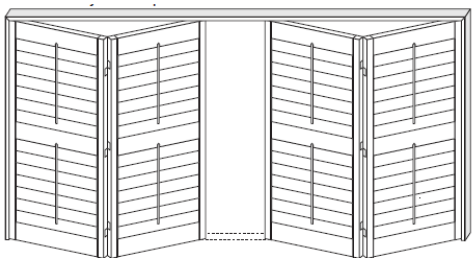
This section contains the glossary that was designed to help respondents understand the terminology used in the internet survey.

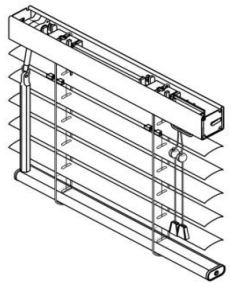
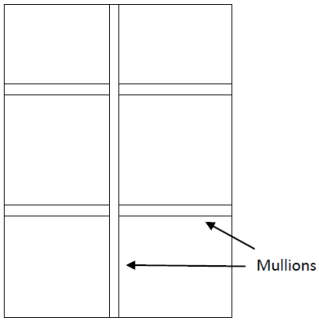
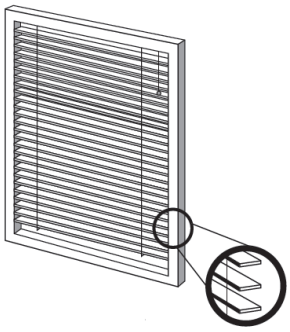
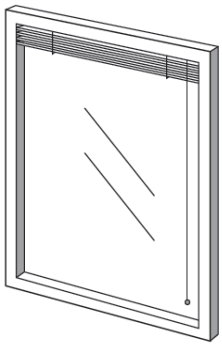
Term	Definition	Image
Awning	Roof-like shelters installed on a home's exterior to shade windows from the sun's heat and glare. Awnings can also shade outdoor living spaces.	
Bay Window	An arrangement of three or more individual window units that project from the building at various angles. In a three-unit bay, the center section is normally fixed and the end windows are able to open.	
Bow Window	A rounded bay window that projects from the wall in an arc shape, generally consisting of windows of the same type (all casement for example).	
Casement	A window that swings open in or out on side hinges.	

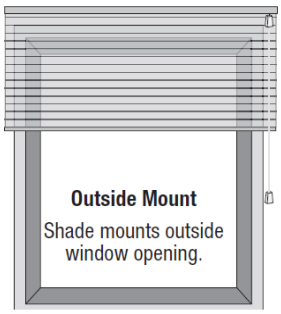
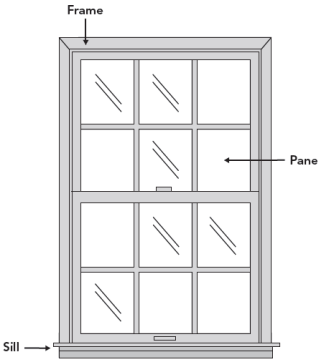
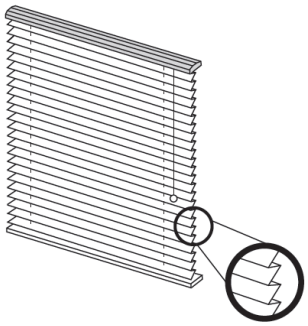
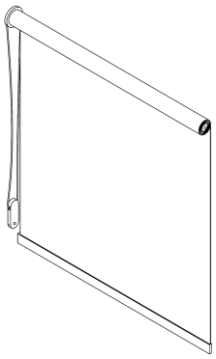
		 
Cellular Shade	Shades made of pleated materials that are designed to fold up, accordion-like, usually at the top of the window, but sometimes at either the top or the bottom. Insulated shades contain one or more air layers in a honeycomb cross-section.	
Closed Blind	Slats of blinds are fully closed, allowing little or no light to penetrate through.	

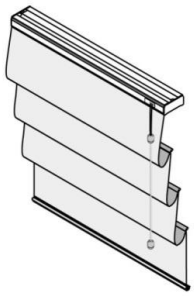
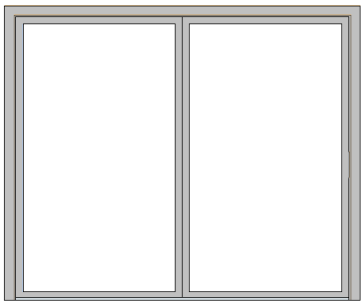
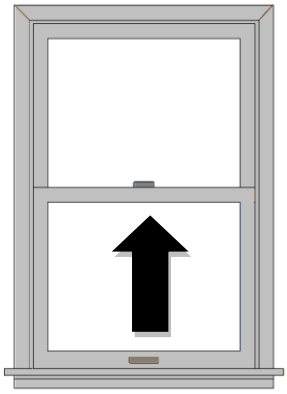
Closed Covering	Window covering is completely pulled down to cover the entire window.	
Double Hung Window	A window in which both the lower and upper halves can be slid up or down to open.	
Double Pane	Two sheets of glass separated within one window frame.	
Drapery	Sheer fabric interior attachments that are either sized to fit the window (curtains) or to reach all the way to the floor (drapes).	

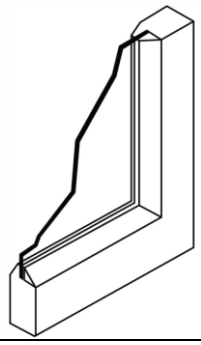
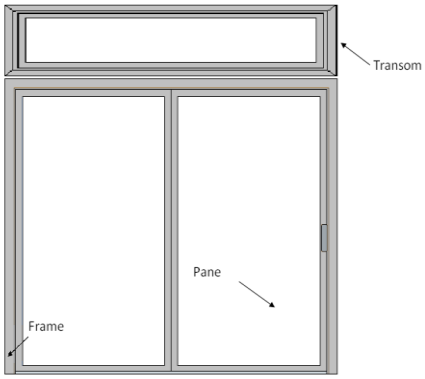
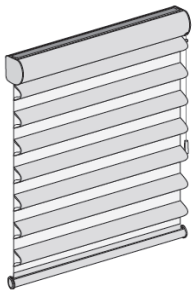
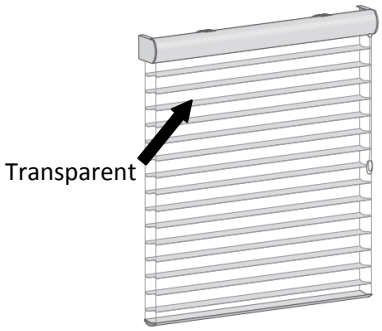
Fixed Window	A window that does not open.	
Frame	The fixed frame of a window that holds the panes of glass in place.	
French Door	Hinged glass doors usually decorated with mullions.	
Frosted Glass	Non-transparent or non-translucent glass.	

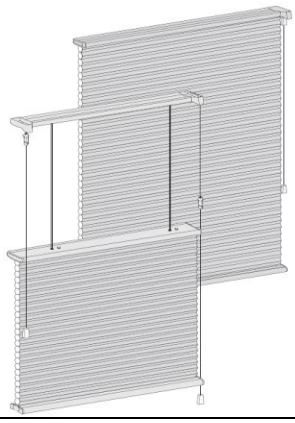
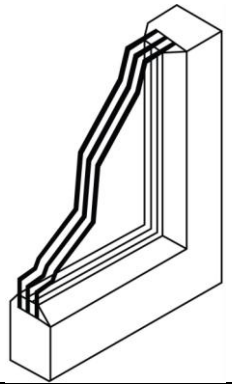
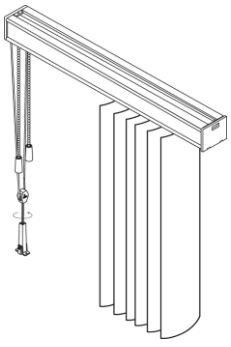
Half Open Blind	Individual blinds are set in a half open position (approximately 45 degrees).	
Half Open Covering	Window covering covers approximately half of the window.	
Horizontal Slider	A window with movable panels, which slide horizontally.	
Inside Mount	Blinds that are mounted inside of the window frame.	
Interior Shutters	Interior hinged shutters typically made of either wood or vinyl.	

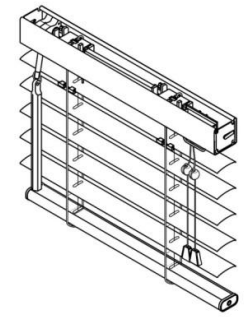
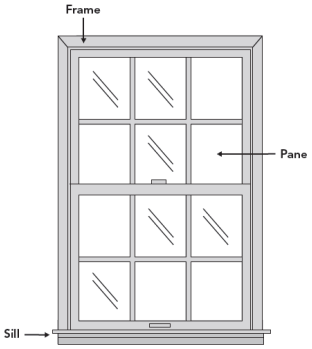
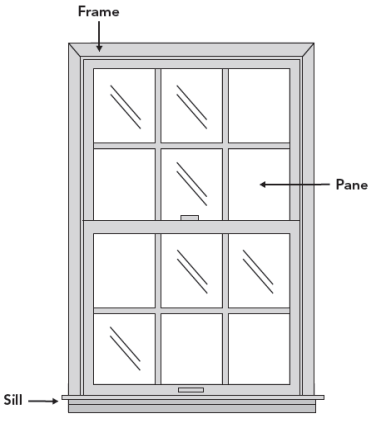
Metal Blinds	Product consisting of metal horizontal slats, which can be tilted.	
Mullions	Small bars that divide the glass into separate panes within a window that are often used decoratively.	
Open Blind	Individual blinds are completely open (horizontal), allowing maximum light to penetrate or blinds are pulled up do not cover the window.	
Open Covering	Window covering is completely pulled up on the window, allowing maximum light to penetrate.	

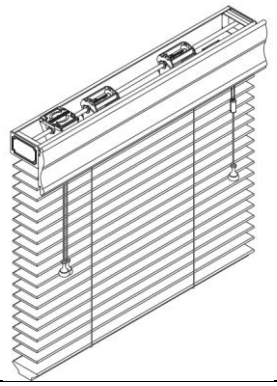
Outside Mount	Blinds that are mounted outside of the window frame.	
Pane of Glass	A sheet of glass in a window or door frame.	
Pleated Shade	Product consisted of pleated material, which can be retracted by folding.	
Roller Shade	Product consisting of a sheet of material, which can be retracted by rolling.	

Roman Shade	A fabric window shade that is drawn up into a series of evenly stacked folds when raised or lowered.	
Sheer Drapery	Sheer fabric interior attachments that are either sized to fit the window (curtains) or to reach all the way to the floor (drapes).	
Side By Side Window	Individual windows that are positioned side by side to each other.	
Single Hung Window	A window in which the only the lower half can be slid up and down.	

Single Pane	A single sheet of glass in a window or door.	
Sliding Glass Door	A door fitted with one or more panels that move horizontally on a track and/or in grooves.	
Soft Sheer Blinds (Non Transparent)	Product consisting of non-transparent horizontal slats, which can be tilted.	
Soft Sheer Blinds (Transparent)	Product consisting of transparent material and horizontal slats, which can be tilted.	

Storm Windows	A second set of removable windows installed on the outside or inside of the primary windows to provide additional insulation and wind protection.	
Top-Down Shade/Bottom-Up Shade	Shades that can be adjusted from the top and/or the bottom.	
Triple Pane	Three sheets of glass inside a frame with two air spaces between the panes.	
Vertical Blind	Product consisting of vertical slats, which can be pivoted. The slats may be retracted by drawing the blinds to one side, either side, or the center.	

Vinyl Horizontal Blind	Product consisting of vinyl horizontal slats, which can be tilted.	
Window	An opening in an external wall of a building; an entire unit consisting of a frame, panes of glass, and any operable elements.	
Window Covering	Product installed either internally or externally to provide additional protection or privacy.	
Windowsill	The bottom of the window frame.	

Wood or Faux Wood Horizontal Blind	Product consisting of wood or faux-wood horizontal slats, which can be tilted.	

APPENDIX G: WINDOW COVERING POSITION BY PRODUCT TYPE

Table 95: Window Coverings Position: Summer Weekday Morning

Covering Position	Morning (%)											
	Vertical Blinds	Metal or Vinyl Horizontal Blinds	Wood or Faux Wood Blinds	Soft Sheer Blinds (non transparent)	Soft Sheer Blinds (transparent)	Roller Shade	Cellular Shade	Pleated Shade	Roman Shade	Curtains /Drapery	Sheer Drapery	Interior Shutters
Open	26	18	20	11	23	28	24	25	29	25	26	23
Half Open	32	28	33	35	41	31	32	29	34	29	29	41
Closed	43	54	47	54	35	42	44	46	37	47	45	36
Total	100	100	100	100	100	100	100	100	100	100	100	100

Table 96: Window Coverings Position: Summer Weekday Afternoon

Covering Position	Afternoon (%)											
	Vertical Blinds	Metal or Vinyl Horizontal Blinds	Wood or Faux Wood Blinds	Soft Sheer Blinds (non transparent)	Soft Sheer Blinds (transparent)	Roller Shade	Cellular Shade	Pleated Shade	Roman Shade	Curtains /Drapery	Sheer Drapery	Interior Shutters
Open	24	17	18	10	24	27	20	24	28	23	25	15
Half Open	31	27	32	35	40	32	29	30	33	29	31	44
Closed	45	55	50	56	36	42	51	45	39	48	45	41
Total	100	100	100	100	100	100	100	100	100	100	100	100

Table 97: Window Coverings Position: Summer Weekday Evening

Covering Position	Evening (%)											
	Vertical Blinds	Metal or Vinyl Horizontal Blinds	Wood or Faux Wood Blinds	Soft Sheer Blinds (non transparent)	Soft Sheer Blinds (transparent)	Roller Shade	Cellular Shade	Pleated Shade	Roman Shade	Curtains /Drapery	Sheer Drapery	Interior Shutters
Open	21	15	16	11	23	26	20	21	26	21	23	18
Half Open	29	24	29	35	40	28	29	29	26	26	29	40
Closed	50	61	55	54	37	45	51	50	48	53	48	42
Total	100	100	100	100	100	100	100	100	100	100	100	100

Table 98: Window Coverings Position: Summer Weekend Morning

Covering Position	Morning (%)											
	Vertical Blinds	Metal or Vinyl Horizontal Blinds	Wood or Faux Wood Blinds	Soft Sheer Blinds (non transparent)	Soft Sheer Blinds (transparent)	Roller Shade	Cellular Shade	Pleated Shade	Roman Shade	Curtains /Drapery	Sheer Drapery	Interior Shutters
Open	26	19	21	13	23	26	24	26	30	23	26	19
Half Open	32	27	32	35	40	34	35	33	34	31	33	50
Closed	41	54	47	51	37	40	41	41	35	46	41	31
Total	100	100	100	100	100	100	100	100	100	100	100	100

Table 99: Window Coverings Position: Summer Weekend Afternoon

Covering Position	Afternoon (%)											
	Vertical Blinds	Metal or Vinyl Horizontal Blinds	Wood or Faux Wood Blinds	Soft Sheer Blinds (non transparent)	Soft Sheer Blinds (transparent)	Roller Shade	Cellular Shade	Pleated Shade	Roman Shade	Curtains /Drapery	Sheer Drapery	Interior Shutters
Open	26	18	19	12	20	26	21	26	28	23	26	18
Half Open	31	27	31	35	41	33	34	31	34	30	34	48
Closed	43	55	50	53	39	40	45	43	38	47	40	34
Total	100	100	100	100	100	100	100	100	100	100	100	100

Table 100: Window Coverings Position: Summer Weekend Evening

Covering Position	Evening (%)											
	Vertical Blinds	Metal or Vinyl Horizontal Blinds	Wood or Faux Wood Blinds	Soft Sheer Blinds (non transparent)	Soft Sheer Blinds (transparent)	Roller Shade	Cellular Shade	Pleated Shade	Roman Shade	Curtains /Drapery	Sheer Drapery	Interior Shutters
Open	23	15	17	13	19	27	19	22	23	22	23	15
Half Open	28	25	29	34	42	30	32	30	28	29	33	48
Closed	49	60	54	53	39	43	49	48	48	49	44	37
Total	100	100	100	100	100	100	100	100	100	100	100	100

Table 101: Window Coverings Position: Winter Weekday Morning

Covering Position	Morning (%)											
	Vertical Blinds	Metal or Vinyl Horizontal Blinds	Wood or Faux Wood Blinds	Soft Sheer Blinds (non transparent)	Soft Sheer Blinds (transparent)	Roller Shade	Cellular Shade	Pleated Shade	Roman Shade	Curtains /Drapery	Sheer Drapery	Interior Shutters
Open	32	22	24	14	24	32	27	25	31	27	32	18
Half Open	31	26	31	37	28	26	30	30	28	28	51	17
Closed	37	52	45	54	39	40	47	46	39	45	40	30
Total	100	100	100	100	100	100	100	100	100	100	100	100

Table 102: Window Coverings Position: Winter Weekday Afternoon

Covering Position	Afternoon (%)											
	Vertical Blinds	Metal or Vinyl Horizontal Blinds	Wood or Faux Wood Blinds	Soft Sheer Blinds (non transparent)	Soft Sheer Blinds (transparent)	Roller Shade	Cellular Shade	Pleated Shade	Roman Shade	Curtains /Drapery	Sheer Drapery	Interior Shutters
Open	31	23	25	14	24	33	29	24	33	28	32	20
Half Open	32	26	31	32	38	29	27	31	28	29	29	50
Closed	36	51	44	53	38	38	44	45	38	43	39	30
Total	100	100	100	100	100	100	100	100	100	100	100	100

Table 103: Window Coverings Position: Winter Weekday Evening

Covering Position	Evening (%)											
	Vertical Blinds	Metal or Vinyl Horizontal Blinds	Wood or Faux Wood Blinds	Soft Sheer Blinds (non transparent)	Soft Sheer Blinds (transparent)	Roller Shade	Cellular Shade	Pleated Shade	Roman Shade	Curtains /Drapery	Sheer Drapery	Interior Shutters
Open	25	16	18	13	12	26	20	19	26	21	25	14
Half Open	28	23	27	30	38	25	22	26	19	25	28	46
Closed	47	60	55	58	49	49	58	55	55	54	48	40
Total	100	100	100	100	100	100	100	100	100	100	100	100

Table 104: Window Coverings Position: Winter Weekend Morning

Covering Position	Morning (%)											
	Vertical Blinds	Metal or Vinyl Horizontal Blinds	Wood or Faux Wood Blinds	Soft Sheer Blinds (non transparent)	Soft Sheer Blinds (transparent)	Roller Shade	Cellular Shade	Pleated Shade	Roman Shade	Curtains /Drapery	Sheer Drapery	Interior Shutters
Open	29	22	24	14	24	29	27	25	32	27	32	20
Half Open	30	26	32	32	38	31	28	32	32	29	26	47
Closed	42	51	44	54	38	40	45	43	37	44	42	34
Total	100	100	100	100	100	100	100	100	100	100	100	100

Table 105: Window Coverings Position: Winter Weekend Afternoon

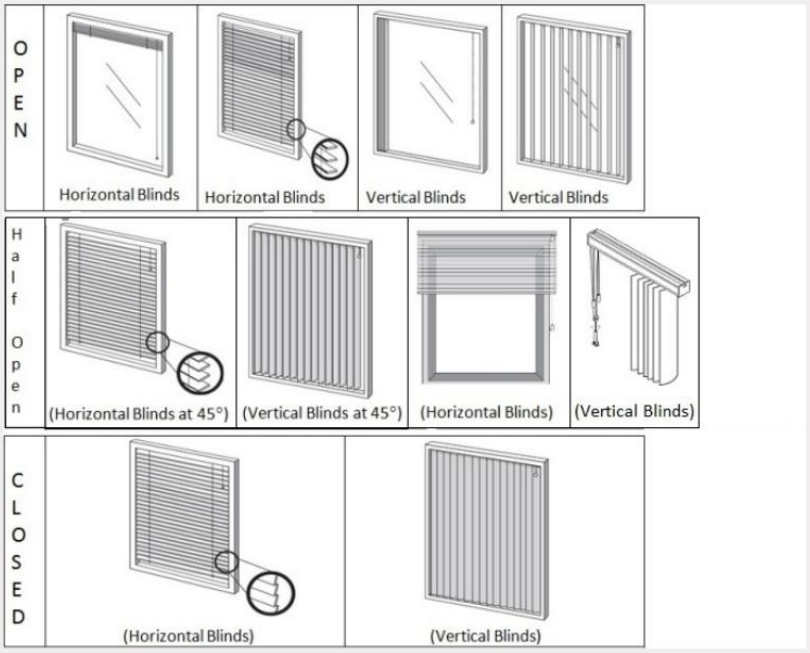
Covering Position	Afternoon (%)											
	Vertical Blinds	Metal or Vinyl Horizontal Blinds	Wood or Faux Wood Blinds	Soft Sheer Blinds (non transparent)	Soft Sheer Blinds (transparent)	Roller Shade	Cellular Shade	Pleated Shade	Roman Shade	Curtains /Drapery	Sheer Drapery	Interior Shutters
Open	29	23	24	14	22	29	29	24	32	28	32	20
Half Open	31	27	32	34	42	32	28	34	31	30	27	49
Closed	40	50	44	52	36	39	43	42	37	42	41	31
Total	100	100	100	100	100	100	100	100	100	100	100	100

Table 106: Window Coverings Position: Winter Weekend Evening

Covering Position	Evening (%)											
	Vertical Blinds	Metal or Vinyl Horizontal Blinds	Wood or Faux Wood Blinds	Soft Sheer Blinds (non transparent)	Soft Sheer Blinds (transparent)	Roller Shade	Cellular Shade	Pleated Shade	Roman Shade	Curtains /Drapery	Sheer Drapery	Interior Shutters
Open	23	17	17	13	11	23	21	18	26	21	27	16
Half Open	26	24	28	29	35	27	24	29	23	26	25	45
Closed	51	59	55	58	53	51	54	53	52	52	48	39
Total	100	100	100	100	100	100	100	100	100	100	100	100

APPENDIX H: WINDOW COVERING POSITION SURVEY IMAGE

Please indicate the position of the covering you open and close most often on each of these windows in your Master Bedroom at this moment?
Please note: these pictures are only meant to represent the position of your window coverings. Your actual window coverings may look different from the ones shown here.
Please select one answer below



Window #1

Open	○
Half open	○
Closed	○

APPENDIX I: STATISTICAL SIGNIFICANCE

The headings in the tables below signify the following:

Abbreviated Heading	**Signifies**
N	Number of samples
Mean	Average of the samples
Std. Deviation (Standard deviation)	Square root of the variance
Std. Error Mean	Standard deviation divided by the square root of N
t	Student's t-test
df	Degrees of freedom
Sig (2-tailed)	Significance (probability value) for two-tailed t-test
Mean Difference	Mean difference from the test value
Confidence Interval	Lower and upper bounds of the difference from the test value

SHARE OF UNCOVERED WINDOWS

The tables below show the results of the comparison between climate zones of the share of uncovered windows by household. The hypothesis was that there was no difference in the share of uncovered windows between climate zones, but the tables below show that this hypothesis for the Northern and Southern zones and the Northern and Mid-Tier zones is highly unlikely and that in fact the differences between the climate zones are statistically significant.

Northern and Mid-Tier Climate Zone Comparison

Group Statistics

Climate Zone		N	Mean	Std. Deviation	Std. Error Mean
Share of windows without coverings	Northern Zone	691	.1349	.22081	.00840
	Mid Tier Zone	702	.1079	.20293	.00766

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Share of windows without coverings	Equal variances assumed	8.939	.003	2.373	1391	.018	.02696	.01136	.00467	.04924
	Equal variances not assumed			2.371	1377.226	.018	.02696	.01137	.00466	.04926

Northern and Southern Climate Zone Comparison

Group Statistics					
Climate Zone		N	Mean	Std. Deviation	Std. Error Mean
Share of windows without coverings	Northern Zone	691	.1349	.22081	.00840
	Southern Zone	708	.1042	.20603	.00774

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Share of windows without coverings	Equal variances assumed	9.516	.002	2.687	1397	.007	.03067	.01141	.00828	.05306
	Equal variances not assumed			2.685	1384.904	.007	.03067	.01142	.00826	.05308

Mid-Tier and Southern Climate Zone Comparison

Group Statistics					
Climate Zone		N	Mean	Std. Deviation	Std. Error Mean
Share of windows without coverings	Mid Tier Zone	702	.1079	.20293	.00766
	Southern Zone	708	.1042	.20603	.00774

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Share of windows without coverings	Equal variances assumed	.021	.886	.341	1408	.733	.00371	.01089	-.01765	.02508
	Equal variances not assumed			.341	1407.938	.733	.00371	.01089	-.01765	.02508

WINDOW COVERING POSITION

The tables below show the results of the hypothesis that the share of coverings open in the afternoon was 23%. Each was statistically different from the test value. Additionally, the confidence intervals for the summer overlap with one another and the confidence intervals for the winter overlap with one another, but there is not overlap between the summer and winter, which means that the differences between summer and winter are statistically significant.

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Summer Weekday Afternoon Open	2064	.1965	.30495	.00671
Winter Weekday Afternoon Open	2064	.2671	.36762	.00809
Winter Weekend Afternoon Open	2064	.2642	.36624	.00806
Summer Weekend Afternoon Open	2064	.2085	.31911	.00702

One-Sample Test

	Test Value = 0.23					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Summer Weekday Afternoon Open	-4.996	2063	.000	-.03354	-.0467	-.0204
Summer Weekend Afternoon Open	-3.064	2063	.002	-.02152	-.0353	-.0077
Winter Weekday Afternoon Open	4.586	2063	.000	.03711	.0212	.0530
Winter Weekend Afternoon Open	4.247	2063	.000	.03424	.0184	.0500

WINDOW COVERING POSITION BY CLIMATE ZONE

The tables below compare the differences between climate zones in coverings position at the household level. The results of this analysis are discussed on page 36.

Northern and Mid-Tier Climate Zone Comparison

Group Statistics					
Climate Zone		N	Mean	Std. Deviation	Std. Error Mean
Summer Weekday Afternoon Open	Northern Tier	682	.2394	.32880	0.0126
	Mid-Tier	687	.2014	.31036	0.0118
Summer Weekday Afternoon Half Open	Northern Tier	682	.3359	.35218	0.0135
	Mid-Tier	687	.3209	.35466	0.0135
Summer Weekday Afternoon Closed	Northern Tier	682	.4247	.37757	0.0145
	Mid-Tier	687	.4779	.39079	0.0149
Summer Weekend Afternoon Open	Northern Tier	682	.2473	.34087	0.0131
	Mid-Tier	687	.2134	.32440	0.0124
Summer Weekend Afternoon Half Open	Northern Tier	682	.3437	.35669	0.0137
	Mid-Tier	687	.3277	.37010	0.0141
Summer Weekend After Closed	Northern Tier	682	.4091	.37549	0.0144
	Mid-Tier	687	.4593	.39831	0.0152
Winter Weekday Afternoon Open	Northern Tier	682	.3087	.38486	0.0147
	Mid-Tier	687	.2555	.36795	0.0140
Winter Weekday Afternoon Half Open	Northern Tier	682	.3161	.36621	0.0140
	Mid-Tier	687	.2825	.36033	0.0137
Winter Weekday Afternoon Closed	Northern Tier	682	.3752	.39271	0.0150
	Mid-Tier	687	.4624	.41171	0.0157
Winter Weekend Afternoon Open	Northern Tier	682	.3016	.38136	0.0146
	Mid-Tier	687	.2574	.36873	0.0141
Winter Weekend Afternoon Half Open	Northern Tier	682	.3256	.37470	0.0143
	Mid-Tier	687	.2853	.36155	0.0138
Winter Weekend Afternoon Closed	Northern Tier	682	.3728	.39360	0.0151
	Mid-Tier	687	.4578	.40593	0.0155
Summer Weekday Evening Open	Northern Tier	682	.2266	.31793	0.0122
	Mid-Tier	687	.1869	.30158	0.0115
Summer Weekday Evening Half Open	Northern Tier	682	.3074	.33816	0.0129
	Mid-Tier	687	.2861	.33423	0.0128
Summer Weekday Evening Closed	Northern Tier	682	.4662	.37636	0.0144
	Mid-Tier	687	.5275	.38644	0.0147
Summer Weekend Evening Open	Northern Tier	682	.2240	.32493	0.0124
	Mid-Tier	687	.1916	.31311	0.0119

Summer Weekend Evening Half Open	Northern Tier	682	.3189	.34880	0.0134
	Mid-Tier	687	.2943	.35112	0.0134
Summer Weekend Evening Closed	Northern Tier	682	.4572	.38114	0.0146
	Mid-Tier	687	.5145	.39784	0.0152
Winter Weekday Evening Open	Northern Tier	682	.2261	.34678	0.0133
	Mid-Tier	687	.1787	.31251	0.0119
Winter Weekday Evening Half Open	Northern Tier	682	.2662	.34709	0.0133
	Mid-Tier	687	.2618	.34603	0.0132
Winter Weekday Evening Closed	Northern Tier	682	.5078	.40759	0.0156
	Mid-Tier	687	.5599	.40511	0.0155
Winter Weekend Evening Open	Northern Tier	682	.2248	.34367	0.0132
	Mid-Tier	687	.1812	.32125	0.0123
Winter Weekend Evening Half Open	Northern Tier	682	.2705	.35161	0.0135
	Mid-Tier	687	.2564	.34958	0.0133
Winter Weekend Evening Closed	Northern Tier	682	.5048	.41024	0.0157
	Mid-Tier	687	.5628	.40862	0.0156
Summer Weekday Morning Open	Northern Tier	682	.2582	.33432	0.0128
	Mid-Tier	687	.2163	.32230	0.0123
Summer Weekday Morning Half Open	Northern Tier	682	.3443	.35467	0.0136
	Mid-Tier	687	.3137	.34571	0.0132
Summer Weekday Morning Closed	Northern Tier	682	.3975	.37092	0.0142
	Mid-Tier	687	.4701	.38765	0.0148
Summer Weekend Morning Open	Northern Tier	682	.2565	.34182	0.0131
	Mid-Tier	687	.2254	.33633	0.0128
Summer Weekend Morning Half Open	Northern Tier	682	.3527	.35756	0.0137
	Mid-Tier	687	.3193	.36352	0.0139
Summer Weekend Morning Closed	Northern Tier	682	.3908	.37032	0.0142
	Mid-Tier	687	.4558	.39855	0.0152
Winter Weekday Morning Open	Northern Tier	682	.3003	.38115	0.0146
	Mid-Tier	687	.2508	.36652	0.0140
Winter Weekday Morning Half Open	Northern Tier	682	.3064	.36213	0.0139
	Mid-Tier	687	.2809	.35552	0.0136
Winter Weekday Morning Closed	Northern Tier	682	.3933	.39445	0.0151
	Mid-Tier	687	.4688	.40964	0.0156
Winter Weekend Morning Open	Northern Tier	682	.2904	.37732	0.0144
	Mid-Tier	687	.2481	.36585	0.0140
Winter Weekend Morning Half Open	Northern Tier	682	.3116	.36584	0.0140
	Mid-Tier	687	.2797	.35844	0.0137
Winter Weekend Morning Closed	Northern Tier	682	.3979	.39411	0.0151
	Mid-Tier	687	.4726	.40729	0.0155

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Summer Weekday Afternoon Open	Equal variances assumed	5.055	.025	2.197	1367	.028	.03796	.01728	.00406	.07186
	Equal variances not assumed			2.196	1361	.028	.03796	.01728	.00405	.07186
Summer Weekday Afternoon Half Open	Equal variances assumed	.185	.667	.783	1367	.434	.01496	.01910	-.02251	.05244
	Equal variances not assumed			.783	1367	.434	.01496	.01910	-.02251	.05244
Summer Weekday Afternoon Closed	Equal variances assumed	3.314	.069	-2.562	1367	.011	-.05321	.02077	-.09396	-.01247
	Equal variances not assumed			-2.562	1366	.011	-.05321	.02077	-.09395	-.01247
Summer Weekend Afternoon Open	Equal variances assumed	3.927	.048	1.882	1367	.060	.03384	.01798	-.00144	.06912
	Equal variances not assumed			1.881	1363	.060	.03384	.01799	-.00145	.06912
Summer Weekend Afternoon Half Open	Equal variances assumed	1.133	.287	.815	1367	.415	.01601	.01965	-.02253	.05455
	Equal variances not assumed			.815	1366	.415	.01601	.01964	-.02253	.05455

Summer Weekend After Closed	Equal variances assumed	9.918	.002	-2.399	1367	.017	-.05020	.02092	-.09124	-.00915
	Equal variances not assumed			-2.399	1363	.017	-.05020	.02092	-.09124	-.00916
Winter Weekday Afternoon Open	Equal variances assumed	5.449	.020	2.615	1367	.009	.05322	.02035	.01330	.09314
	Equal variances not assumed			2.615	1363	.009	.05322	.02035	.01330	.09315
Winter Weekday Afternoon Half Open	Equal variances assumed	1.310	.253	1.710	1367	.087	.03358	.01964	-.00494	.07210
	Equal variances not assumed			1.710	1366	.087	.03358	.01964	-.00494	.07210
Winter Weekday Afternoon Closed	Equal variances assumed	7.392	.007	-4.008	1367	.000	-.08717	.02175	-.12983	-.04450
	Equal variances not assumed			-4.009	1365	.000	-.08717	.02175	-.12982	-.04451
Winter Weekend Afternoon Open	Equal variances assumed	3.367	.067	2.182	1367	.029	.04423	.02027	.00446	.08401
	Equal variances not assumed			2.181	1365	.029	.04423	.02028	.00446	.08401
Winter Weekend Afternoon Half Open	Equal variances assumed	3.114	.078	2.027	1367	.043	.04033	.01990	.00129	.07937
	Equal variances not assumed			2.026	1364	.043	.04033	.01990	.00129	.07938

Winter Weekend Afternoon Closed	Equal variances assumed	2.735	.098	-3.930	1367	.000	-.08494	.02161	-.12734	-.04254
	Equal variances not assumed			-3.931	1366	.000	-.08494	.02161	-.12734	-.04255
Summer Weekday Evening Open	Equal variances assumed	5.283	.022	2.370	1367	.018	.03970	.01675	.00684	.07255
	Equal variances not assumed			2.370	1362	.018	.03970	.01675	.00684	.07256
Summer Weekday Evening Half Open	Equal variances assumed	.082	.774	1.173	1367	.241	.02132	.01817	-.01433	.05697
	Equal variances not assumed			1.173	1367	.241	.02132	.01817	-.01433	.05697
Summer Weekday Evening Closed	Equal variances assumed	1.736	.188	-2.971	1367	.003	-.06126	.02062	-.10171	-.02082
	Equal variances not assumed			-2.972	1367	.003	-.06126	.02062	-.10171	-.02082
Summer Weekend Evening Open	Equal variances assumed	2.823	.093	1.876	1367	.061	.03236	.01725	-.00147	.06619
	Equal variances not assumed			1.876	1364	.061	.03236	.01725	-.00148	.06619
Summer Weekend Evening Half Open	Equal variances assumed	.010	.920	1.303	1367	.193	.02465	.01892	-.01246	.06176
	Equal variances not assumed			1.303	1367	.193	.02465	.01892	-.01246	.06176

Summer Weekend Evening Closed	Equal variances assumed	4.501	.034	-2.723	1367	.007	-.05736	.02106	-.09867	-.01604
	Equal variances not assumed			-2.724	1365	.007	-.05736	.02106	-.09866	-.01605
Winter Weekday Evening Open	Equal variances assumed	14.531	.000	2.657	1367	.008	.04740	.01784	.01240	.08239
	Equal variances not assumed			2.656	1350	.008	.04740	.01785	.01239	.08240
Winter Weekday Evening Half Open	Equal variances assumed	.072	.789	.236	1367	.813	.00443	.01873	-.03232	.04118
	Equal variances not assumed			.236	1367	.813	.00443	.01873	-.03232	.04118
Winter Weekday Evening Closed	Equal variances assumed	.060	.807	-2.371	1367	.018	-.05208	.02196	-.09517	-.00899
	Equal variances not assumed			-2.371	1367	.018	-.05208	.02197	-.09517	-.00899
Winter Weekend Evening Open	Equal variances assumed	8.383	.004	2.423	1367	.016	.04356	.01798	.00829	.07883
	Equal variances not assumed			2.422	1359	.016	.04356	.01798	.00828	.07884
Winter Weekend Evening Half Open	Equal variances assumed	.328	.567	.743	1367	.458	.01408	.01895	-.02310	.05126
	Equal variances not assumed			.743	1367	.458	.01408	.01895	-.02310	.05126

Winter Weekend Evening Closed	Equal variances assumed	.016	.900	-2.621	1367	.009	-.05801	.02213	-.10143	-.01460
	Equal variances not assumed			-2.621	1367	.009	-.05801	.02213	-.10143	-.01460
Summer Weekday Morning Open	Equal variances assumed	2.727	.099	2.357	1367	.019	.04184	.01775	.00702	.07665
	Equal variances not assumed			2.357	1364	.019	.04184	.01775	.00701	.07666
Summer Weekday Morning Half Open	Equal variances assumed	.691	.406	1.620	1367	.106	.03066	.01893	-.00648	.06779
	Equal variances not assumed			1.619	1366	.106	.03066	.01893	-.00648	.06780
Summer Weekday Morning Closed	Equal variances assumed	5.364	.021	-3.542	1367	.000	-.07264	.02051	-.11287	-.03241
	Equal variances not assumed			-3.542	1365	.000	-.07264	.02051	-.11286	-.03241
Summer Weekend Morning Open	Equal variances assumed	.866	.352	1.701	1367	.089	.03117	.01833	-.00479	.06712
	Equal variances not assumed			1.700	1366	.089	.03117	.01833	-.00479	.06713
Summer Weekend Morning Half Open	Equal variances assumed	.091	.763	1.717	1367	.086	.03346	.01949	-.00478	.07169
	Equal variances not assumed			1.717	1367	.086	.03346	.01949	-.00478	.07169

Summer Weekend Morning Closed	Equal variances assumed	14.560	.000	-3.125	1367	.002	-.06499	.02080	-.10578	-.02419
	Equal variances not assumed			-3.126	1361	.002	-.06499	.02079	-.10577	-.02420
Winter Weekday Morning Open	Equal variances assumed	5.163	.023	2.450	1367	.014	.04951	.02021	.00986	.08915
	Equal variances not assumed			2.449	1364	.014	.04951	.02021	.00986	.08916
Winter Weekday Morning Half Open	Equal variances assumed	1.146	.285	1.316	1367	.188	.02552	.01940	-.01253	.06357
	Equal variances not assumed			1.316	1366	.189	.02552	.01940	-.01253	.06357
Winter Weekday Morning Closed	Equal variances assumed	5.071	.024	-3.471	1367	.001	-.07545	.02174	-.11809	-.03281
	Equal variances not assumed			-3.471	1366	.001	-.07545	.02173	-.11809	-.03281
Winter Weekend Morning Open	Equal variances assumed	2.896	.089	2.109	1367	.035	.04236	.02009	.00296	.08177
	Equal variances not assumed			2.109	1365	.035	.04236	.02009	.00295	.08177
Winter Weekend Morning Half Open	Equal variances assumed	1.325	.250	1.630	1367	.103	.03190	.01958	-.00650	.07031
	Equal variances not assumed			1.630	1366	.103	.03190	.01958	-.00650	.07031

Winter Weekend Morning Closed	Equal variances assumed	3.421	.065	-3.448	1367	.001	-.07469	.02166	-.11719	-.03219
	Equal variances not assumed			-3.448	1366	.001	-.07469	.02166	-.11718	-.03219

Northern and Southern Zone Comparison

Group Statistics					
Climate Zone		N	Mean	Std. Deviation	Std. Error Mean
Summer Weekday Afternoon Open	Northern Tier	682	.2394	.32880	0.0126
	Southern Tier	694	.1497	.26677	0.0101
Summer Weekday Afternoon Half Open	Northern Tier	682	.3359	.35218	0.0135
	Southern Tier	694	.2520	.31796	0.0121
Summer Weekday Afternoon Closed	Northern Tier	682	.4247	.37757	0.0145
	Southern Tier	694	.5986	.37009	0.0140
Summer Weekend Afternoon Open	Northern Tier	682	.2473	.34087	0.0131
	Southern Tier	694	.1658	.28532	0.0108
Summer Weekend Afternoon Half Open	Northern Tier	682	.3437	.35669	0.0137
	Southern Tier	694	.2486	.31824	0.0121
Summer Weekend After Closed	Northern Tier	682	.4091	.37549	0.0144
	Southern Tier	694	.5859	.37912	0.0144
Winter Weekday Afternoon Open	Northern Tier	682	.3087	.38486	0.0147
	Southern Tier	694	.2382	.34635	0.0131
Winter Weekday Afternoon Half Open	Northern Tier	682	.3161	.36621	0.0140
	Southern Tier	694	.2563	.33432	0.0127
Winter Weekday Afternoon Closed	Northern Tier	682	.3752	.39271	0.0150
	Southern Tier	694	.5058	.39533	0.0150
Winter Weekend Afternoon Open	Northern Tier	682	.3016	.38136	0.0146
	Southern Tier	694	.2347	.34554	0.0131
Winter Weekend Afternoon Half Open	Northern Tier	682	.3256	.37470	0.0143
	Southern Tier	694	.2720	.34689	0.0132
Winter Weekend Afternoon Closed	Northern Tier	682	.3728	.39360	0.0151
	Southern Tier	694	.4936	.39880	0.0151
Summer Weekday Evening Open	Northern Tier	682	.2266	.31793	0.0122
	Southern Tier	694	.1240	.24104	0.0091
Summer Weekday Evening Half Open	Northern Tier	682	.3074	.33816	0.0129
	Southern Tier	694	.2254	.30510	0.0116
Summer Weekday Evening Closed	Northern Tier	682	.4662	.37636	0.0144
	Southern Tier	694	.6508	.36058	0.0137
Summer Weekend Evening Open	Northern Tier	682	.2240	.32493	0.0124
	Southern Tier	694	.1319	.25396	0.0096
Summer Weekend Evening Half Open	Northern Tier	682	.3189	.34880	0.0134
	Southern Tier	694	.2359	.32121	0.0122
Summer Weekend Evening Closed	Northern Tier	682	.4572	.38114	0.0146
	Southern Tier	694	.6324	.37201	0.0141

Winter Weekday Evening Open	Northern Tier	682	.2261	.34678	0.0133
	Southern Tier	694	.1651	.29721	0.0113
Winter Weekday Evening Half Open	Northern Tier	682	.2662	.34709	0.0133
	Southern Tier	694	.2166	.32177	0.0122
Winter Weekday Evening Closed	Northern Tier	682	.5078	.40759	0.0156
	Southern Tier	694	.6186	.38781	0.0147
Winter Weekend Evening Open	Northern Tier	682	.2248	.34367	0.0132
	Southern Tier	694	.1694	.30588	0.0116
Winter Weekend Evening Half Open	Northern Tier	682	.2705	.35161	0.0135
	Southern Tier	694	.2324	.33049	0.0125
Winter Weekend Evening Closed	Northern Tier	682	.5048	.41024	0.0157
	Southern Tier	694	.5985	.39558	0.0150
Summer Weekday Morning Open	Northern Tier	682	.2582	.33432	0.0128
	Southern Tier	694	.1674	.27839	0.0106
Summer Weekday Morning Half Open	Northern Tier	682	.3443	.35467	0.0136
	Southern Tier	694	.2640	.32550	0.0124
Summer Weekday Morning Closed	Northern Tier	682	.3975	.37092	0.0142
	Southern Tier	694	.5688	.37828	0.0144
Summer Weekend Morning Open	Northern Tier	682	.2565	.34182	0.0131
	Southern Tier	694	.1730	.28750	0.0109
Summer Weekend Morning Half Open	Northern Tier	682	.3527	.35756	0.0137
	Southern Tier	694	.2532	.32064	0.0122
Summer Weekend Morning Closed	Northern Tier	682	.3908	.37032	0.0142
	Southern Tier	694	.5740	.38133	0.0145
Winter Weekday Morning Open	Northern Tier	682	.3003	.38115	0.0146
	Southern Tier	694	.2294	.34702	0.0132
Winter Weekday Morning Half Open	Northern Tier	682	.3064	.36213	0.0139
	Southern Tier	694	.2495	.33288	0.0126
Winter Weekday Morning Closed	Northern Tier	682	.3933	.39445	0.0151
	Southern Tier	694	.5214	.39799	0.0151
Winter Weekend Morning Open	Northern Tier	682	.2904	.37732	0.0144
	Southern Tier	694	.2278	.34356	0.0130
Winter Weekend Morning Half Open	Northern Tier	682	.3116	.36584	0.0140
	Southern Tier	694	.2657	.34208	0.0130
Winter Weekend Morning Closed	Northern Tier	682	.3979	.39411	0.0151
	Southern Tier	694	.5069	.39736	0.0151

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Summer Weekday Afternoon Open	Equal variances assumed	53.085	.000	5.563	1374	.000	.08973	.01613	.05809	.12137
	Equal variances not assumed			5.553	1309	.000	.08973	.01616	.05803	.12143
Summer Weekday Afternoon Half Open	Equal variances assumed	15.537	.000	4.642	1374	.000	.08394	.01808	.04846	.11941
	Equal variances not assumed			4.638	1355	.000	.08394	.01810	.04843	.11944
Summer Weekday Afternoon Closed	Equal variances assumed	.573	.449	-8.626	1374	.000	-.17385	.02016	-.21339	-.13431
	Equal variances not assumed			-8.624	1372	.000	-.17385	.02016	-.21340	-.13431
Summer Weekend Afternoon Open	Equal variances assumed	43.911	.000	4.811	1374	.000	.08148	.01693	.04826	.11470
	Equal variances not assumed			4.804	1325	.000	.08148	.01696	.04821	.11475
Summer Weekend Afternoon Half Open	Equal variances assumed	20.628	.000	5.220	1374	.000	.09508	.01822	.05934	.13081
	Equal variances not assumed			5.214	1351	.000	.09508	.01823	.05931	.13085

Summer Weekend After Closed	Equal variances assumed	.324	.569	-8.690	1374	.000	-.17680	.02034	-.21671	-.13689
	Equal variances not assumed			-8.691	1374	.000	-.17680	.02034	-.21671	-.13690
Winter Weekday Afternoon Open	Equal variances assumed	22.570	.000	3.574	1374	.000	.07051	.01973	.03180	.10922
	Equal variances not assumed			3.570	1354	.000	.07051	.01975	.03177	.10925
Winter Weekday Afternoon Half Open	Equal variances assumed	15.522	.000	3.163	1374	.002	.05977	.01890	.02270	.09685
	Equal variances not assumed			3.161	1358	.002	.05977	.01891	.02267	.09688
Winter Weekday Afternoon Closed	Equal variances assumed	.223	.637	-6.144	1374	.000	-.13053	.02125	-.17221	-.08885
	Equal variances not assumed			-6.144	1374	.000	-.13053	.02124	-.17220	-.08885
Winter Weekend Afternoon Open	Equal variances assumed	18.419	.000	3.408	1374	.001	.06684	.01961	.02837	.10532
	Equal variances not assumed			3.405	1356	.001	.06684	.01963	.02834	.10535
Winter Weekend Afternoon Half Open	Equal variances assumed	10.651	.001	2.755	1374	.006	.05361	.01946	.01544	.09179
	Equal variances not assumed			2.753	1362	.006	.05361	.01947	.01541	.09182

Winter Weekend Afternoon Closed	Equal variances assumed	.618	.432	-5.653	1374	.000	-.12077	.02136	-.16268	-.07886
	Equal variances not assumed			-5.654	1374	.000	-.12077	.02136	-.16268	-.07887
Summer Weekday Evening Open	Equal variances assumed	80.900	.000	6.749	1374	.000	.10253	.01519	.07273	.13234
	Equal variances not assumed			6.733	1270	.000	.10253	.01523	.07266	.13241
Summer Weekday Evening Half Open	Equal variances assumed	15.907	.000	4.726	1374	.000	.08203	.01736	.04798	.11608
	Equal variances not assumed			4.722	1355	.000	.08203	.01737	.04795	.11611
Summer Weekday Evening Closed	Equal variances assumed	4.286	.039	-9.291	1374	.000	-.18459	.01987	-.22357	-.14561
	Equal variances not assumed			-9.287	1369	.000	-.18459	.01988	-.22358	-.14560
Summer Weekend Evening Open	Equal variances assumed	66.937	.000	5.865	1374	.000	.09212	.01571	.06130	.12293
	Equal variances not assumed			5.852	1288	.000	.09212	.01574	.06124	.12299
Summer Weekend Evening Half Open	Equal variances assumed	12.343	.000	4.592	1374	.000	.08299	.01807	.04754	.11844
	Equal variances not assumed			4.589	1361	.000	.08299	.01808	.04752	.11847

Summer Weekend Evening Closed	Equal variances assumed	1.400	.237	-8.631	1374	.000	-.17524	.02030	-.21507	-.13541
	Equal variances not assumed			-8.629	1372	.000	-.17524	.02031	-.21507	-.13540
Winter Weekday Evening Open	Equal variances assumed	27.534	.000	3.506	1374	.000	.06101	.01740	.02688	.09515
	Equal variances not assumed			3.502	1335	.000	.06101	.01742	.02683	.09520
Winter Weekday Evening Half Open	Equal variances assumed	8.897	.003	2.754	1374	.006	.04968	.01804	.01429	.08506
	Equal variances not assumed			2.752	1362	.006	.04968	.01805	.01427	.08509
Winter Weekday Evening Closed	Equal variances assumed	6.075	.014	-5.165	1374	.000	-.11077	.02145	-.15284	-.06870
	Equal variances not assumed			-5.163	1368	.000	-.11077	.02145	-.15286	-.06869
Winter Weekend Evening Open	Equal variances assumed	18.602	.000	3.157	1374	.002	.05534	.01753	.02095	.08973
	Equal variances not assumed			3.153	1350	.002	.05534	.01755	.02091	.08977
Winter Weekend Evening Half Open	Equal variances assumed	4.869	.028	2.071	1374	.039	.03809	.01839	.00201	.07417
	Equal variances not assumed			2.070	1365	.039	.03809	.01840	.00199	.07419

Winter Weekend Evening Closed	Equal variances assumed	2.816	.094	-4.314	1374	.000	-.09372	.02172	-.13634	-.05110
	Equal variances not assumed			-4.313	1370	.000	-.09372	.02173	-.13635	-.05109
Summer Weekday Morning Open	Equal variances assumed	40.855	.000	5.478	1374	.000	.09079	.01657	.05828	.12330
	Equal variances not assumed			5.469	1322	.000	.09079	.01660	.05822	.12335
Summer Weekday Morning Half Open	Equal variances assumed	10.306	.001	4.379	1374	.000	.08035	.01835	.04436	.11634
	Equal variances not assumed			4.376	1360	.000	.08035	.01836	.04433	.11637
Summer Weekday Morning Closed	Equal variances assumed	1.408	.236	-8.483	1374	.000	-.17136	.02020	-.21098	-.13173
	Equal variances not assumed			-8.484	1374	.000	-.17136	.02020	-.21098	-.13173
Summer Weekend Morning Open	Equal variances assumed	40.063	.000	4.907	1374	.000	.08350	.01702	.05012	.11688
	Equal variances not assumed			4.900	1327	.000	.08350	.01704	.05007	.11693
Summer Weekend Morning Half Open	Equal variances assumed	19.151	.000	5.437	1374	.000	.09951	.01830	.06361	.13542
	Equal variances not assumed			5.432	1353	.000	.09951	.01832	.06358	.13545

Summer Weekend Morning Closed	Equal variances assumed	1.941	.164	-9.039	1374	.000	-.18321	.02027	-.22297	-.14345
	Equal variances not assumed			-9.042	1374	.000	-.18321	.02026	-.22296	-.14346
Winter Weekday Morning Open	Equal variances assumed	20.146	.000	3.605	1374	.000	.07083	.01964	.03229	.10936
	Equal variances not assumed			3.602	1357	.000	.07083	.01966	.03226	.10939
Winter Weekday Morning Half Open	Equal variances assumed	13.087	.000	3.035	1374	.002	.05690	.01875	.02012	.09367
	Equal variances not assumed			3.033	1360	.002	.05690	.01876	.02010	.09370
Winter Weekday Morning Closed	Equal variances assumed	.542	.462	-5.992	1374	.000	-.12801	.02136	-.16992	-.08610
	Equal variances not assumed			-5.992	1374	.000	-.12801	.02136	-.16992	-.08610
Winter Weekend Morning Open	Equal variances assumed	16.180	.000	3.222	1374	.001	.06266	.01945	.02451	.10081
	Equal variances not assumed			3.219	1357	.001	.06266	.01946	.02448	.10084
Winter Weekend Morning Half Open	Equal variances assumed	8.359	.004	2.404	1374	.016	.04589	.01909	.00844	.08334
	Equal variances not assumed			2.403	1364	.016	.04589	.01910	.00842	.08336

Winter Weekend Morning Closed	Equal variances assumed	.530	.467	-5.108	1374	.000	-.10900	.02134	-.15086	-.06714
	Equal variances not assumed			-5.108	1374	.000	-.10900	.02134	-.15086	-.06714

Mid-Tier and Southern Climate Zone Comparison

Group Statistics					
Climate Zone		N	Mean	Std. Deviation	Std. Error Mean
Summer Weekday Afternoon Open	Mid-Tier	687	.2014	.31036	0.0118
	Southern Tier	694	.1497	.26677	0.0101
Summer Weekday Afternoon Half Open	Mid-Tier	687	.3209	.35466	0.0135
	Southern Tier	694	.2520	.31796	0.0121
Summer Weekday Afternoon Closed	Mid-Tier	687	.4779	.39079	0.0149
	Southern Tier	694	.5986	.37009	0.0140
Summer Weekend Afternoon Open	Mid-Tier	687	.2134	.32440	0.0124
	Southern Tier	694	.1658	.28532	0.0108
Summer Weekend Afternoon Half Open	Mid-Tier	687	.3277	.37010	0.0141
	Southern Tier	694	.2486	.31824	0.0121
Summer Weekend After Closed	Mid-Tier	687	.4593	.39831	0.0152
	Southern Tier	694	.5859	.37912	0.0144
Winter Weekday Afternoon Open	Mid-Tier	687	.2555	.36795	0.0140
	Southern Tier	694	.2382	.34635	0.0131
Winter Weekday Afternoon Half Open	Mid-Tier	687	.2825	.36033	0.0137
	Southern Tier	694	.2563	.33432	0.0127
Winter Weekday Afternoon Closed	Mid-Tier	687	.4624	.41171	0.0157
	Southern Tier	694	.5058	.39533	0.0150
Winter Weekend Afternoon Open	Mid-Tier	687	.2574	.36873	0.0141
	Southern Tier	694	.2347	.34554	0.0131
Winter Weekend Afternoon Half Open	Mid-Tier	687	.2853	.36155	0.0138
	Southern Tier	694	.2720	.34689	0.0132
Winter Weekend Afternoon Closed	Mid-Tier	687	.4578	.40593	0.0155
	Southern Tier	694	.4936	.39880	0.0151
Summer Weekday Evening Open	Mid-Tier	687	.1869	.30158	0.0115
	Southern Tier	694	.1240	.24104	0.0091
Summer Weekday Evening Half Open	Mid-Tier	687	.2861	.33423	0.0128
	Southern Tier	694	.2254	.30510	0.0116
Summer Weekday Evening Closed	Mid-Tier	687	.5275	.38644	0.0147
	Southern Tier	694	.6508	.36058	0.0137
Summer Weekend Evening Open	Mid-Tier	687	.1916	.31311	0.0119
	Southern Tier	694	.1319	.25396	0.0096
Summer Weekend Evening Half Open	Mid-Tier	687	.2943	.35112	0.0134
	Southern Tier	694	.2359	.32121	0.0122
Summer Weekend Evening Closed	Mid-Tier	687	.5145	.39784	0.0152
	Southern Tier	694	.6324	.37201	0.0141

Winter Weekday Evening Open	Mid-Tier	687	.1787	.31251	0.0119
	Southern Tier	694	.1651	.29721	0.0113
Winter Weekday Evening Half Open	Mid-Tier	687	.2618	.34603	0.0132
	Southern Tier	694	.2166	.32177	0.0122
Winter Weekday Evening Closed	Mid-Tier	687	.5599	.40511	0.0155
	Southern Tier	694	.6186	.38781	0.0147
Winter Weekend Evening Open	Mid-Tier	687	.1812	.32125	0.0123
	Southern Tier	694	.1694	.30588	0.0116
Winter Weekend Evening Half Open	Mid-Tier	687	.2564	.34958	0.0133
	Southern Tier	694	.2324	.33049	0.0125
Winter Weekend Evening Closed	Mid-Tier	687	.5628	.40862	0.0156
	Southern Tier	694	.5985	.39558	0.0150
Summer Weekday Morning Open	Mid-Tier	687	.2163	.32230	0.0123
	Southern Tier	694	.1674	.27839	0.0106
Summer Weekday Morning Half Open	Mid-Tier	687	.3137	.34571	0.0132
	Southern Tier	694	.2640	.32550	0.0124
Summer Weekday Morning Closed	Mid-Tier	687	.4701	.38765	0.0148
	Southern Tier	694	.5688	.37828	0.0144
Summer Weekend Morning Open	Mid-Tier	687	.2254	.33633	0.0128
	Southern Tier	694	.1730	.28750	0.0109
Summer Weekend Morning Half Open	Mid-Tier	687	.3193	.36352	0.0139
	Southern Tier	694	.2532	.32064	0.0122
Summer Weekend Morning Closed	Mid-Tier	687	.4558	.39855	0.0152
	Southern Tier	694	.5740	.38133	0.0145
Winter Weekday Morning Open	Mid-Tier	687	.2508	.36652	0.0140
	Southern Tier	694	.2294	.34702	0.0132
Winter Weekday Morning Half Open	Mid-Tier	687	.2809	.35552	0.0136
	Southern Tier	694	.2495	.33288	0.0126
Winter Weekday Morning Closed	Mid-Tier	687	.4688	.40964	0.0156
	Southern Tier	694	.5214	.39799	0.0151
Winter Weekend Morning Open	Mid-Tier	687	.2481	.36585	0.0140
	Southern Tier	694	.2278	.34356	0.0130
Winter Weekend Morning Half Open	Mid-Tier	687	.2797	.35844	0.0137
	Southern Tier	694	.2657	.34208	0.0130
Winter Weekend Morning Closed	Mid-Tier	687	.4726	.40729	0.0155
	Southern Tier	694	.5069	.39736	0.0151

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Summer Weekday Afternoon Open	Equal variances assumed	24.852	.000	3.325	1379	.001	.05177	.01557	.02123	.08231
	Equal variances not assumed			3.323	1344	.001	.05177	.01558	.02121	.08234
Summer Weekday Afternoon Half Open	Equal variances assumed	19.442	.000	3.806	1379	.000	.06897	.01812	.03342	.10452
	Equal variances not assumed			3.804	1360	.000	.06897	.01813	.03340	.10454
Summer Weekday Afternoon Closed	Equal variances assumed	6.811	.009	-5.891	1379	.000	-.12064	.02048	-.16081	-.08047
	Equal variances not assumed			-5.889	1373	.000	-.12064	.02049	-.16083	-.08045
Summer Weekend Afternoon Open	Equal variances assumed	21.377	.000	2.899	1379	.004	.04764	.01644	.01540	.07988
	Equal variances not assumed			2.897	1353	.004	.04764	.01645	.01538	.07991
Summer Weekend Afternoon Half Open	Equal variances assumed	30.502	.000	4.258	1379	.000	.07907	.01857	.04264	.11549
	Equal variances not assumed			4.255	1345	.000	.07907	.01858	.04262	.11552

Summer Weekend After Closed	Equal variances assumed	6.772	.009	-6.051	1379	.000	-.12661	.02092	-.16765	-.08556
	Equal variances not assumed			-6.049	1374	.000	-.12661	.02093	-.16766	-.08555
Winter Weekday Afternoon Open	Equal variances assumed	5.559	.019	.899	1379	.369	.01729	.01923	-.02043	.05501
	Equal variances not assumed			.899	1372	.369	.01729	.01923	-.02044	.05502
Winter Weekday Afternoon Half Open	Equal variances assumed	7.427	.007	1.400	1379	.162	.02619	.01870	-.01050	.06288
	Equal variances not assumed			1.400	1369	.162	.02619	.01871	-.01051	.06290
Winter Weekday Afternoon Closed	Equal variances assumed	5.152	.023	-1.996	1379	.046	-.04336	.02172	-.08597	-.00075
	Equal variances not assumed			-1.996	1375	.046	-.04336	.02172	-.08598	-.00075
Winter Weekend Afternoon Open	Equal variances assumed	5.715	.017	1.176	1379	.240	.02261	.01923	-.01511	.06033
	Equal variances not assumed			1.176	1371	.240	.02261	.01923	-.01512	.06034
Winter Weekend Afternoon Half Open	Equal variances assumed	2.132	.145	.697	1379	.486	.01328	.01907	-.02412	.05068
	Equal variances not assumed			.696	1375	.486	.01328	.01907	-.02413	.05069

Winter Weekend Afternoon Closed	Equal variances assumed	.776	.379	-1.655	1379	.098	-.03583	.02165	-.07831	.00665
	Equal variances not assumed			-1.654	1378	.098	-.03583	.02166	-.07831	.00665
Summer Weekday Evening Open	Equal variances assumed	42.218	.000	4.279	1379	.000	.06284	.01468	.03403	.09164
	Equal variances not assumed			4.274	1310	.000	.06284	.01470	.03400	.09167
Summer Weekday Evening Half Open	Equal variances assumed	13.977	.000	3.526	1379	.000	.06071	.01722	.02693	.09449
	Equal variances not assumed			3.524	1365	.000	.06071	.01723	.02692	.09450
Summer Weekday Evening Closed	Equal variances assumed	11.542	.001	-6.132	1379	.000	-.12333	.02011	-.16278	-.08387
	Equal variances not assumed			-6.130	1370	.000	-.12333	.02012	-.16279	-.08386
Summer Weekend Evening Open	Equal variances assumed	40.514	.000	3.897	1379	.000	.05976	.01533	.02968	.08984
	Equal variances not assumed			3.893	1317	.000	.05976	.01535	.02964	.08987
Summer Weekend Evening Half Open	Equal variances assumed	12.911	.000	3.222	1379	.001	.05834	.01811	.02282	.09386
	Equal variances not assumed			3.221	1366	.001	.05834	.01811	.02281	.09388

Summer Weekend Evening Closed	Equal variances assumed	10.982	.001	-5.688	1379	.000	-.11788	.02072	-.15853	-.07722
	Equal variances not assumed			-5.686	1371	.000	-.11788	.02073	-.15855	-.07721
Winter Weekday Evening Open	Equal variances assumed	1.886	.170	.830	1379	.407	.01362	.01641	-.01857	.04581
	Equal variances not assumed			.830	1374	.407	.01362	.01641	-.01858	.04582
Winter Weekday Evening Half Open	Equal variances assumed	7.295	.007	2.517	1379	.012	.04525	.01798	.00998	.08052
	Equal variances not assumed			2.516	1370	.012	.04525	.01799	.00997	.08053
Winter Weekday Evening Closed	Equal variances assumed	4.982	.026	-2.750	1379	.006	-.05869	.02134	-.10055	-.01683
	Equal variances not assumed			-2.750	1375	.006	-.05869	.02134	-.10056	-.01682
Winter Weekend Evening Open	Equal variances assumed	1.820	.178	.698	1379	.485	.01178	.01688	-.02133	.04490
	Equal variances not assumed			.698	1374	.485	.01178	.01688	-.02134	.04490
Winter Weekend Evening Half Open	Equal variances assumed	2.548	.111	1.312	1379	.190	.02401	.01831	-.01190	.05992
	Equal variances not assumed			1.311	1373	.190	.02401	.01831	-.01191	.05993

Winter Weekend Evening Closed	Equal variances assumed	2.435	.119	-1.650	1379	.099	-.03571	.02164	-.07816	.00675
	Equal variances not assumed			-1.650	1377	.099	-.03571	.02165	-.07817	.00675
Summer Weekday Morning Open	Equal variances assumed	21.601	.000	3.022	1379	.003	.04895	.01620	.01717	.08074
	Equal variances not assumed			3.019	1346	.003	.04895	.01621	.01715	.08076
Summer Weekday Morning Half Open	Equal variances assumed	5.776	.016	2.750	1379	.006	.04969	.01807	.01425	.08513
	Equal variances not assumed			2.749	1372	.006	.04969	.01807	.01424	.08515
Summer Weekday Morning Closed	Equal variances assumed	1.332	.249	-4.789	1379	.000	-.09872	.02061	-.13915	-.05828
	Equal variances not assumed			-4.789	1377	.000	-.09872	.02061	-.13915	-.05828
Summer Weekend Morning Open	Equal variances assumed	28.264	.000	3.109	1379	.002	.05233	.01683	.01931	.08535
	Equal variances not assumed			3.107	1342	.002	.05233	.01685	.01929	.08538
Summer Weekend Morning Half Open	Equal variances assumed	21.247	.000	3.582	1379	.000	.06606	.01844	.02988	.10223
	Equal variances not assumed			3.580	1354	.000	.06606	.01845	.02986	.10226

Summer Weekend Morning Closed	Equal variances assumed	5.859	.016	-5.633	1379	.000	-.11823	.02099	-.15940	-.07705
	Equal variances not assumed			-5.631	1375	.000	-.11823	.02099	-.15941	-.07704
Winter Weekday Morning Open	Equal variances assumed	4.621	.032	1.110	1379	.267	.02132	.01921	-.01636	.05899
	Equal variances not assumed			1.110	1373	.267	.02132	.01921	-.01637	.05900
Winter Weekday Morning Half Open	Equal variances assumed	6.293	.012	1.693	1379	.091	.03138	.01853	-.00498	.06773
	Equal variances not assumed			1.693	1371	.091	.03138	.01854	-.00499	.06774
Winter Weekday Morning Closed	Equal variances assumed	2.391	.122	-2.418	1379	.016	-.05256	.02173	-.09520	-.00993
	Equal variances not assumed			-2.418	1377	.016	-.05256	.02174	-.09520	-.00992
Winter Weekend Morning Open	Equal variances assumed	5.100	.024	1.063	1379	.288	.02030	.01910	-.01716	.05776
	Equal variances not assumed			1.063	1372	.288	.02030	.01910	-.01718	.05777
Winter Weekend Morning Half Open	Equal variances assumed	2.912	.088	.742	1379	.458	.01399	.01885	-.02300	.05097
	Equal variances not assumed			.742	1375	.458	.01399	.01886	-.02300	.05098

Winter Weekend Morning Closed	Equal variances assumed	1.326	.250	-1.585	1379	.113	-.03431	.02165	-.07679	.00817
	Equal variances not assumed			-1.584	1377	.113	-.03431	.02166	-.07679	.00817

Endnotes

[1] The α value represents the behavioral error rate. In other words, should we repeat the survey in at least 95% of the cases we would observe a difference between the Northern and Southern climate zones in the share of window coverings in a closed position per household.
[2] Schaeffer, N.C., and S. Presser. 2003. "The Science of Asking Questions." *Annual Review of Sociology* 29:65-88.
[3] A transom window is an operable or fixed window on the upper portion of a wall or above other windows or doors on an upper part of a wall.
[4] A bow window is a rounded set of windows that project from the wall in an arc shape, consisting of windows of the same type (all double hung, for example).
[5] U.S. Census Bureau, Current Population Survey, 2012 Annual Social and Economic Supplement.
[6] U.S. Energy Information Administration, Residential Energy Consumption Survey, March 28, 2011.
[7] U.S. Census Bureau, American Housing Survey 2009.
[8] U.S. Energy Information Administration, Residential Energy Consumption Survey, March 28, 2011.
[9] Ducker Research Company, Inc., *Study of the U.S. Market For Windows, Doors and Skylights,* Published on behalf of the American Architectural Manufacturers Association and the Window and Door Manufacturers Association, May 2010.
[10] Information Provided to D&R International by WCMA
[11] Poetsch, S., & Gaudry, P. (2012, May 31). [E-mail interview by E. Phan-Gruber].
[12] Poetsch, S., & Gaudry, P. (2012, May 31). [E-mail interview by E. Phan-Gruber].
[13] Barrett, Deb. *Blind and Shade Industry Snapshot*. Rept. N.p.: IBIS World, 2012. Print.
[14] Information provided to D&R International by WCMA members.
[15] Information provided to D&R International by WCMA members.
[16] Information provided to D&R International by WCMA members.
[17] Information provided to D&R International by WCMA members.
[18] U.S. Census Bureau, 2010 Census, American FactFinder.
[19] U.S. Census Bureau, 2010 American Community Survey, American FactFinder.
[20] Ibid.
[21] U.S. Census Bureau, 2007-2011 American Community Survey, American FactFinder.
[22] U.S. Census Bureau, 2010 Census, American FactFinder.
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[24] Bureau of Labor Statistics, "The Employment Situation-August 2012", U.S. Department of Labor, September 2012.
[25] Ibid.
[26] U.S. Census Bureau, 2010 American Community Survey, American FactFinder.
[27] Ibid.
[28] U.S. Census Bureau, Current Population Survey, Computer and Internet Use in the United States: 2010.
[29] U.S. Census Bureau: State and County QuickFacts. Accessed August 2012.
[30] U.S. Census Bureau, Census 2010 Census Summary File 1, American FactFinder.
[31] U.S. Census Bureau, American Housing Survey, 2009.
[32] Figure from the U.S. Census Bureau, American Community Survey, 2010.
[33] Ibid.
[34] Figure compiled from U.S. Census Bureau, Foreign Trade Division. Accessed August 2012.
[35] Estimate based on consultation with WCMA members.
[36] Estimates based on consultation with WCMA members.
[37] Environmental Protection Agency. ENERGY STAR website.
http://www.energystar.gov/ia/products/windows_doors/Promotional_Map.pdf?a700-e9aa. Accessed 31 July 2012.
[38] U.S. Department of Energy, "Residential Provisions of the 2012 International Energy Conservation Code." July 2011.
http://www.energycodes.gov/becu/documents/2012iecc_residential_BECU.pdf. Accessed 31 July 2012.
[39] Bradburn, N., S. Sudman, and B.Wansink. 2004. *Asking Questions: The Definitive Guide to Questionnaire Design.* San Francisco: Jossey-Bass.
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[41] U.S. Census Bureau. Current Population Survey. 2012 Annual Social and Economic Supplement.

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