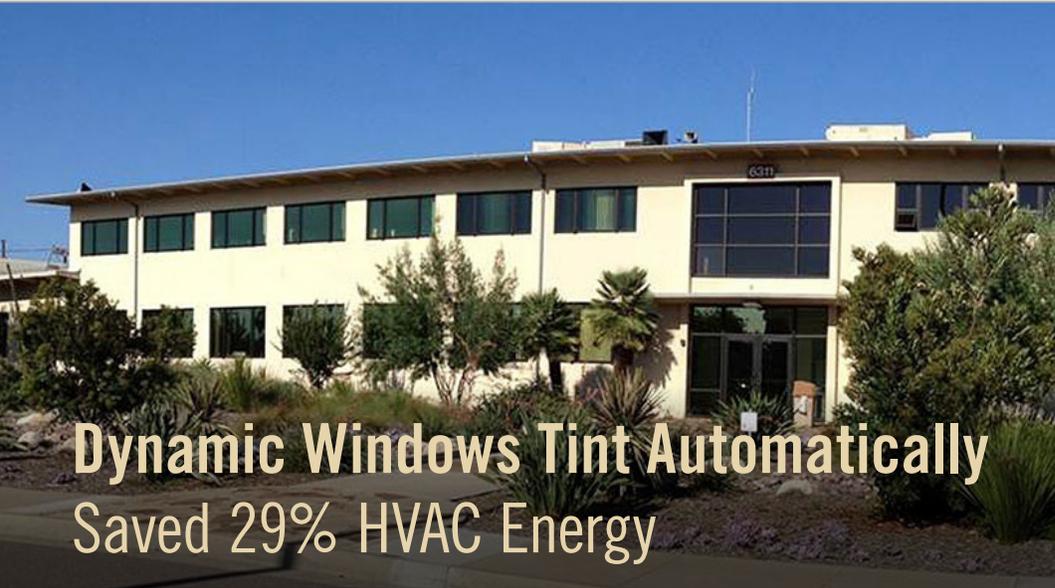


Low-Cost, High Energy-Saving Dynamic Windows



Dynamic Windows Tint Automatically Saved 29% HVAC Energy

As part of a whole-building retrofit, View Inc. dynamic windows were installed at Marine Corps Air Station (MCAS) in Miramar, California.

► DYNAMIC TINT IN RESPONSE TO SMALL ELECTRIC CHARGE

In response to signals indicating changes in outdoor conditions, dynamic glass transitions through multiple tint levels to optimize daylighting while reducing glare and solar heat gain. The technology has the potential to significantly improve the energy impact of windows by minimizing solar heat-gain in summer, maximizing passive heating in winter and accessing natural daylight throughout the year.

► MORE COST-EFFECTIVE THAN LOW-E

The MCAS study demonstrated a reduction in heating, ventilation and air conditioning (HVAC) energy use of 29% compared to the existing clear double-pane windows. Dynamic windows delivered twice the HVAC savings and 280% greater life-cycle cost savings when compared to state-of-art low-emissivity (low-e) windows.

Technologies Tested

VIEW DYNAMIC GLASS

- Configured as one tint field with four tint levels, ranging from clear to fully tinted. Can be customized to meet solar heat gain coefficient (SHGC) and visible transmittance (VT) requirements.
- Glazing transitions from clear to fully tinted in 10–30 minutes, depending on window size and temperature.
- Control system tints windows automatically, using photosensor readings and values for daily changes in the sun's arc, or manually, in response to wall switches.
- Can operate as fully autonomous network or be integrated into building automation system (BAS).
- Available for both operable and inoperable windows.

Advantages compared to low-e:

- **Cuts solar heat in the summer:** SHGC can be tuned as low as 0.09 compared to 0.38 for typical low-e.
- **Increases solar heat in the winter:** SHGC can be tuned as high as 0.46.
- **Reduces whole-building peak-load:** by reducing cooling requirements.
- **Reduces glare:** VT can be tuned as low as 3%, low-e VT ~70%.
- **Improves daylighting:** VT can be tuned as high as 58%, allowing 10x higher average daylight than low-e.

Best suited to:

- Hot climates (energy savings are greater in hotter climates).
- Facilities with large south-, east-, and west-facing windows and advanced lighting controls.

ABOUT ESTCP



Demonstration Site: MCAS, Miramar, CA

The dynamic window demonstration replaced 1,805 ft² of glass at Marine Corps Air Station (MCAS) Miramar in southern California. The climate at Miramar is mild, therefore savings with dynamic glass in many other climate zones of the United States should be comparable or higher.

Researchers installed monitoring equipment and performed baseline energy measurements and occupant surveys for a period of 5 months. These data were then used to model results and determine the total annual impact of dynamic windows.

FIRST COSTS*			OPERATING COSTS*		
	LOW-E	DYNAMIC		LOW-E	DYNAMIC
IGU	\$20	\$97	ENERGY CONSUMPTION	\$28.78	\$21.58
WINDOW FRAME	\$30	\$30	HVAC MAINTENANCE	\$2.21	\$1.66
INSTALLATION LABOR	\$25	\$28	SHADING MAINTENANCE	\$0.17	\$0.00
ELECTRICIAN LABOR	\$0	\$2	TOTAL	\$31.16	\$23.24
HVAC	\$236	\$190	*Cost information is for reference only. Individual sites should do due diligence to determine local costs.		
SHADING	\$15	\$0			
TOTAL	\$326	\$347			

*Cost information is for reference only. Individual sites should do due diligence to determine local costs.

Demonstration Results

ENERGY SAVINGS

- 29% savings over existing baseline of clear double-pane windows. 2.2x greater savings than upgrading to low-e. (Energy savings assume that advanced lighting controls are in place and lights dim in response to daylight.)
- 27% reduction in peak load. 2.5x greater reduction than upgrading to low-e.
- 62% lighting savings. 2.5x greater reduction than upgrading to low-e.

INSTALLATION

- No issues with installation.

OPERATIONS & MAINTENANCE

- Occupant training, especially on expectations for tint transition time, should be included as a project milestone.

USER SATISFACTION

- Overall comfort increased by 15% to 95%.
- Overall satisfaction increased by 31% to 98%.

COST-EFFECTIVENESS

- 4.3x increase in lifecycle cost savings compared to low-e.
- Capital- and maintenance-savings from down-sizing HVAC systems are enabled by reduced heating and cooling peak-load demand.
- Dynamic glass savings include capital- and maintenance-costs for blinds, which should not be needed.

Additional Resources

► EW-201252 FINAL REPORTS AND TECHNOLOGY TRANSFER TOOLS

<https://serdp-estcp.org/Program-Areas/Energy-and-Water/Energy/Conservation-and-Efficiency/EW-201252>

► TECHNOLOGY USED AT DEMONSTRATION SITE

View Dynamic Glass, www.view.com.

NOTE: Before incorporating new technology, refer to Unified Facilities Criteria (UFCs) and other appropriate guidance to ensure compliance with current requirements. <https://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc>