REPORT # MR25-008

California Window Stock Study

Determining room heat pump product needs for California

Research Report

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1 Introduction

CalMTA's Phase II research for the Room Heat Pumps (RHPs) Market Transformation Initiative (MTI) identified the need to better understand window types in residential buildings. The Room Heat Pump Market Characterization Report identified that as much as 50% of all window types in California could be horizontal sliders, and that the most probable location for an RHP would be primary bedrooms and living rooms. These findings indicated a potential barrier to market adoption of RHPs: currently, the most efficient and appealing products, U-shaped and saddlebag form factors, are only designed to fit in double hung windows. Standard box units face similar difficulty when trying to be utilized in horizontal sliding windows.

CalMTA has recommended a market intervention strategy to engage manufacturers in a technology challenge to develop an RHP that fits horizontal slider windows and has heating and cooling specifications that are appropriate for California's moderate climate. CalMTA determined that manufacturers required more detailed information on California residential window characteristics, including window measurements and locations, to drive their participation in the technology challenge. To obtain that information, CalMTA conducted a large-scale survey of residential homeowners.

The survey was also utilized to collect home characteristics and respondent knowledge of RHPs. The sample was established from a Qualtrics panel with the goal of achieving a large, stratified representative sample of California (see section 3 Methodology). This report summarizes the key findings and conclusions from the survey research effort.

Additionally, the survey included questions on cooktops, which will be reported in a separate deliverable forthcoming in 2026.[1]

2 Study objectives

This study had three primary objectives:

1) Gain insight into the window types in multifamily and single-family homes in California.
2) Determine the most common measurements of slider windows in multifamily and single-family homes in California.
3) Understand participant knowledge of, and likelihood to adopt, room heat pumps.

[1] The cooktop-related survey questions to be reported in 2026 addressed the following objectives in support of CalMTA's Induction Cooking MTI: 1) Understand types of cooktops in multifamily and single-family homes in California; 2) Understand participant knowledge of, and likelihood to adopt, induction cooktops.

3 Methodology

The CalMTA team developed a survey instrument covering demographics, home information, window information, heating and cooling information, and cooktop questions, with the goal of obtaining 5,000 responses from California residents.

A random sample was created using Qualtrics panels across California. Qualtrics builds their samples through online opt-in market research panels, from which participants earn small incentives for completing surveys. To ensure that each survey response is from a different individual, Qualtrics uses deduplication technology to remove multiple responses from the same IP address. Qualtrics also removed responses from individuals who completed the survey in less than five minutes to protect against responses where individuals rushed through the survey and realistically could not have answered the questions in the survey thoughtfully. At the end of sample cleaning, the sample included 5,100 people.

The CalMTA team sought a mix of respondents in terms of demographics but did not set hard quotas. To ensure that the sample collected was representative of the California population, CalMTA compared demographics of respondents to California statewide demographics using data from the United States Census Bureau. These demographic comparisons can be found in more detail in Appendix C. Generally, the sample is well-matched to the California demographics in terms of number of people living in a household, whether they own or rent, and their income, with a bias towards individuals in lower income brackets. This is unsurprising, given that individuals who seek supplemental income are more likely to complete surveys for incentives.

Compared to California census data, this survey sample favors multifamily homes and underrepresents older, single-family homes. For this reason, the study reports results separately for multifamily and single-family homes. After some additional consistency checks on the sample, 215 responses were removed. These checks included two separate lists being created (one looking at utility and zip code mismatches, and the other identifying suspect responses within Qualtrics based on things such as survey time, straight-lined answers, etc.), and these two lists had an overlap of 215 responses. Our final sample included 4,885 respondents.

Once the representativeness of the sample was assessed, CalMTA analyzed the data using PowerBI and Excel.

The report discusses the following window types:

1) **Horizontal sliding window:** A window that slides horizontally along tracks.
2) **Double hung window:** A window that features two operable sashes that slide up and down in the frame.
3) **Sliding glass door:** A sliding door made predominantly from glass and situated in an external wall.

4) **Casement window:** A window that is attached to its frame by one or more hinges at the side, allowing it to open outward like a door.

4 Findings

Objective 1: Gain insight into the window types in multifamily and single-family homes in California.

4.1 Window types

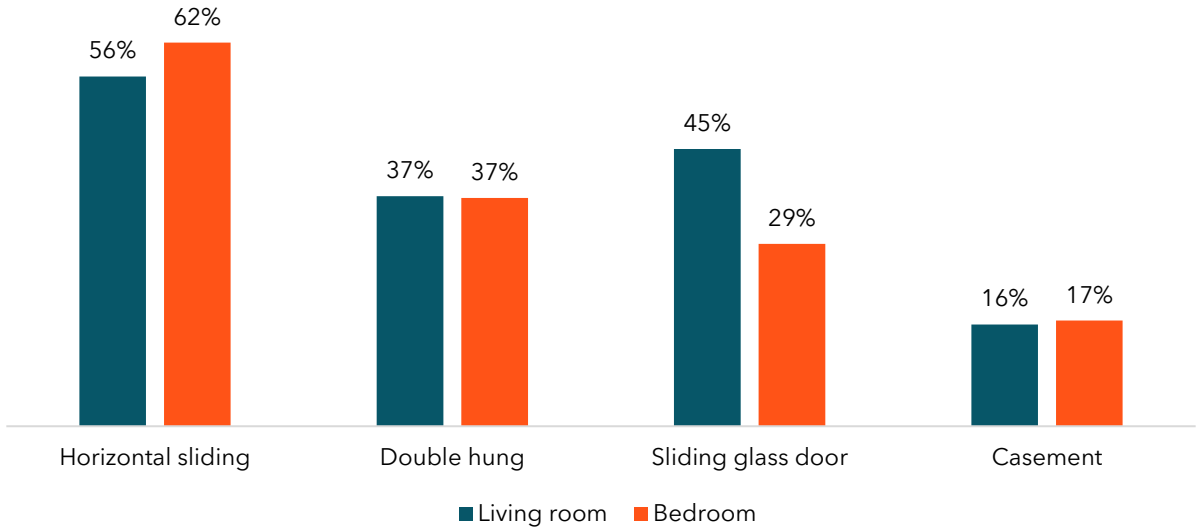
Previous research by CalMTA determined that individuals are most likely to install RHPs in their primary living room or primary bedroom. Respondents were therefore asked to describe the types of windows they had in their primary living room and in their primary bedroom. The findings are presented first for single-family homes (n=3,167) and then for multifamily homes (n=1,600), because these home types are fundamentally different due to the presence or absence of shared walls.

4.1.1 Single-family homes

Among respondents living in single-family homes (n=3,167), 86% reported having primary living rooms with operable windows, and 100% reported having primary bedrooms with operable windows.

Different window types were reported as being present within living rooms and bedrooms. As shown in Figure 1, 56% of single-family homes report one or more horizontal sliding windows present in their living rooms, and 62% report one or more horizontal sliding windows in primary bedrooms. This shows that the majority of homes surveyed have horizontal sliding windows as the most prevalent type present. Double hung windows are equally common in living rooms (37%) and bedrooms (37%). The chart shows all window types present in each room, regardless of quantity.

Figure 1. Reported window types present in single-family homes by room type (n=3,167)



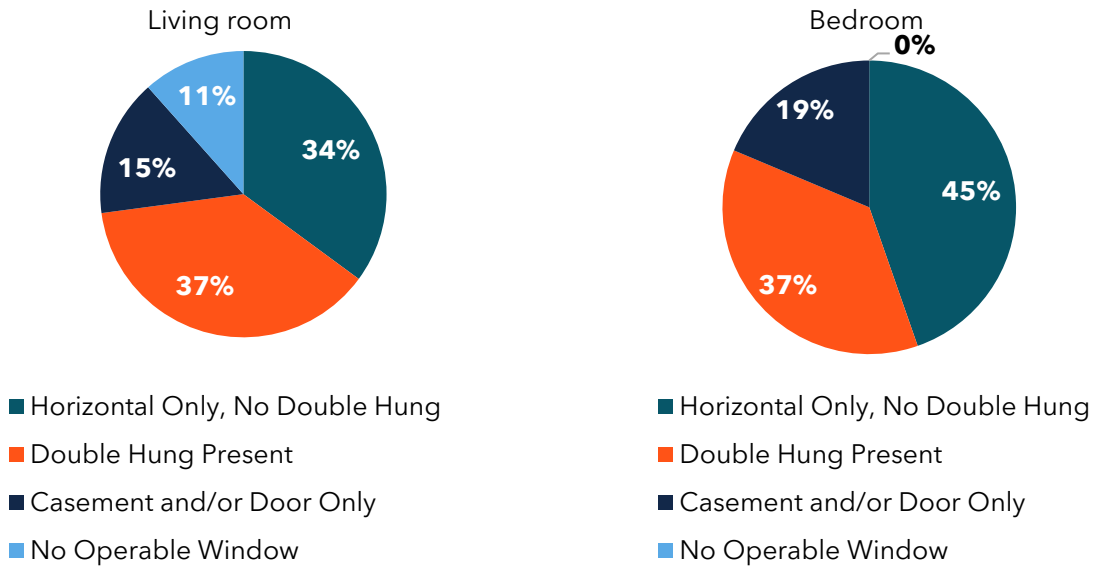
Survey Question: How many of your operable windows are each of the following types? [Asked separately for primary living rooms and bedrooms]

Note: Bars represent the presence of window types observed in each room type, with multiple types possible per room.

Sliding glass doors and casement windows were included in the data collection for completeness of responses, but double hung and horizontal sliding windows were of primary interest for this study. The analysis next explored the combination of windows present in living rooms and bedrooms: at least one double hung window present; no double hung and only horizontal sliders present; no double hung and only sliding glass doors or casement windows; or no operable windows.

Single-family living room and bedroom windows are characterized in Figure 2, showing 26% of living rooms and 19% of bedrooms with inoperable or unsuitable window types (sliding doors or casement only), 37% and 37% with a double hung window present, and **34% and 45% with *only* horizontal sliding windows present for living rooms and bedrooms, respectively**. Note that respondents did not report any inoperable windows within single-family bedrooms.

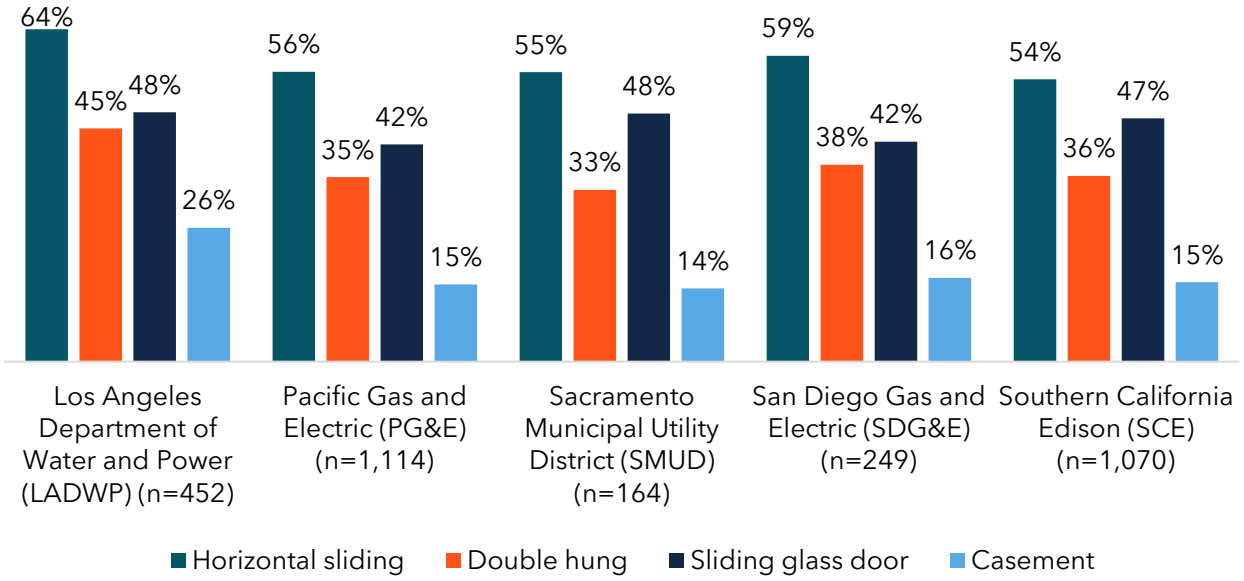
Figure 2. Single-family window types



Window type by utility

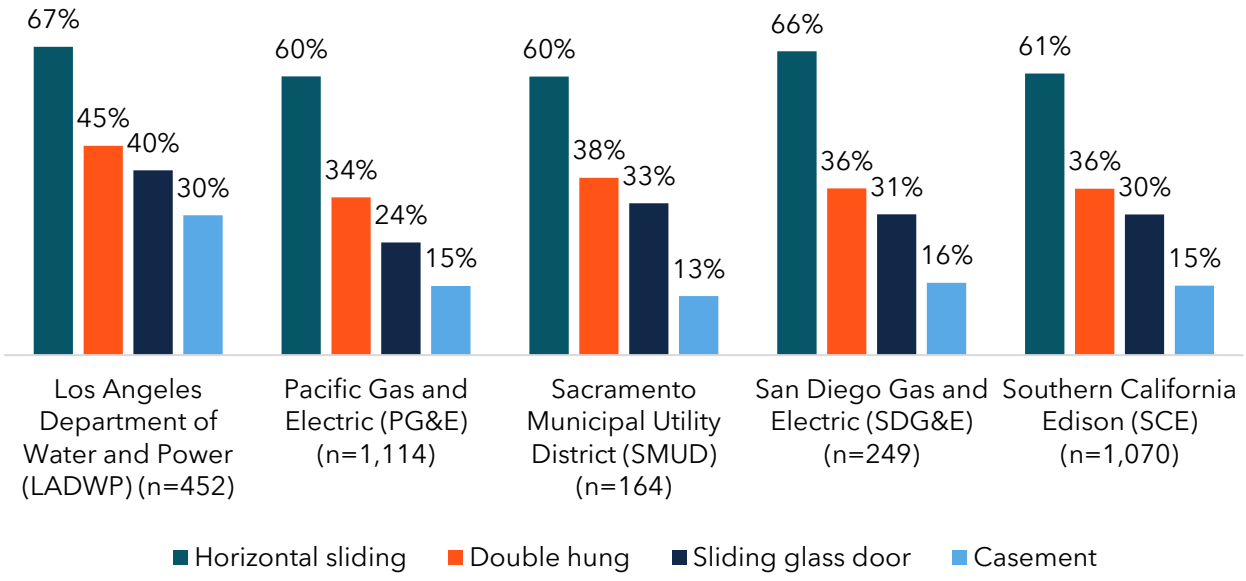
Window characteristics vary by utility service territory; however, horizontal sliding windows are the most common type of window in living rooms and bedrooms in all service territories.

Figure 3. Single-family window types by utility in living rooms



Survey Question: How many of these operable windows are each of the following types? AND Please select your electric utility.
Note: Analyzed on the household level.

Figure 4. Single-family window types by utility in bedrooms



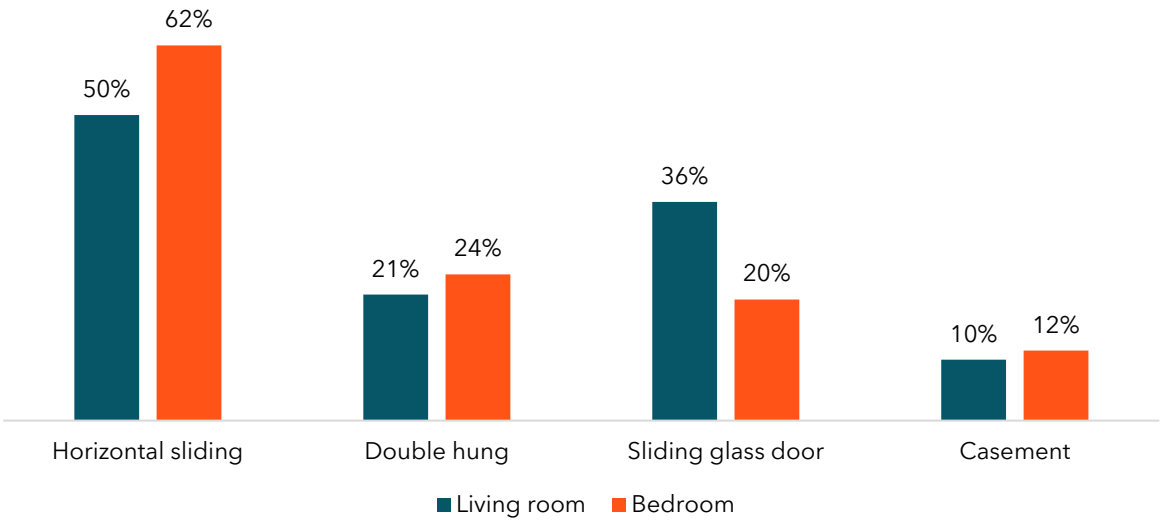
Survey Question: How many of these operable windows are each of the following types? AND Please select your electric utility.
Note: Analyzed on the household level.

4.1.2 Multifamily homes

Among respondents living in multifamily homes (n=1,600), 81% reported having primary living rooms with operable windows, and 90% reported having primary bedrooms with operable windows.

Different window types were reported as being present within living rooms and bedrooms. As shown in Figure 5, 50% of multifamily homes report one or more horizontal sliding windows present in their living rooms, and 62% report one or more horizontal sliding windows in primary bedrooms. This shows that the majority of homes surveyed have horizontal sliding windows as the most prevalent type present. Double hung windows are slightly more common in bedrooms (24%) than living rooms (21%). The chart shows all window types present in each room, regardless of quantity.

Figure 5. Reported window types present in multifamily by room type (n=1,600)



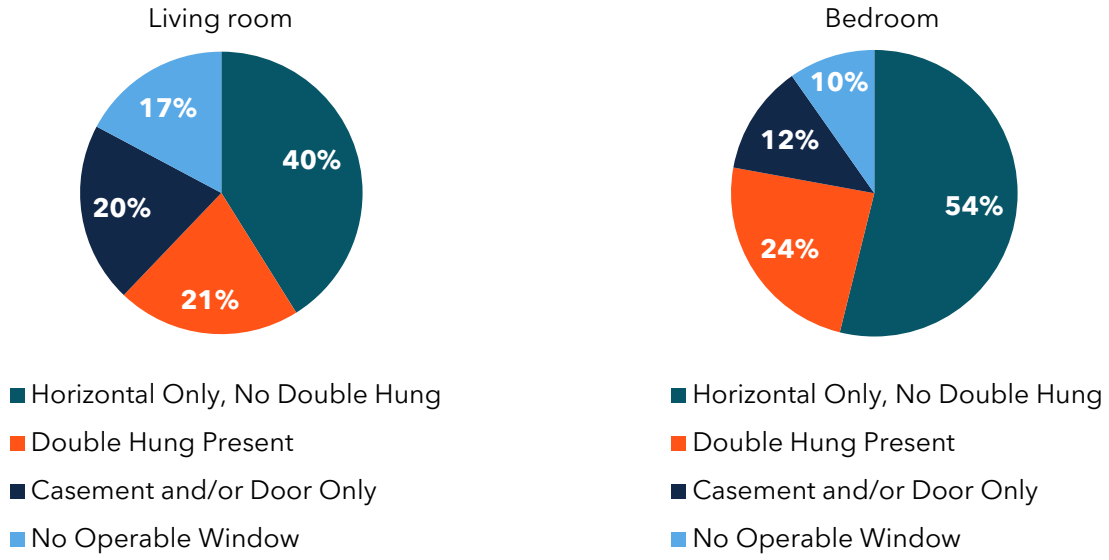
Survey Question: How many of your operable windows are each of the following types?
Note: Bars represent the presence of window types observed in each room, with multiple types possible per room.

As with single-family homes, the analysis next explored the combination of windows present in living rooms and bedrooms: at least one double hung window present; no double hung and only horizontal sliders present; no double hung and only sliding glass doors or casement windows; or no operable windows.

Single-family living room and bedroom windows are characterized in Figure 6, showing 37% of living rooms and 22% of bedrooms with inoperable or unsuitable window types (sliding doors or casement only), 21% and 24%, respectively, with a double hung window present, and **40% and 54% with *only* horizontal sliding windows present for living rooms and bedrooms, respectively**. These proportions are significantly higher than the proportions of single-family

residences with *only* horizontal sliding windows, for both living rooms (34%) and bedrooms (45%). Horizontal sliders alone are more common in bedrooms than living rooms for both single-family and multifamily residences.

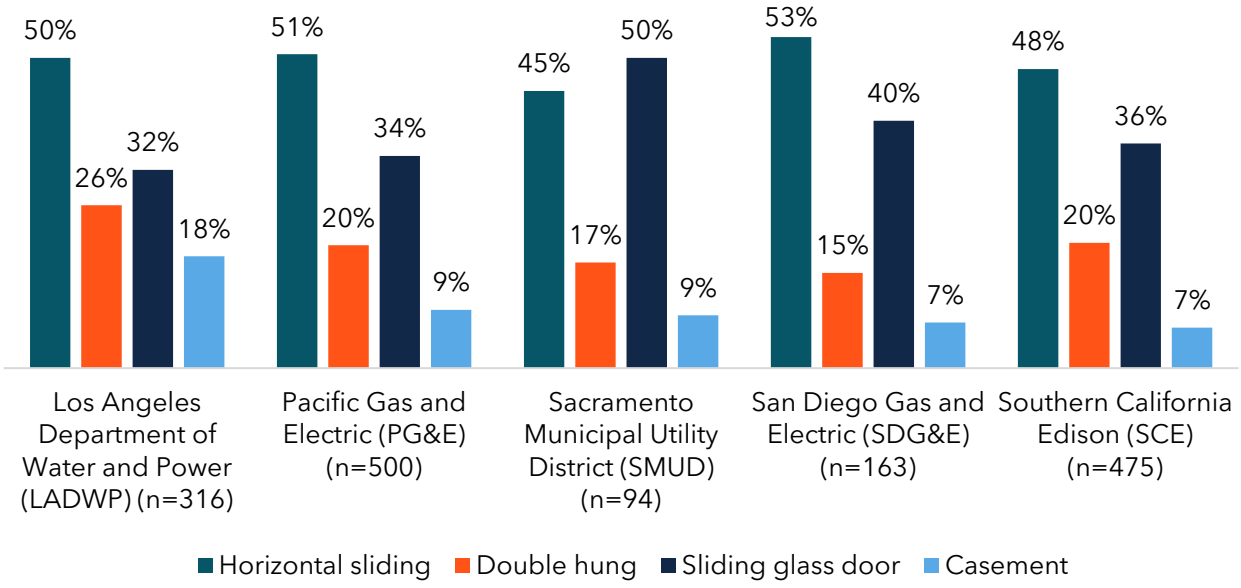
Figure 6. Multifamily window types



Window type by utility

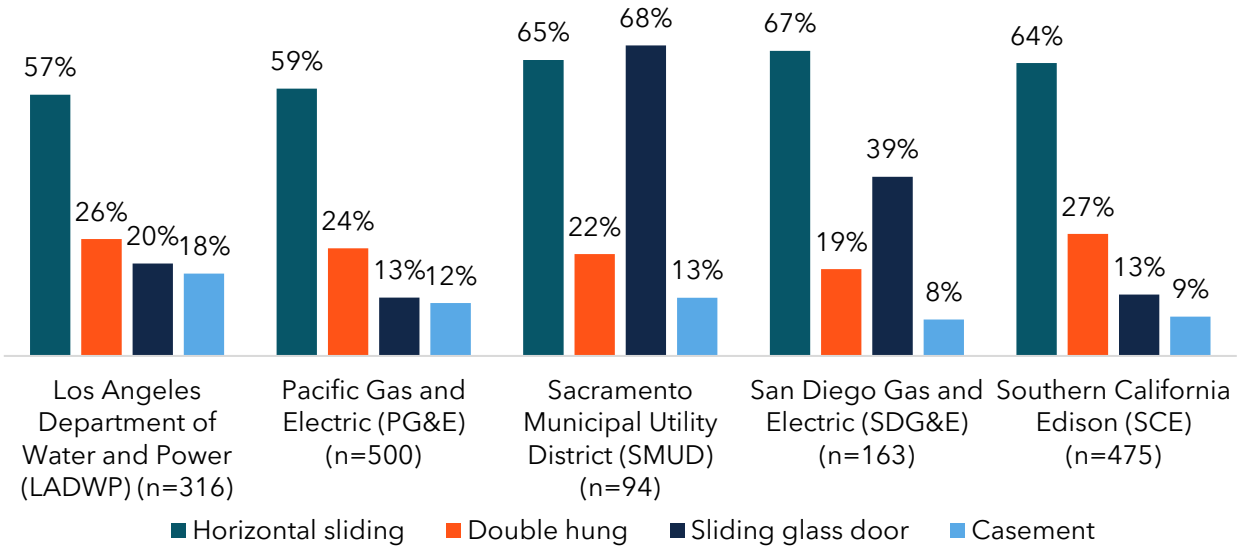
Horizontal sliding windows are the most frequently present type of window in multifamily residences across major utilities, with the exception of Sacramento Municipal Utility District (SMUD), where sliding glass doors were reported at a higher percentage. This is the case for windows in both living rooms (Figure 7) and bedrooms (Figure 8).

Figure 7. Multifamily window types by utility in living rooms



Survey Question: How many of these operable windows are each of the following types? AND Please select your electric utility.

Figure 8. Multifamily window types by utility in primary bedrooms



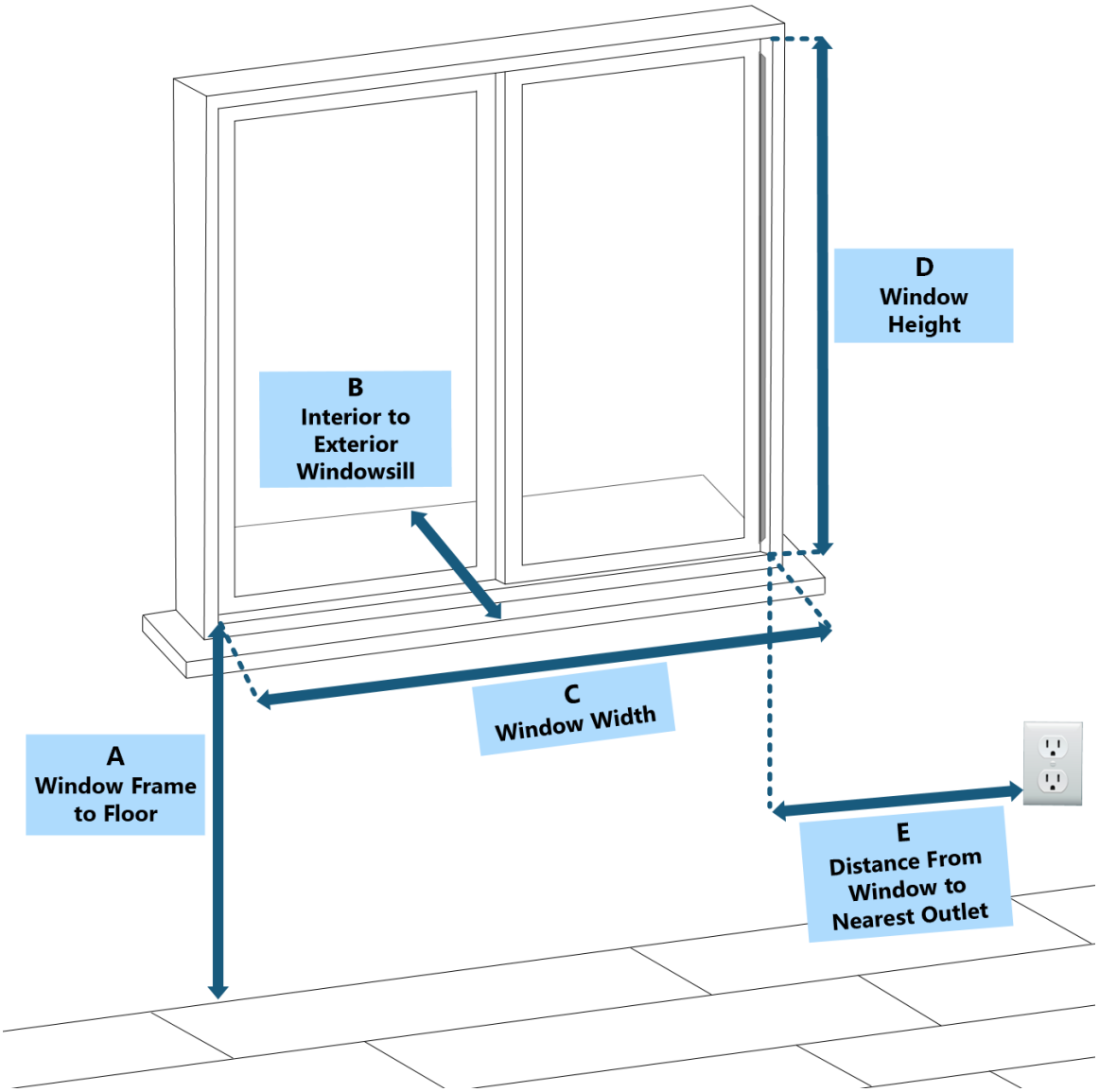
Survey Question: How many of these operable windows are each of the following types? AND Please select your electric utility.

Objective 2: Determine the most common measurements of horizontal sliding windows in single-family and multifamily homes in California.

4.2 Window measurements

Respondents were asked to provide measurements of the horizontal sliding windows in their living rooms and bedrooms. Figure **9** shows the dimensions for measurements that were collected in the survey.

Figure 9. Measurements collected from respondents

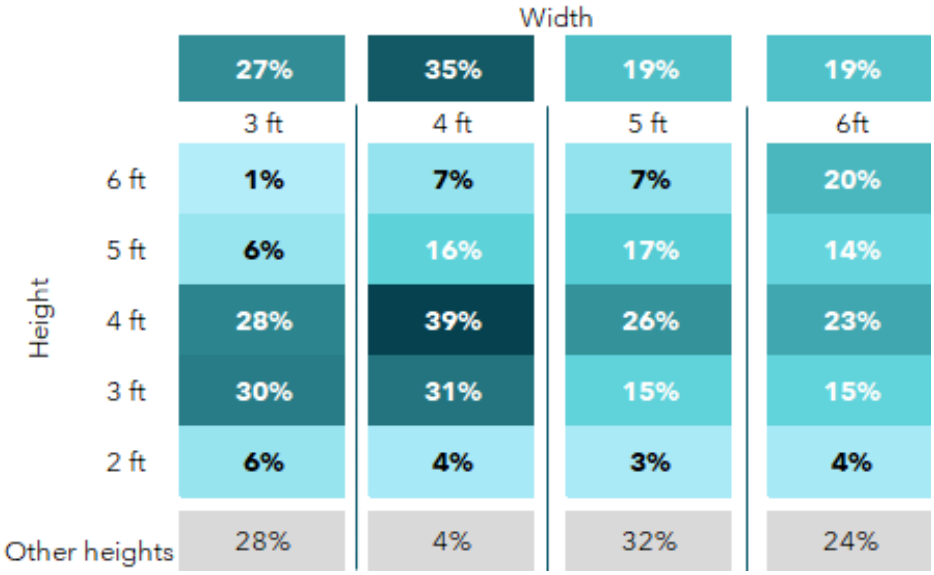


4.2.1 Most common horizontal sliding window widths and corresponding heights

The most commonly reported horizontal sliding window width was 4 feet across (which allows for less than 2 feet of opening space[2]), followed by widths of 3 feet, and 5 and 6 feet. The figure below shows the most common heights for each window width ranging from 3 to 6 feet.

Overall, the most common horizontal sliding window dimension reported was **4 feet across and 4 feet high**. The next most common dimensions were 4 feet across and 3 feet high, followed by 3 feet across and 3 or 4 feet high.

Figure 10. Prominent horizontal window widths and corresponding heights (n=3,501)



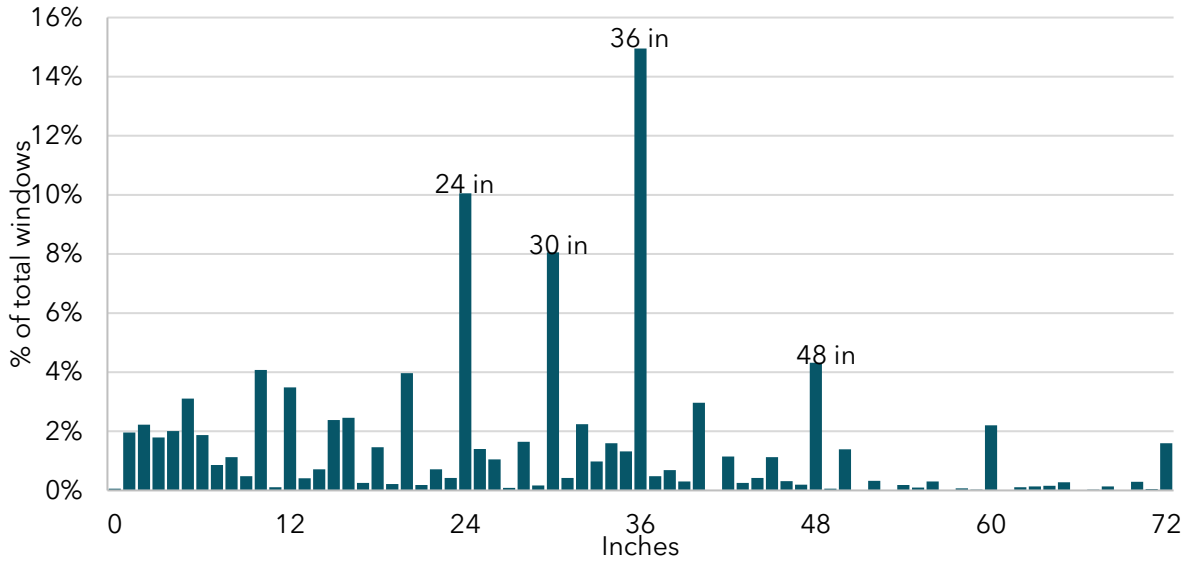
Note: The values at the top show the proportion of these most common window widths. Each vertical column shows the distribution of window heights for the respective window width. Window measurements were taken to include +/- 2 inches to account for measuring error. For example, "4-foot" windows include responses from 46 to 50 inches.

4.2.2 "A" - Window frame-to-floor distance

Over 8,000 horizontal sliding window distances from the bottom of the window to the floor were reported by respondents for living rooms and bedrooms across single-family and multifamily home types. The distances reported were consistent between room types and home types. The most common distance from the floor to the bottom of the window was 36 inches, followed by 24 inches, 30 inches, then 48 inches (Figure **11**). 69% of reported windows were 20 inches or more off the ground.

[2] The actual window opening is somewhat less than half of the window width to allow for a fully opened window and some overlap of the window sash.

Figure 11. Distribution of window frame-to-floor distances (n=8,266)

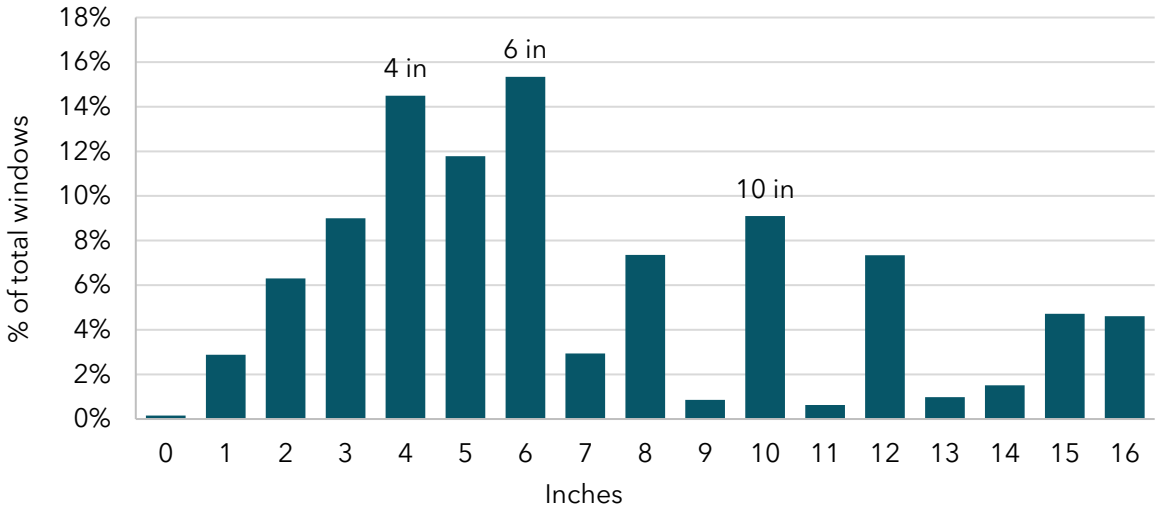


Note: Window frame-to-floor distances are rounded to the nearest inch in this figure. Exact data are shown in Appendix B.

4.2.3 "B" – Interior to exterior windowsill depth

The depth of the windowsill was reported, again, with little variability between single-family and multifamily or room types. The most prevalent windowsill depth was reported at 6 inches (approximately 15% of windows), closely followed by 4 inches (Figure 12). Additional measurements of 5 inches and 3 inches might be indicative of close measuring error. Another cluster of 8 inches, 10 inches, and 12 inches can be seen, which are represented slightly more in multifamily.

Figure 12. Distribution of interior-to-exterior windowsill depth (n=8,266)

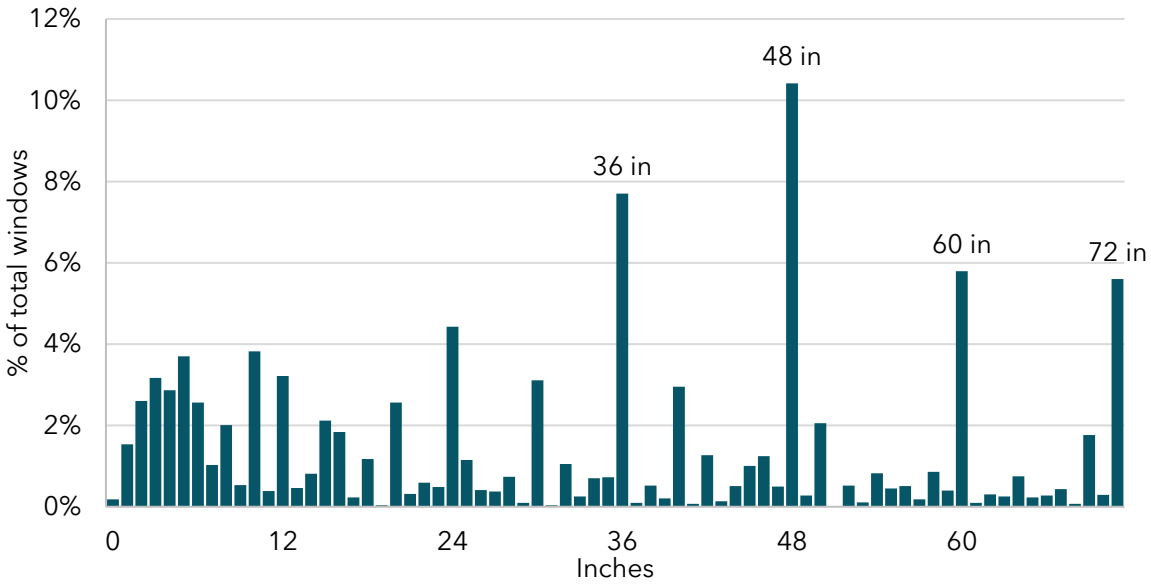


Note: Windowsill depths are rounded to the nearest inch in this figure. Exact data are shown in Appendix B.

4.2.4 "C" - Window width

Figure **13**Figure **13. Distribution of horizontal sliding window widths (n=8,266)** provides the distribution of reported horizontal sliding window widths for both single-family and multifamily, as well as living room and bedroom combined. Individual measurements can be found in Appendix B. It is important to note these are the measurements of the entire sliding window, so the opening is a little less than half of these measurements. Overall, the most prevalent horizontal sliding window width is 4 feet (more than 10% of windows), followed by 3 feet (just under 8% of windows), 5 feet, then 6 feet. Half of all windows were reported to have a width of 3 feet or more.

Figure 13. Distribution of horizontal sliding window widths (n=8,266)

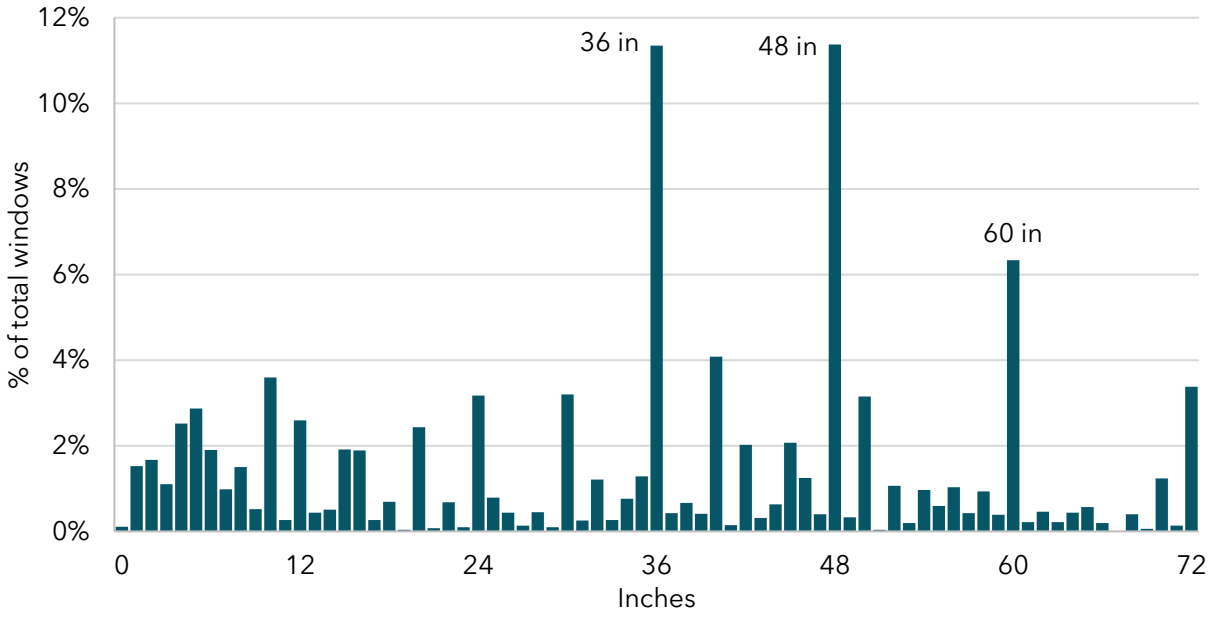


Note: Horizontal sliding window widths are rounded to the nearest inch in this figure. Exact data are shown in Appendix B.

4.2.5 "D" - Window height

Figure **14** shows horizontal sliding window heights for single-family and multifamily, as well as living room and bedroom combined. Across all reported horizontal sliding window heights, the predominant heights are reported as 3 and 4 feet (11% of windows, each), with 5 feet as the third most common.

Figure 14. Horizontal sliding window heights (n=8,266)

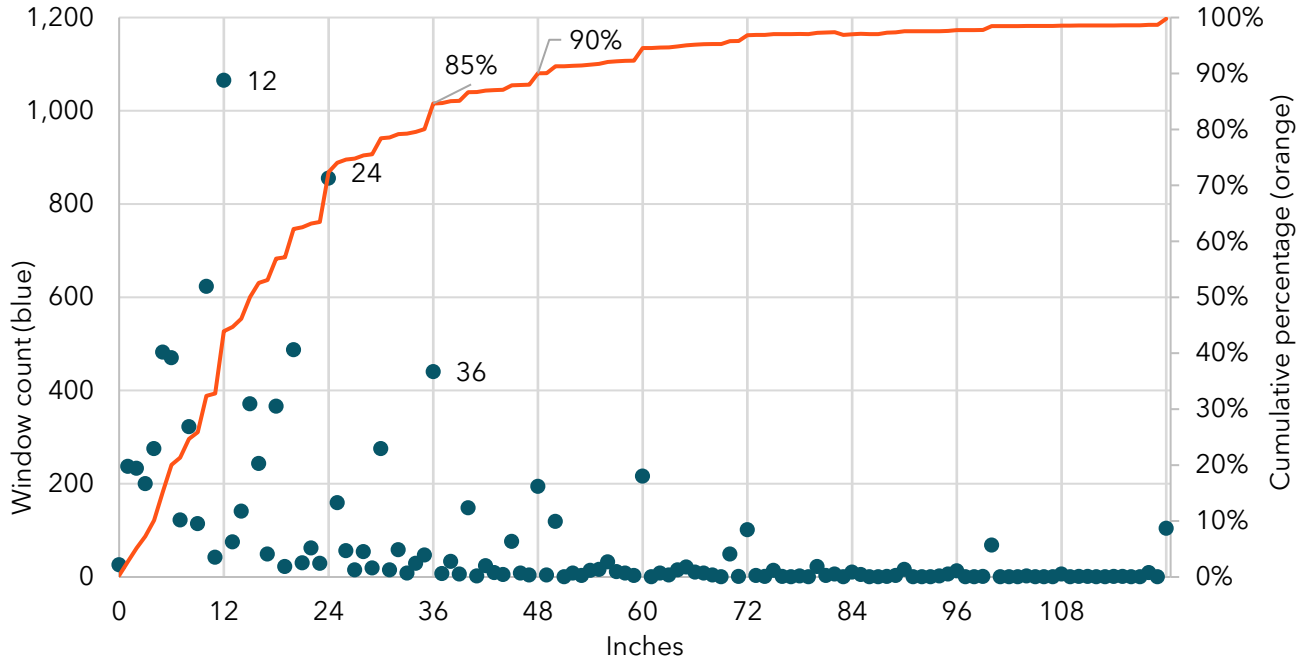


Note: Horizontal sliding window heights are rounded to the nearest inch in this figure. Exact data are shown in Appendix B.

4.2.6 "E" - Distance from window to nearest outlet

Nearly 9,600 measurements were provided for the distance from the window to the nearest outlet. The most common response was a distance of 12 inches, followed by 24 inches. Note that 85% of all responses indicated outlets were within 36 inches of the window, and 90% within 48 inches. This measurement is important to the manufacturing of window units because it is inadvisable to use an extension cord, so a minimum unit cord of 3 feet would reach outlets for 85% of reported windows.

Figure 15. Distance from window to outlet

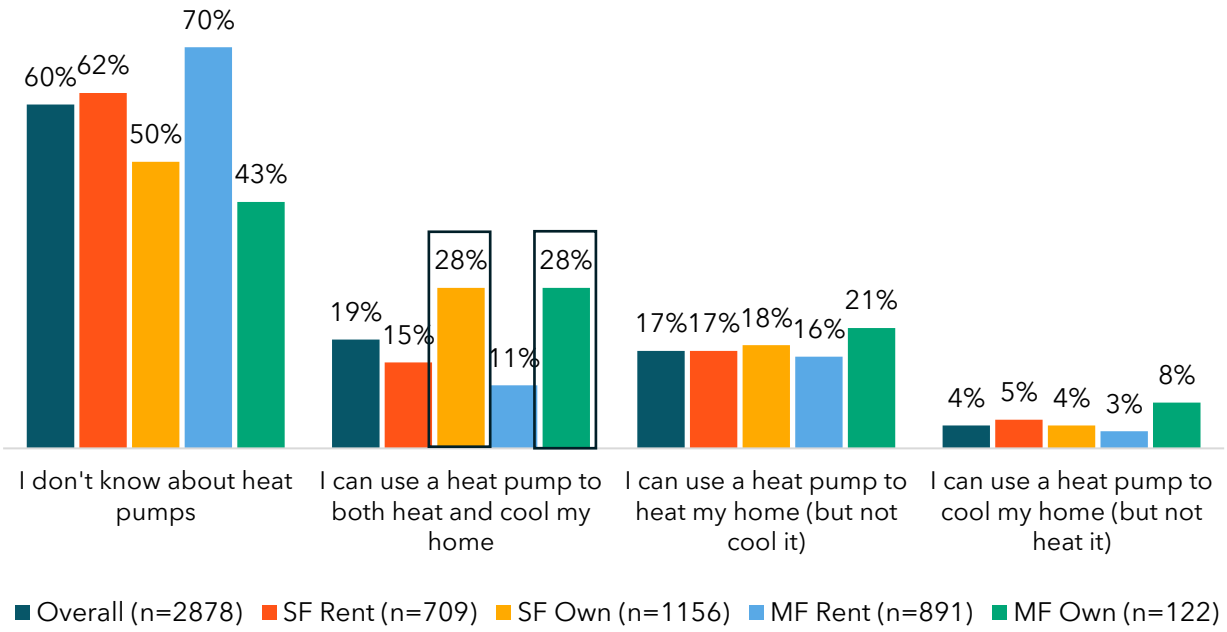


Objective 3: Understand respondent knowledge of, and likelihood to adopt, room heat pumps.

4.3 Understanding of heat pump functionality

Overall, 60% of respondents reported that they did not know about heat pumps, with homeowners more likely than renters to report any knowledge of heat pumps. Twenty-eight percent of both single-family and multifamily homeowners know that heat pumps can be used for both heating and cooling. This is approximately twice the percentage for renters, with renters of multifamily residences least likely (11%) to have that knowledge. Figure 16 provides complete reported heat pump knowledge by residential segment.

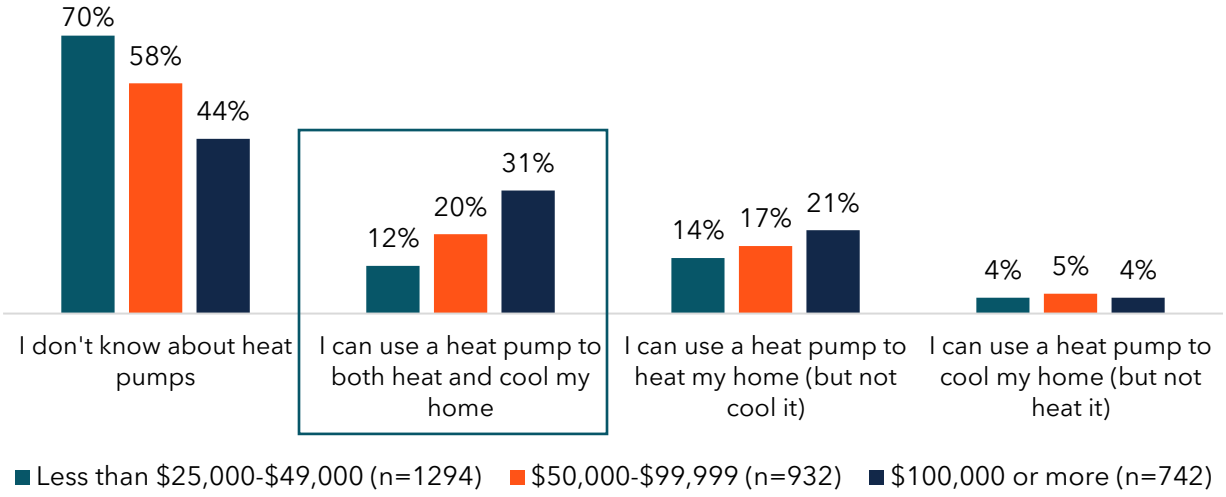
Figure 16. Knowledge of heat pump functionality, by residential segment



Survey Question: What type of home do you live in? AND Do you own or rent your home? AND Based on what you know about heat pumps, please indicate which of the following statements best describes your understanding of how you can use a heat pump.

Knowledge of heat pump functionality is correlated with income; 52% of respondents with annual household income greater than $100,000 said they could use a heat pump for both heating and cooling (31%) or for heating only (21%); while only half as many respondents with annual income between $25,000 and $49,999 said they could use a heat pump for both functions (12%) or for heating only (14%) (Figure 17Figure **17**).

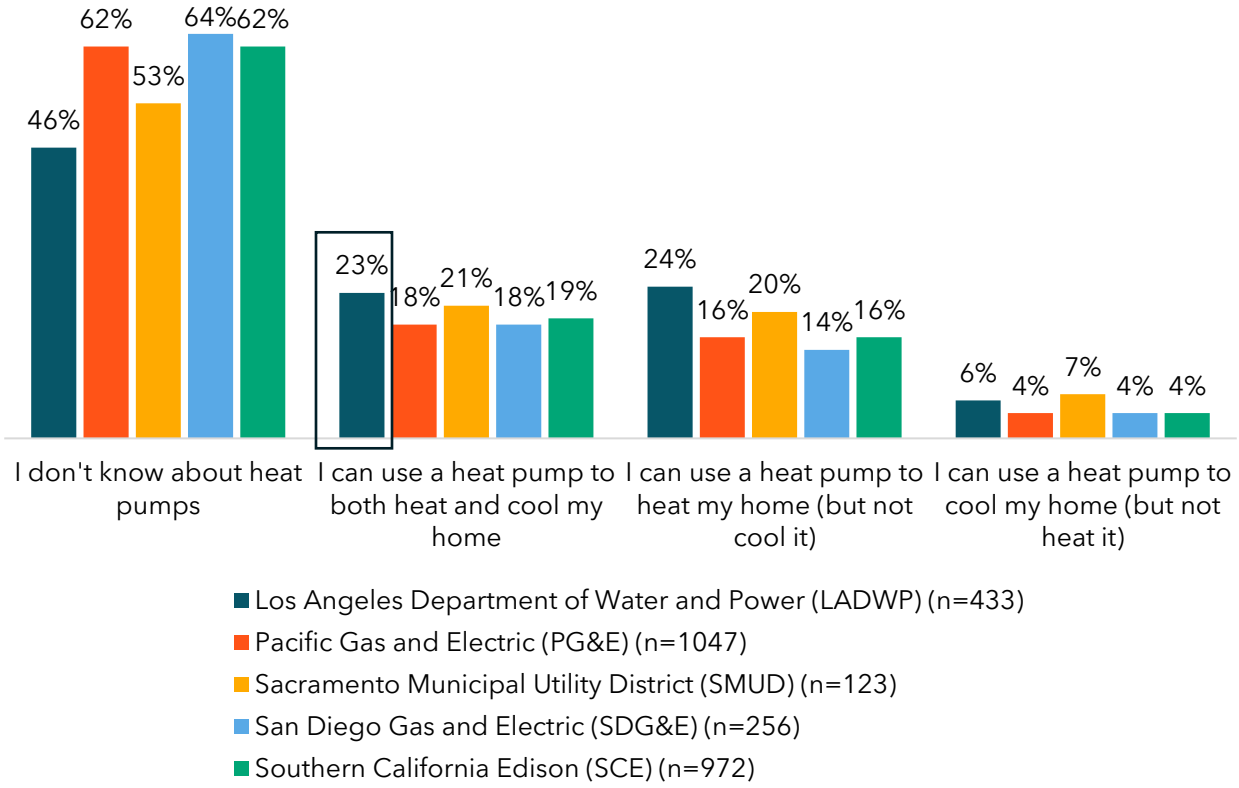
Figure 17. Knowledge of heat pump functionality by income



Survey Question: Please indicate your household's total annual income before taxes in the previous tax year. AND Based on what you know about heat pumps, please indicate which of the following statements best describes your understanding of how you can use a heat pump.

Results were somewhat consistent across utility service territories, but respondents who reported their utility as Los Angeles Department of Water and Power (LADWP) or SMUD were more likely to report some knowledge about heat pump functionality (Figure 18).

Figure 18. Knowledge of room heat pump by utility

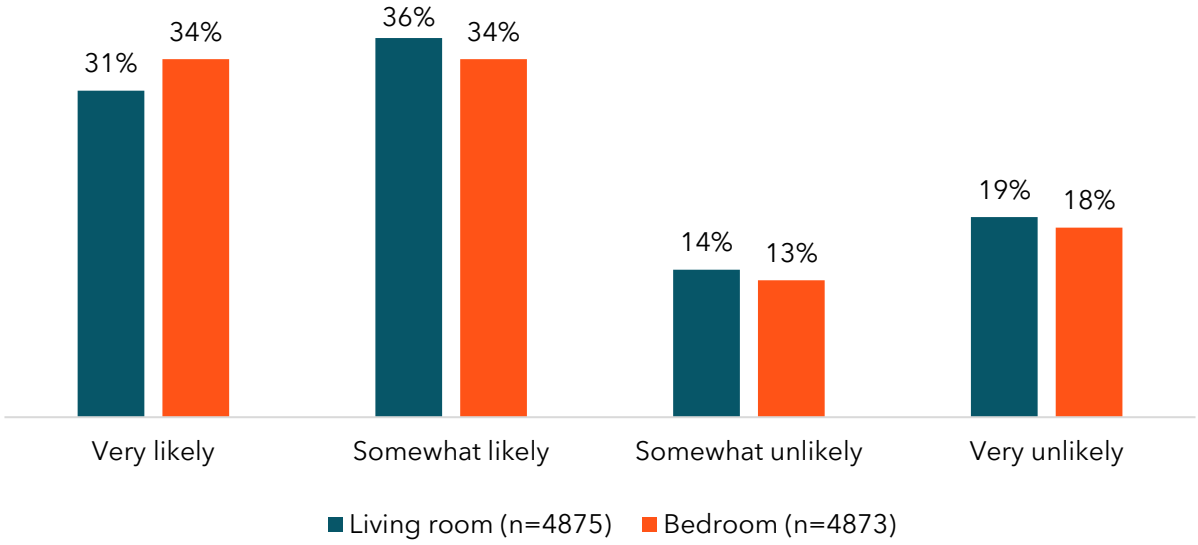


Survey Question: Please select your electric utility. AND Based on what you know about heat pumps, please indicate which of the following statements best describes your understanding of how you can use a heat pump.

4.4 Likelihood to consider a room heat pump

After asking about heat pump functionality in general, the survey introduced room heat pump technology, outlining that the unit would provide both heating and cooling. Respondents were then asked how likely they would be to consider using a room heat pump in either their primary bedroom or primary living space. Most respondents said they were somewhat or very likely to consider using a room heat pump (67% in the living room; 68% in the bedroom) (Figure 19). Regardless of income, respondents were likely to consider RHPs.

Figure *19*. Likelihood *to consider using a room heat pump*

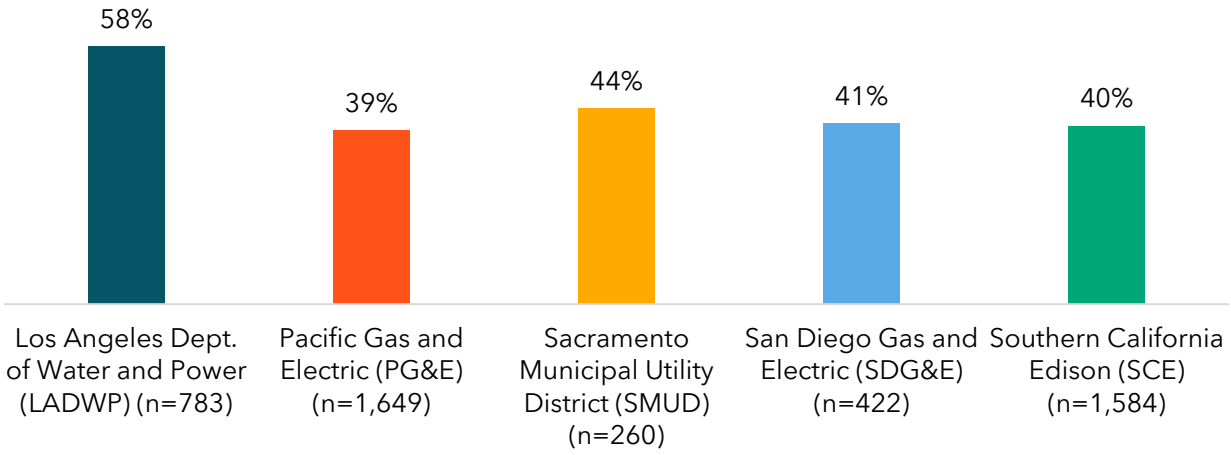


Survey Question: A new technology is becoming available called a Room Heat Pump, which is a unit similar to a Room or Window AC, but it provides both heating and cooling. How likely would you consider using a room heat pump in either your primary bedroom, living space, or another area? Please select one for each.

42% of all respondents stated being "very likely" to consider a room heat pump in any room (living room, bedroom, or other area). Homeowners were only slightly more interested, at 45%, and renters reported 40%. Respondents with higher incomes showed somewhat higher likelihood to consider room heat pumps.

Respondents who reported their utility as LADWP were much more likely than others to report being likely to consider using a room heat pump (Figure 20). This is notable as those in LADWP also reported higher knowledge of heat pumps. More knowledge about heat pumps may correlate with an increased likelihood to consider their use. Those who were unlikely to consider using a room heat pump generally reported being unlikely to do so due to lack of familiarity with the system, inability to make decisions about equipment due to being a renter, the perception that running the system would be expensive, or because they are already happy with the systems they have.

Figure 20. "Very likely" to use an RHP in any room



Survey Question: Please select your electric utility. AND A new technology is becoming available called a Room Heat Pump, which is a unit similar to a Room or Window AC, but it provides both heating and cooling. How likely would you consider using a room heat pump in either your primary bedroom, living space, or another area? Please select one for each.

5 Summary of key findings

Finding #1: Horizontal sliding windows are the most prevalent window type reported as being present (one or more present) for both bedrooms and living rooms in single-family and multifamily homes (ranging from 50% to 62% for room and home type combinations).

Finding #2: Rooms often have several types of windows present. However, 34% of single-family homes have *only* horizontal sliding windows in their living rooms, and 45% have *only* horizontal sliding windows in primary bedrooms. For multifamily homes, 41% have *only* horizontal sliding windows in their living rooms, and 54% have *only* horizontal sliding windows in their bedrooms. These figures support the need for a window HVAC unit that is suitable for horizontal sliding windows.

Finding #3: The most common measurements of horizontal sliding windows vary slightly between living rooms and bedrooms, but generally are 3, 4, 5 or 6 feet wide and 3 or 4 feet tall. The most commonly reported dimensions were 4 feet wide and 4 feet tall, followed by 4 feet wide and 3 feet tall. Because horizontal sliding windows can only open halfway at most, the opening space is only 1.5 to 3 feet wide. Of the five window measurements requested by California respondents, the following table summarizes the key take-aways.

Table 1. Window measurement summary

Measurement	Finding
Distance to outlet	85% of responses within 3 feet, 90% within 4 feet
Floor-to-window distance	69% of responses 20 inches or more

Measurement	Finding
interior-to-exterior wall depth	61% between 3 and 8 inches, 42% between 4 and 6 inches
Horizontal window width	50.1% of responses are 3 feet* wide or more, noting that 16.6% of responses reported 6 inches or less total width
Horizontal window height	70.6% of responses are 2 feet* high or more, 59.9% are 3 feet* or more, noting 11.7% reported 6 inches or less

**Allowing for 2-inch measurement error*

Finding #4: Knowledge of and likelihood to adopt room heat pumps are highest for those who report their utility as LADWP.

Finding #5: Owners are more likely than renters to know that heat pumps can be used for both heating and cooling regardless of whether they live in single-family or multifamily homes, and they were only slightly more likely than renters to consider a room heat pump in any room of their home. As expected, likelihood to consider heat pumps is correlated with income at higher income levels.

6 About CalMTA

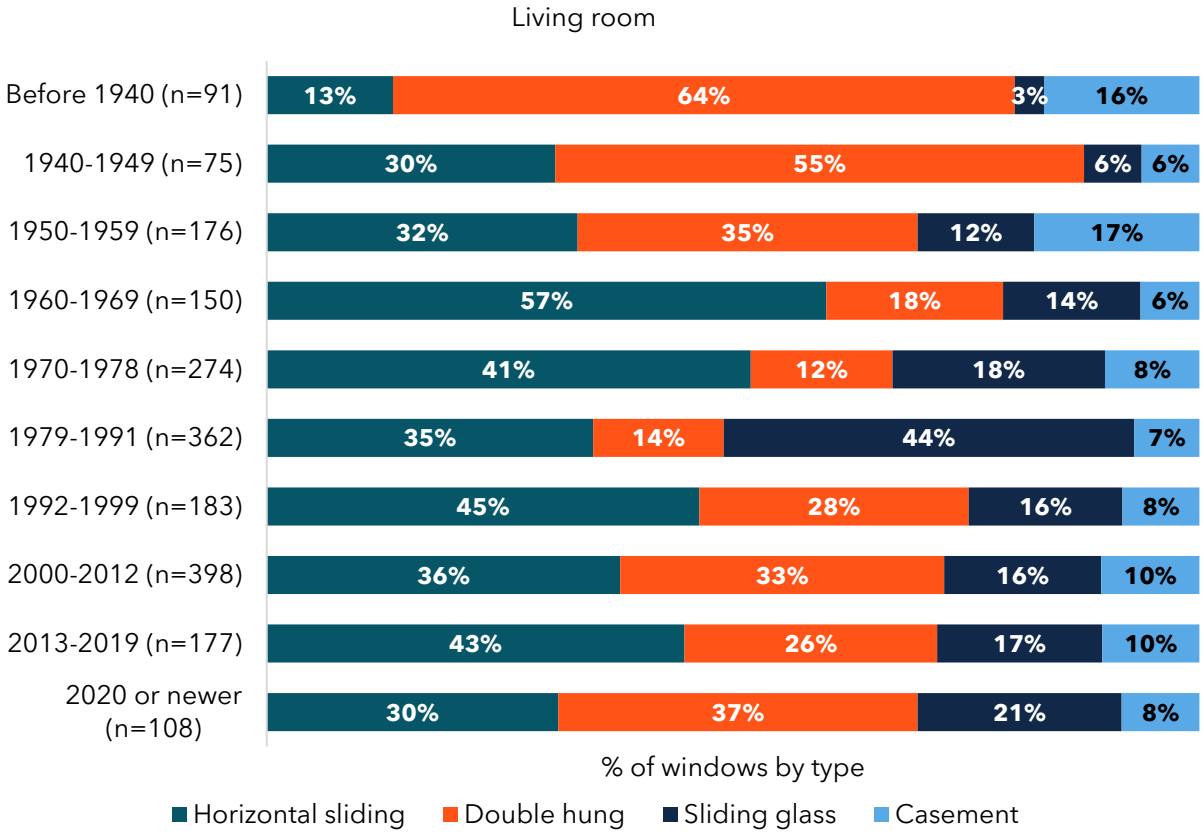
CalMTA is a program of the California Public Utilities Commission and is administered by Resource Innovations. We work to deliver cost-effective energy efficiency and decarbonization benefits to Californians through a unique approach called market transformation. Market transformation is the strategic process of intervening in a market to create lasting change by removing market barriers or exploiting opportunities, accelerating the adoption of identified technologies or practices. CalMTA-developed market transformation initiatives also aim to advance state goals on demand flexibility, workforce development, and equity. Learn more at www.calmta.org.

Appendix A. Window Type by Age of Home

Window type by age of home – single-family

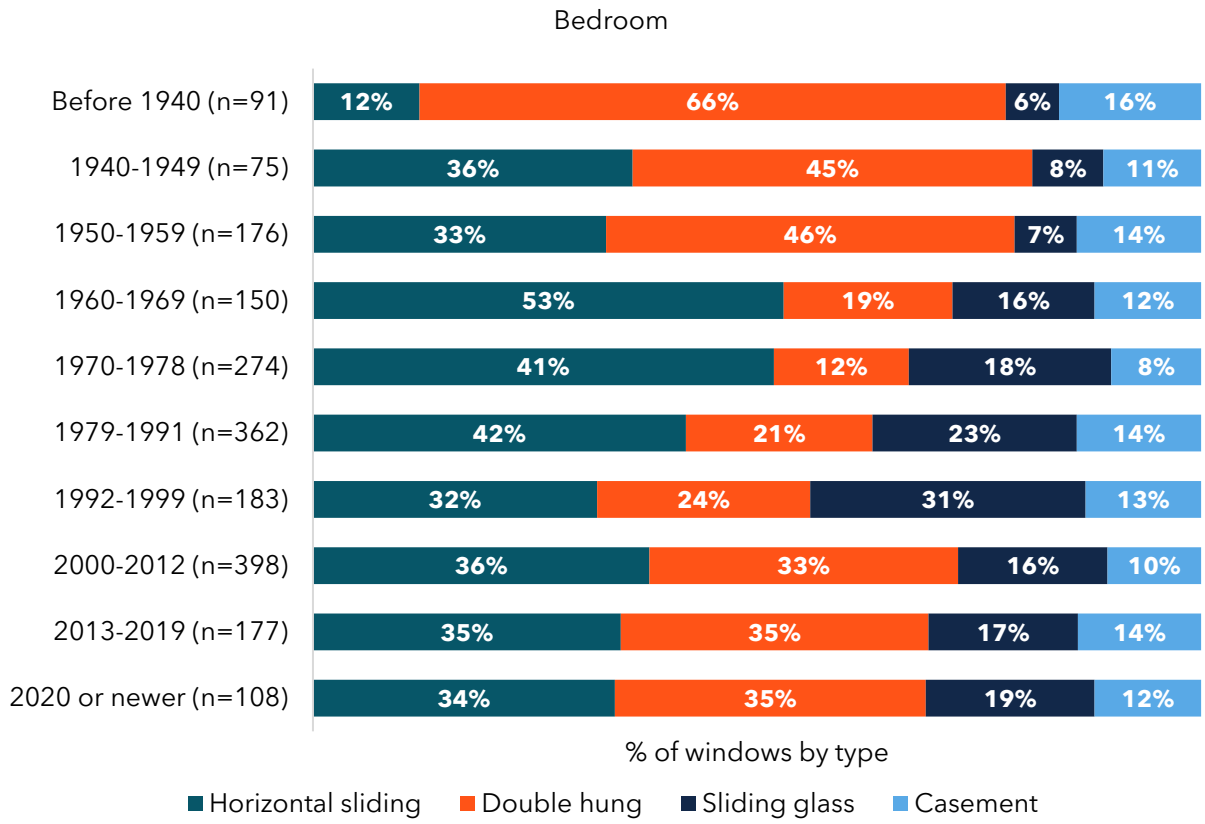
Self-reports from occupants suggest that double hung windows are the most common window type in both living rooms (Figure 21) and bedrooms (Figure 22). This finding is consistent with those of the RHP Market Characterization study, which found that homes built after 1970 have more horizontal sliding windows.

Figure 21. Window types in living room by age of home – single-family



Survey Question: How many of these operable windows are each of the following types? AND In what year was your home built? Your best estimate is fine.

Figure 22. Window types in bedrooms by age of home – single-family

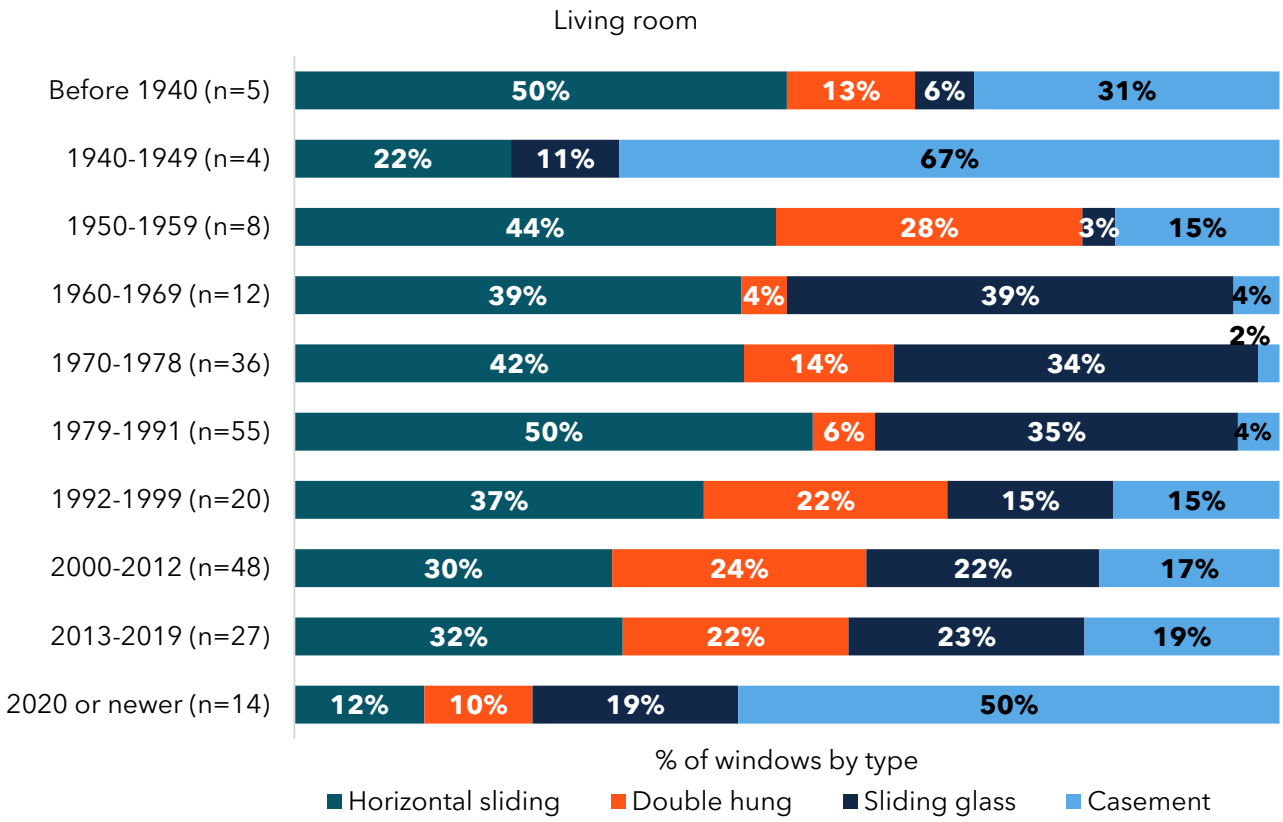


Survey Question: How many of these operable windows are each of the following types? AND In what year was your home built? Your best estimate is fine.

Window type by age of home – multifamily

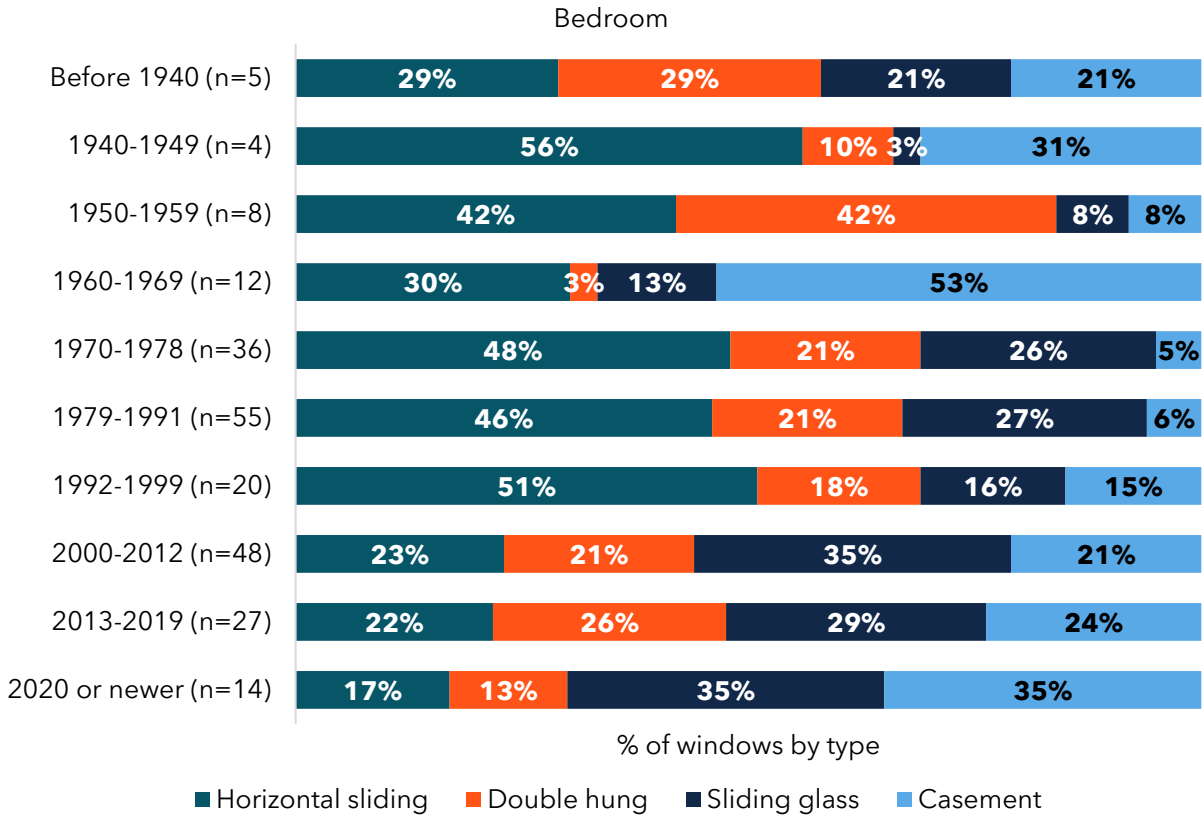
Self-reports from occupants suggest that horizontal sliding windows are the most common in living rooms regardless of age (with the exception of 2020 or newer) (Figure 23). Bedroom window types show more variability than living room windows, with horizontal sliding windows being prevalent until 2000, when casement and sliding glass doors begin taking greater share (Figure 24).

Figure 23. Window types in living room by age of home – multifamily



Survey Question: How many of these operable windows are each of the following types? AND In what year was your home built? Your best estimate is fine.

Figure 24. Window types in bedroom by age of home – multifamily



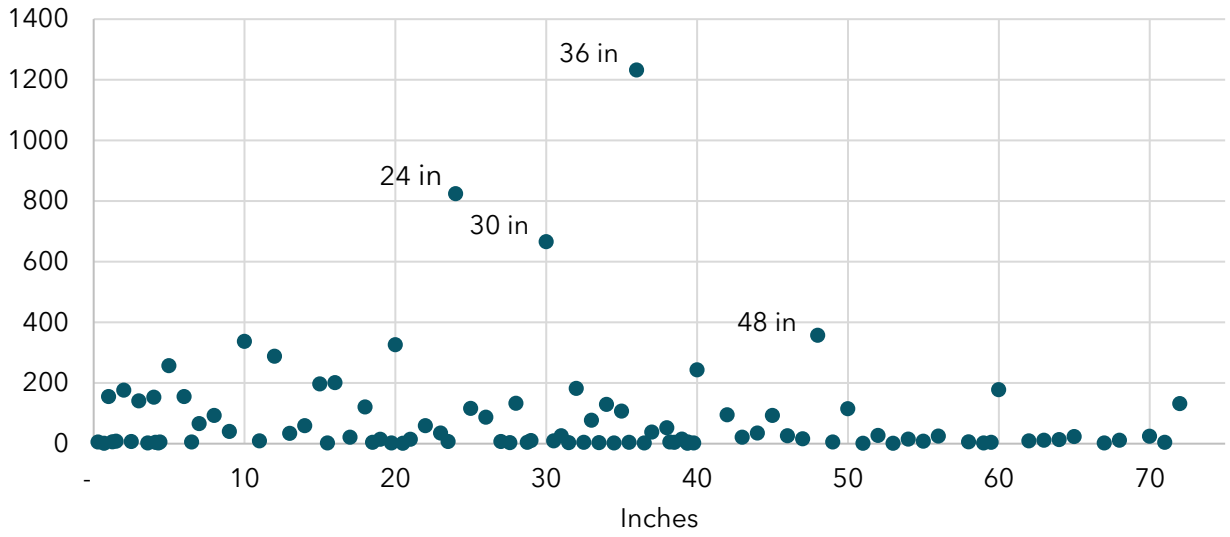
Survey Question: How many of these operable windows are each of the following types? AND In what year was your home built? Your best estimate is fine.

Appendix B. Detailed Window Measurement Findings

"A" - Window frame-to-floor distance

Over 8,000 horizontal sliding window distances from the bottom of the window to the floor were reported by respondents for living rooms and bedrooms across single-family and multifamily home types. The distances reported were consistent between room types and home types. The most common distance from the floor to the bottom of the window was 36 inches, followed by 24 inches, 30 inches, then 48 inches (Figure 25).

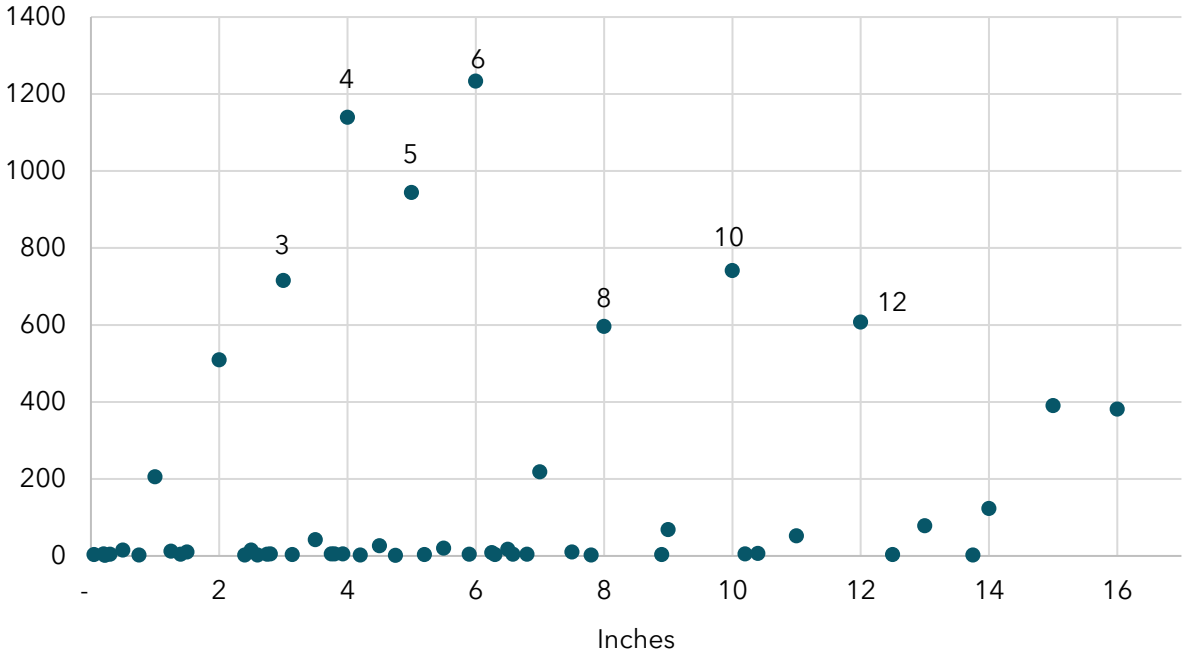
Figure 25. Distribution of window frame-to-floor distances



"B" – Interior-to-exterior windowsill depth

The depth of the windowsill was reported, again, with little variability between single-family and multifamily or room types. The most prevalent windowsill depth was reported at 6 inches, closely followed by 4 inches (Figure 26). Additional measurements of 5 inches and 3 inches might be indicative of close measuring error. Another cluster of 8 inches, 10 inches, and 12 inches can be seen, which are represented slightly more in multifamily.

Figure 26. Interior-to-exterior windowsill depth



"C" - Window width

Figure 27 provides the reported horizontal sliding window widths by single-family and multifamily, as well as by living room and bedroom. It is important to note these are the measurements of the entire sliding window, so the opening is half of these measurements. Overall, both single-family living rooms and bedrooms have window widths of 3 and 4 feet, with a smaller portion measuring 5 and 6 feet. Multifamily living rooms and bedrooms show more consistent variability between 3-, 4-, 5-, and 6-feet widths, overall skewing larger than single-family horizontal windows.

Figure 27. Horizontal sliding window widths by home and room type

"D" - Window height

Figure 28 shows horizontal sliding window heights by single-family and multifamily, as well as by living room and bedroom. Across all four charts, the predominant heights are reported as 3 and 4 feet, with 5 feet as the third most common.

Figure 28. Horizontal sliding window heights by home and room type

Appendix C. Demographics

The following tables describe the general demographics of the sample (n=4,885) compared to the California population, based on census data.

Table 2. Number of people in the household

Number of people in household	Survey distribution	CA census data
1 person	21%	25%
2 people	27%	31%
3 people	19%	17%
4 or more people	32%	28%

Table 3. Total annual income

Total annual income	Survey distribution	CA census data
Less than $25,000	18%	13%
$25,000-$49,000	22%	14%
$50,000-$74,999	19%	14%
$75,000-$99,999	14%	12%
$100,000-$149,999	16%	18%
$150,000-$199,999	7%	11%
$200,000 or more	5%	19%

Table 4. Home type

Home type	Survey distribution	CA census data
Single-family detached house	49%	57%
Single-family attached house such as a duplex or townhouse	9%	9%
Condo or apartment building with 4 or more units	33%	29%
Mobile or manufactured home	5%	4%
Vacation or rental home/unit (not a primary residence)	1%	N/A
Other	2%	N/A

Table 6. Year home was built

Year home was built	Survey distribution	CA census data
Before 1940	4%	9%
1940-1949	3%	5%
1950-1959	8%	12%
1960-1969	7%	12%
1970-1978	14%	1970-1979: 16%
1979-1983	7%	1980-1989: 15%
1984-1999	20%	1990-1999: 10%
2000-2012	20%	2000-2009: 12%
2013-2019	9%	2010-2019: 7%
2020 or newer	5%	2%
Don't know	2%	N/A

Table 5. Own or rent

Own or rent	Survey distribution	CA census data
Own	47%	56%
Rent	53%	44%

Table 7. Utility distribution

Utility	Survey distribution	CA population
Los Angeles Department of Water and Power (LADWP)	16%	~9%
Pacific Gas & Electric (PG&E)	34%	~27%
Sacramento Municipal Utility District (SMUD)	5%	~4%
San Diego Gas & Electric (SDGE)	9%	~10%
Southern California Edison (SCE)	32%	~30%
Other	4%	~20%

**Data from the CPUC and NRDC.*