

**OPERABLE SKYLIGHTS IN SUNROOMS
LOWER ENERGY LOAD, BOOST AIR QUALITY**

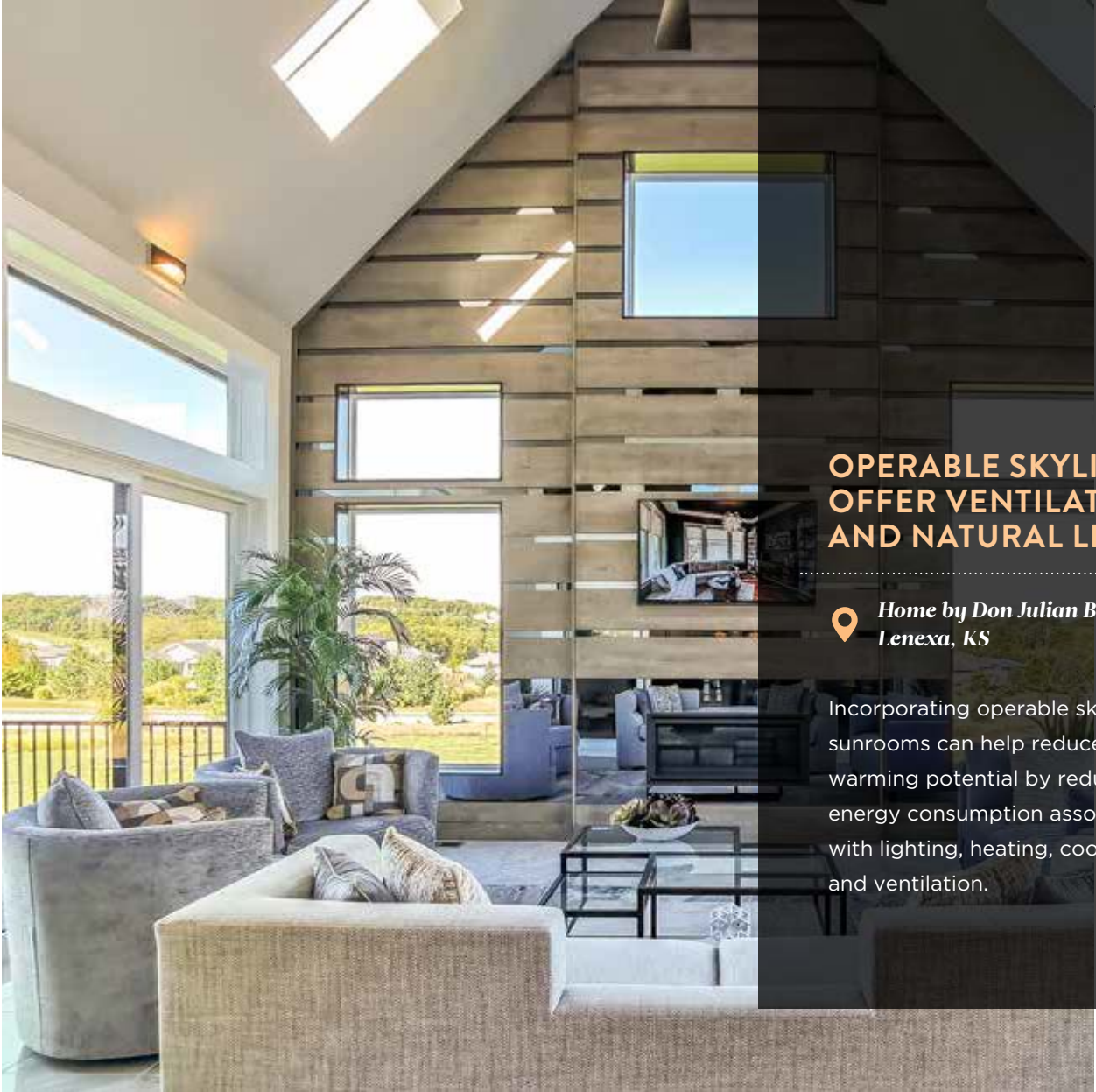
REPORT
2023



PATHWAY TO A MORE SUSTAINABLE PLANET

Eneref Institute examines how ventilating skylights in sunrooms can mitigate global warming.





OPERABLE SKYLIGHTS OFFER VENTILATION AND NATURAL LIGHT

 Home by Don Julian Builders
Lenexa, KS

Incorporating operable skylights in sunrooms can help reduce global warming potential by reducing energy consumption associated with lighting, heating, cooling, and ventilation.

Residential homes with sunrooms can employ operable skylights to reduce the HVAC energy load during summer months and the lighting energy load during winter. Venting (operable) skylights can easily exhaust unwanted heat and improve indoor air quality by reducing airborne toxins. When the sun is low on the horizon during summer, skylight maximizes the natural daylight capture. Eneref Institute examined the benefits and market obstacles to employing ventilating skylights

in sunrooms to mitigate global warming.

SUNROOMS PROPEL \$2B ANNUAL MARKET

Beginning in the early 2000s, the trend in home design has been to increase the use of glazing and exposure to the outdoors. Sunrooms fill that demand. In the United States, the total sunroom market is over \$2 billion annually but varies depending on location. The Covid-19 pandemic served to increase the sales for residential

sunrooms and for skylights.

“I would say that Covid provided me with the biggest housing boom I have ever experienced,” said Jeff Julian, Vice President at Don Julian Builders, a company that traditionally includes sunrooms with operable skylights in their model homes. “We could hardly keep up. It was pretty insane.” Don Julian Builders is a Kansas City-based homebuilder established in 1974.

Historically, retrofit remodeling

VENTING SKYLIGHTS CAN ELIMINATE HVAC COOLING NEEDS

According to a Group 14 study, venting skylights in Los Angeles completely eliminated cooling needs with natural ventilation.

activity for owner-occupied homes has ranged between 3% to 5%. During the Covid-19 pandemic, this number increased to nearly 18% but has since dropped to 9%, according to the LIRA Joint Center for Housing Studies at Harvard University.

Michael Hoy, CEO of Great Day Improvements and Patio Enclosures said, “People view homes very differently today than they did prior to Covid. People are in their homes for longer periods of time.” Hoy’s companies are the largest U.S. marketer of sunrooms for existing U.S. homes.

OPERABLE SKYLIGHTS LOWER ENERGY COSTS

The average cost of a retrofit sunroom is between \$10,000 to \$75,000 depending upon the existing structure. Operable skylights add only a fraction to that total cost yet they can significantly reduce the home’s electricity demand.

“Skylights are not that expensive,” said Sarah Cooper, New Home Sales Consultant at Schumacher Homes. “It’s a really nice way to add some additional natural light if someone’s

interested in feeling more outdoor-indoor.” Schumacher Homes reports that they are the largest U.S. custom home builder that offers sunrooms with operable skylights.

SKYLIGHTS MAXIMIZE LIGHT

A sunroom is defined as any enclosed space connected to a home’s exterior that brings in natural sunlight with uninterrupted views of the exterior, which includes solariums, conservatories, and patio or porch enclosures. While a simple porch enclosure may be useful for three seasons, more robust all-season sunrooms are typically constructed with insulated glass windows, walls, and skylights, as well as HVAC systems to regulate temperature and humidity. Solarium sunrooms maximize natural light to provide panoramic views. Conservatory sunrooms are glass-enclosed rooms designed to showcase botanicals.

“Natural light is really what customers remark most positively about,” said Jeff Julian of Don Julian Builders.

Geometrically, rooftop glass exposures—skylights—deliver twice as much light as vertical

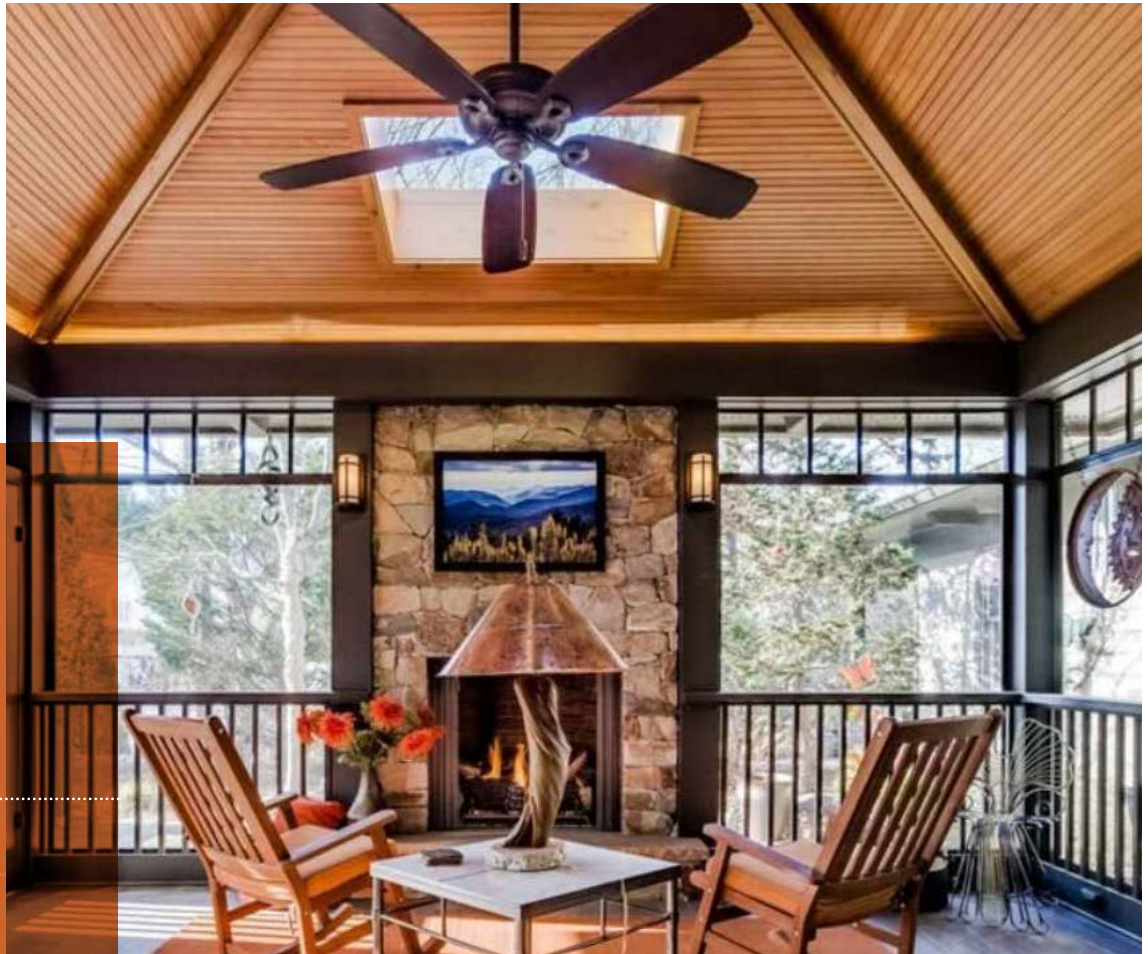
windows while using the same amount of glass. Eneref research found that today, 80% percent of all sunrooms in the U.S. include some rooftop glazing exposure; however, too many still do not benefit from the ventilation that operable skylights provide.

Operable skylights not only add additional outdoor light but also fresh outdoor air while simultaneously reducing the energy costs. In the U.S., skylights that utilize small solar panels to power their automatic open/close mechanisms are eligible for a 30% Federal Solar Tax Credit, as are fixed skylights with solar-powered shades. VELUX is the largest skylight manufacturer that offers skylights with tax credit eligibility.

SUPERIOR LIGHT SOURCE ENHANCES VISUAL ACUITY

To reduce our reliance on fossil fuels, skylights should be the primary light source when roof access is available. Skylights are the best means of providing general ambient lighting to an interior space. Natural interior daylight also improves visual acuity (clarity and sharpness).

Sunroom interiors are typically designed for vertical light from traditional windows, explains Dr. Shelley James, a leading proponent of natural light, founder of Age of Light Innovations, and advisor at International WELL Building



SCHUMACHER HOMES

Schumacher Homes is a large custom home builder that offers sunrooms with operable skylights.

Institute. Instead, says James, the colors and reflectances of furnishings and furniture should consider the unexpected consequence of rooftop skylights.

SMART SKYLIGHTS BOOST AIR QUALITY WITH INNOVATIVE TECH

As everyone knows, heat rises. Operable skylights significantly reduce the energy needed for air conditioning by eliminating heat naturally through their stack effect or chimney effect — venting hot air through the ceiling. Ventilation also improves indoor air quality by

allowing fresh air to circulate throughout the home, reducing the concentration of pollutants and allergens.

“We absolutely love the Velux skylights in our artisan house. You can get really nice cross ventilation,” said Jeff Julian. “You open up those skylights and it brings a gentle breeze right in that flows through the space.”

Advances in skylight technology include remote controls to regulate the temperature and ventilation. Best-in-class skylights, such as the VELUX skylights examined for this report, can be automatically activated using smart sensors

that continuously monitor the temperature, humidity, and CO2 levels and can open or close both the skylights and the blinds. Some models are acoustically activated with sensors that close instantaneously with the first drop of rain. They can also be activated with weather forecast information or via smartphone app.

Dr. James said, “I think that the construction of the Velux skylights I specify in properties are just phenomenal. Just a beautiful piece of engineering. They’re beautifully made... very thoughtful.”

However, Sarah Cooper said that

while Schumacher Homes offers skylights, “I don’t find myself asking people, ‘Hey, do you want to add some skylights there?’ That’s not something that I typically do, but maybe I should.”

SKYLIGHT-EQUIPPED SUNROOMS ILLUMINATE ADJACENT ROOMS

Architects use the abundance of natural light in sunrooms to carry daylight into adjacent rooms, thereby reducing the lighting energy load in other rooms. Light borrowed from sunrooms creates a sense of openness, brightness, and visual connectivity between different parts of a home. Borrowed light is especially valuable for rooms with little access to an external light source, such as a room with few windows or in the interior of a home.

According to VELUX Director of Sales, Bill Charlton, “The sunroom has become a popular spot for skylights to push borrowed light deeper into the core of the home.”

SUNROOMS INCREASE HOME RESALE VALUE

To eliminate the cost of building aftermarket sunrooms, Eneref recommends including sunrooms in new home construction. Beyond the cost, zoning requirements are more easily met during initial planning

and construction.

“Sunroom codes have become harder,” said Michael Hoy.

Despite these obstacles, building a sunroom with operable skylights makes sense because their integration increases a home’s value. According to Remodeling Magazine’s Cost vs. Value Report, the average cost of adding a well-designed sunroom to a home is recouped by over 50% at resale.

MISCONCEPTION DEBUNKED: OPERABLE SKYLIGHTS ARE LEAK-FREE WITH PROPER INSTALL

Michael Hoy reported that Great Day Improvements typically includes fixed skylights in the sunrooms they offer because “skylights add to the room’s aesthetic.” Yet, despite the increase in air quality and ventilation, Hoy said his company avoids specifying venting skylights because “operable skylights leak.”

However, extensive research by Eneref Institute found that, over the past 10 years, cases of leaks were virtually non-existent with well-constructed operable skylights.

“If they’re installed properly, they’re reliable,” explained Dr. James. “The problem happens when people install them badly, or if on a budget they buy a

flashing from somebody else. If you’re going to put a hole in the roof, you want to make sure that you buy one that’s going to last.”

Jeff Julian, Vice President at Don Julian Builders, concurred. “I don’t even know of one instance where we had a leaky skylight. You know, for a long time that was a thing, but I’ve had no complaints of leaky skylights.”

SUNROOM SKYLIGHTS: A SUSTAINABLE SOLUTION TO MITIGATE CLIMATE CHANGE

Several studies by Group 14 Engineering found that operable skylights can reduce global warming potential by reducing energy consumption associated with cooling. Sunrooms with skylights reduce the need for artificial electric lighting while natural ventilation reduces the need for air conditioning.

“We’ve done many model homes with sunrooms and beautiful Velux operable skylights. Every single customer has repeated the skylights in our model homes,” said Jeff Julian, Vice President at Don Julian Builders. “So to me that’s a pretty good indication. It’s one of our most popular features.”



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A young boy is shown in profile, blowing a bubble. He is holding a green apple core with a wooden stick through it. The background is a bright, warm sunset or sunrise, creating a soft, golden glow. The boy is wearing a striped t-shirt. The overall mood is peaceful and hopeful, suggesting a connection to nature and sustainability.

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to improve our planet and society.*

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