



Secondary Interior Window Framing With Advanced Glazing

Technology Overview

Windows, especially single-pane windows, are the weakest energy-efficiency link in the building envelope. They contribute to about 39% of the energy used to heat commercial buildings and 28% of the energy used for cooling in the United States.¹ Secondary windows are pre-manufactured units designed to improve the insulating power of low-performing windows without the expense of replacing windows. They are installed on the room side of existing windows and available in customized configurations.

GSA's Green Proving Ground (GPG) will evaluate two new innovative implementations of secondary windows.

The first design minimizes cost and embodied carbon by shipping disassembled pieces that are assembled onsite and then installed in existing window frames. The design can accommodate multiple glazing options. The vendor estimates an 80% reduction in Scope 3 emissions by shipping the glazing directly to the job site only once, as opposed to the traditional two shipments (from distributor to manufacturer and then from manufacturer to the job site).

The second implementation of secondary window framing extends a previous GPG secondary window evaluation.

Both framing systems will be tested with vacuum-insulated glazing (VIG). VIG is more durable and insulating and has a lower embodied carbon footprint than standard insulating glazing. In addition, VIG inserts are $\frac{2}{3}$ thinner and up to 2 lbs/ft² lighter than inserts made with conventional insulating glass.

Why is GSA Interested?

Window replacement can be costly, especially in older buildings where lead paint and/or asbestos must be remediated as part of a window replacement. Secondary windows can improve the insulating power of low-performing windows without the expense of replacing the windows themselves.

Estimates suggest that secondary windows can result in whole-building heating savings ranging from 8% to 11%. Beyond the energy efficiency gains, they also contribute to improved occupant satisfaction with thermal comfort.

Deployment Potential

Secondary windows are applicable to single-pane and older, lower-performing double-pane windows. They are best suited to cold climates, and because they do not require modifications to a building's facade, they are suitable for historic buildings, which account for one-third of the GSA-owned portfolio.

Secondary windows can also benefit underserved communities where poor-performing windows contribute to high and unaffordable energy costs.

¹ LBNL. Window-Related Energy Consumption in the US Residential and Commercial Building Stock, <https://facades.lbl.gov/sites/all/files/60146.pdf>, accessed 11-2023.

Green Proving Ground (GPG), in collaboration with the U.S. Department of Energy, is evaluating the real-world performance of secondary windows in federally owned buildings within GSA's inventory. The technology will be provided by Indow, 3E Nano, Pilkington, Advanced Impact Technologies, and Vitro Architectural Glass and coordinated with other ongoing evaluations of these technologies.