RESULTS

A typical new Costco store will install skylights on ~5% of its 150,000 sq.ft. rooftop. The daylighting controller, integrated with the EMS, maintains the interior illuminance at a minimum of 55–65 foot-candles in the store. Annual energy savings are projected at 1.5 kWh/sq.ft.-yr. or $23,000.

The remote monitoring and control service established with Costco’s Energy Management System (EMS) contractor has helped ensure that savings persist over time. With an eye toward reducing operating costs and improving lighting conditions for customers, skylighting and daylighting controls have become a building standard at Costco.

RESOURCES

PG&E does not endorse particular products or services from any specific manufacturer or service provider. High efficiency products and services similar to those used in this project are available from multiple suppliers.

For informational purposes, PG&E notes that the following companies provided equipment or services to the project:

- **Skylights:**
  - Bristolite Skylights, Santa Ana, California
  - [www.bristolite.com](http://www.bristolite.com) — 714-540-8966

- **Daylighting Controls:**
  - Day Light Controls, Redmond, Washington
  - [www.daylightcontrols.com](http://www.daylightcontrols.com) — 425-883-0914

- **Contact:** Dave Long

- **Energy Management System:**
  - Roberts Trane, Redmond, Washington
  - 425-643-4310

ADDITIONAL CONTACT INFORMATION

Pacific Energy Center, San Francisco, California


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A Cart Full Of Energy Savings

Costco gains huge energy savings with skylights and remote daylighting controls.

DAYLIGHTING AT COSTCO

Costco, a large chain of discount retail stores, began integrating skylights and daylighting controls in its stores in the late 1980s. Management wanted to increase light levels in its warehouse-style stores to provide an environment conducive to shopping. They also wanted to reduce operating costs and did so by integrating photosensor-based daylighting controls with each store’s Energy Management System (EMS), controlled remotely off-site. Today, skylights and automated daylighting controls are a standard feature in all new Costco stores and distribution centers.

DAYLIGHTING FEATURES

1. SKYLIGHTS

Rectangular 4-ft. x 8-ft. skylights cover approximately 4% of the roof area, evenly distributed over the shopping area below. The skylights are constructed of acrylic-clad fiberglass and feature approximately 40% more efficient than standard medium-white acrylic-only skylights by maximizing natural light transmission with minimum heat gain. Visible light transmittance for each skylight is 72% with a 66% shading coefficient. Twenty-foot-tall ceilings help diffuse the light throughout the space.

2. ENERGY MANAGEMENT SYSTEM

The original energy management system at Costco was designed to manage only the refrigeration and HVAC loads. Fortunately, there was room to integrate the custom-made daylighting controls into the centralized system when Costco began incorporating skylights into its new stores. Costco contracted with an EMS contractor to remotely monitor and control the settings at its 200+ stores. Store managers are able to override the daylighting controls locally if there is a perceived need for more light. If the utility bill seems high for a given month, the EMS team can remotely diagnose the cause by reviewing recent data trends.

SKYLIGHTS

Projected Annual Savings: $150,000
A Cart Full Of Energy Savings

Costco gains huge energy savings with skylights and remote daylighting controls.

With an eye toward reducing operating costs and improving lighting conditions for customers, skylights and daylighting controls have become a building standard at Costco.

Projected Annual Savings: $150,000

A new Costco distribution center in Mira Loma, California, incorporates the same daylighting strategy as Costco's retail stores. The new 653,000 sq. ft. dry goods distribution center was designed with 1,950 5-ft. x 6-ft. skylights covering 8% of the rooftop. Controlled in a manner similar to a retail store, the 1,640 metal halide luminaires operate in three daylit zones. Lower illumination levels are needed for a distribution center than a retail store. Additional savings are achieved in the distribution center by turning off all three zones when adequate daylight is available. Annual energy savings are projected at 2.5 kWh/sq.ft.-yr. or ~$150,000.
RESULTS

A typical new Costco store will install skylights on ~5% of its 150,000 sq. ft. rooftop. The daylighting controller, integrated with the EMS, maintains the interior illuminance at a minimum of 55-65 foot-candles in the store. Annual energy savings are projected at 1.5 kWh/sq.ft.-yr. or $23,000.

The remote monitoring and control service established with Costco’s Energy Management System (EMS) contractor has helped ensure that savings persist over time. With an eye toward reducing operating costs and improving lighting conditions for customers, skylighting and daylighting controls have become a building standard at Costco.

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Annual energy savings are projected at 1.5 kWh/sq.ft.-yr. or $23,000.

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