FACT SHEET

Commercial Replacement and Attachment Window Solutions (CRAWS)

Window upgrades in existing buildings offer a significant opportunity to improve building envelope thermal performance, reduce heating, ventilation, and air conditioning (HVAC) loads, and enable downsizing of HVAC systems in need of replacement. Although windows on average comprise approximately 15% of a building's exterior surface, they are responsible for HVAC losses of about 40%.[1] That equates to roughly 12% of a typical building's overall energy use.[2]

Vacuum Insulated Glass (VIG) and Commercial Secondary Windows (CSW) technologies provide an alternative to the expensive process of full window replacement. This enables an "envelope first" approach that helps building owners maximize the efficiency of their decarbonization efforts (such as installing a downsized HVAC for the updated windows) while saving money by eliminating the need for full window replacement and increasing non-energy benefits (NEBs). Depending on the application, VIG can be 50% less expensive and CSW can be as much as 90% less expensive than full window replacement.[3] The high-value NEBs these technologies provide include increased thermal comfort, noise reduction, climate resilience during extreme weather events, and the ability to participate in demand response (DR) events while better maintaining a constant room temperature.[4]

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[1]Pratt, Jordan and Wynn, Sean. Commercial Secondary Windows Field Test. Northwest Energy Efficiency Alliance. December 18, 2023. https://neea.org/resources/commercial-secondary-windowsfield-test.

[2]ibid.

[3]ibid.

[4] To the building owner/tenants, it's greater comfort, coasting longer through DR events without seeing large temperature changes. To the utility, it's more curtailment because the AC can stay off longer before reaching temperatures where it has to be turned back on.

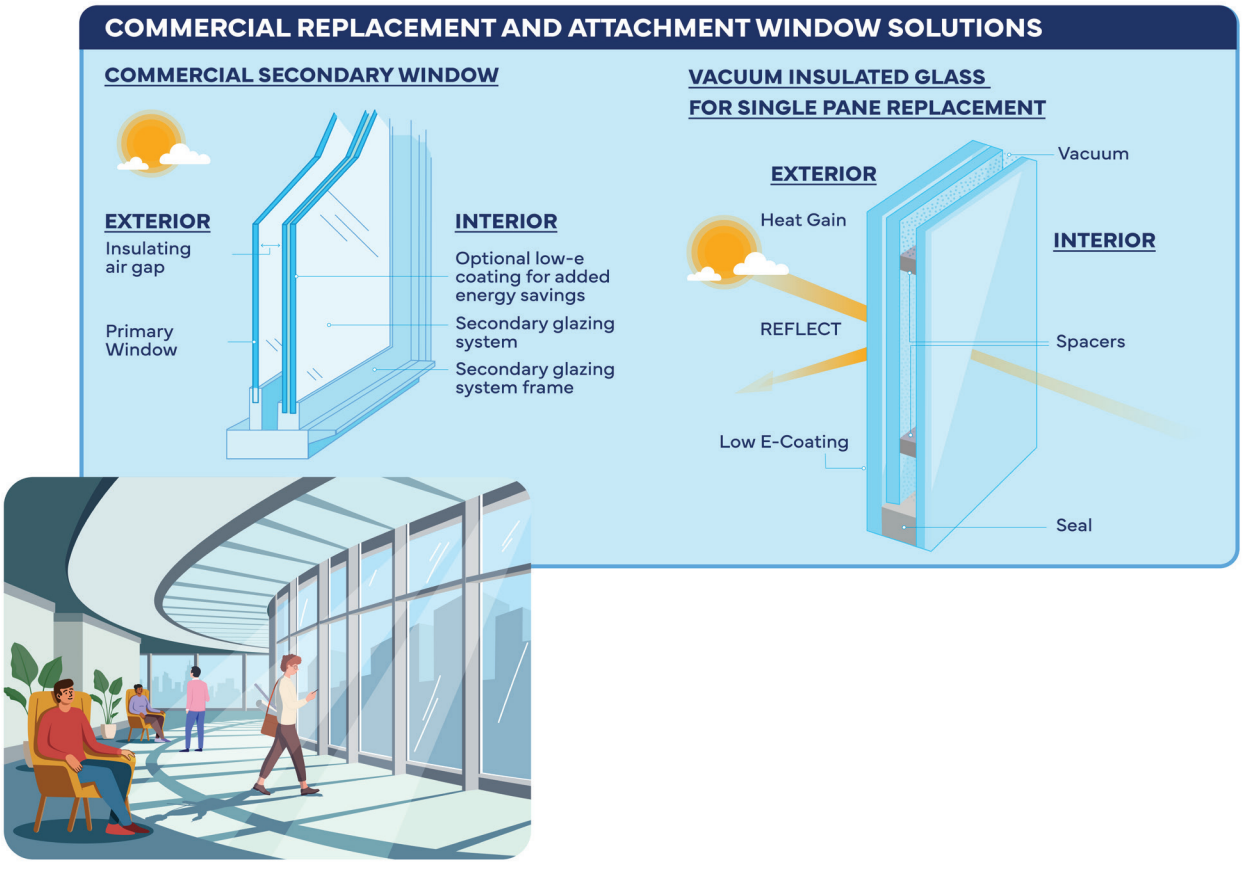
CalMTA is pursuing this potential market transformation initiative (MTI) to provide lower cost options to traditional window replacement and transform the market for these more affordable, energy-saving technologies.

The opportunity

The interaction between window performance and HVAC systems plays a critical role in whole building efficiency, especially in the municipal, university, school, and hospital buildings (MUSH) market. Often systems are oversized to account for the energy lost through leaky windows or windows with high solar heat gain. This results in added equipment expense, higher energy bills, and lower comfort for building occupants. Yet the high cost of full window replacements, and their lengthy return on investment, discourages many California building owners from making these important energy efficiency updates. The affordability of these technologies, the importance of the building envelope for energy efficiency, and the likelihood of Building Performance Standards (BPS) coming to California, make this a timely initiative.[5]

The technology

Vacuum Insulated Glass (VIG) windows are designed to replace existing single-pane glass while retaining use of the existing frame. They are comprised of two glass panes separated by spacers and hermetically sealed around the edges. A vacuum is drawn on the void space between the glass



[5]BPS are policies that require commercial and multifamily buildings to meet certain performance levels, typically for energy use or greenhouse gas emissions. Each local or state government that implements a BPS customizes the requirements to fit its needs, but in general, a BPS contains a performance target and a timeframe in which all buildings must meet this target.

panes resulting in a center-of-glass thermal resistance, or R-Value, of R-10 to R-15 (not including frame effects, which can reduce the whole-window R-Value). VIG products may also include low emissivity (low-E) coatings that reduce solar heat gain and further improve energy performance.

Commercial Secondary Windows (CSW) are retrofit products comprised of one or more panes of glass, polymer, or acrylic, which are mounted in a fixed or operable frame that is attached either on the interior or exterior of existing windows without replacing the primary glass or frame. CSWs may include low-E coatings, insulating gases, thermal films and/or vacuum insulated glass units in their construction. CSWs may be permanently installed or removeable.

MT strategy

Mitigating poor performing windows has not been considered an economically viable solution for energy loss until recently. Return on investments (ROIs) for traditional window replacements are in the 40- to 50-year range, resulting in a "do-nothing" decision in most cases. CSW and VIG are market-ready solutions that do not require opening the building facade, cost 50-90% less than full replacement, and can be installed without tenant disruption. CalMTA's MT strategy is based on building an "envelope first" approach that begins with the MUSH market and will leverage future BPS as it expands into commercial real estate.

Identified market barriers

- Improving windows is expensive in comparison with other efficiency measures
- Many building owners are unaware of VIG and CSW technologies and the positive impacts of high-performing window solutions on energy consumption, peak savings, HVAC downsizing, and occupant comfort
- Current inability to accurately quantify the relevant NEBs
- Lack of policy, awareness, and industry infrastructure to support a windows-first approach in building upgrades

Market interventions and leverage opportunities

- Build marketing tools and resources that communicate the importance of taking an "envelope first" approach when working on existing commercial buildings
- Engage manufacturers and supply chain partners on innovations to drive down product and installation costs and create go-to market strategies especially for the MUSH market
- Conduct in-field demonstrations in the MUSH market that document benefits including NEBs
- Build market awareness of the CSW and VIG national energy rating mechanisms, Attachments Energy Rating Council (AERC) for CSW and the National Fenestration Rating Council (NFRC) for VIG
- BPS is being considered for statewide adoption in California, which would provide technical support, including hubs, for building owners and service providers

Applying an equity lens

The equity considerations for the potential CRAWS MTI would center on targeting buildings in the MUSH markets in environmental and social justice (ESJ) communities with both CSW and VIG. Because CSW is the more affordable of the two technologies, CalMTA also sees a specific opportunity to target small commercial buildings in addition to the MUSH market, which are more commonly owned by ESJ business owners, for CSW replacement.

About CalMTA

CalMTA is a program of the California Public Utilities Commission and is administered by Resource Innovations. We are creating a market transformation (MT) portfolio for California that will deliver cost-effective energy efficiency and decarbonization. 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.

Learn more: calmta.org Follow us: showcase/calmta

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