



NATURAL INTERIOR DAYLIGHT

A REPORT TO ADVOCATE FOR SOCIALLY RESPONSIBLE SUSTAINABLE DEVELOPMENT

ROOFING PROJECT DRIVES NATURAL DAYLIGHT INTO VOLVO TRUCK PLANT

ENEREF INSTITUTE EXAMINES HOW VOLVO GROUP TRUCK PLANT REDUCED THEIR ENERGY LOAD WITH NATURAL INTERIOR DAYLIGHT.

Volvo Group North America has taken a leading role in demonstrating the benefits of natural interior daylight at their largest facility, the New River Valley Cab & Vehicle Assembly plant where all Volvo Trucks for North America are assembled.

In 2010, just one year into a ten-year energy reduction challenge issued by the US Department of Energy (DOE), the plant became the first facility in the nation to meet the goal.

Volvo's energy reduction success

“IT’S A VERY WELL-LIT ENVIRONMENT. WE FEEL LIKE WE GOT A LOT OF BANG FOR OUR BUCK AND THAT IT WAS MONEY WELL SPENT.”

Mike Kijak, Facilities and Energy Manager for Volvo Trucks America

began with a comprehensive plan to implement multiple energy reduction strategies, including the installation of heat-reflective white roofing and extensive use of natural interior daylight (NID) with rooftop skylights.

“Very early on, the skylights were really one of the first items to kickstart the whole energy program,” said Mike Kijak, Facilities and Energy Manager for the New River Valley plant in Dublin, Virginia.

As part of our Natural Interior Daylight initiative, Eneref Institute interviewed key stakeholders from Volvo Trucks North America, including: Mike Kijak, Facilities and Energy Manager and Johnny Kincer, New River Valley plant facilities engineer. Eneref also interviewed Daniel Kimball, VP Sales Southern Group for CentiMark Roofing, Canonsburg, PA.

SIGNIFICANT ENERGY REDUCTION PLAN

The facility utilizes skylights with an LED lighting system, employing daylight harvesting with sensors that measure and maintain interior light levels.

“As the sun comes up and hits the skylights, the LED lights begin to shut off—they’re no longer needed,” said Volvo’s Kijak. “You conserve more energy as the sun comes more directly overhead.”

The DOE ‘Save Energy Now LEADER’ program, currently known as the DOE Better Buildings, Better Plants program, worked with 32 companies to commit to a 25% reduction in their industrial energy intensity per unit of product over a ten-year span. Execution of the New River Valley plant’s plan reduced its energy use per unit, or truck manufactured, by 29.6%—surpassing the ten-year goal within the first year.

Using skylights to provide natural interior daylight dramatically increased the available light in the assembly plant, reducing the need for electric lighting, according to Daniel Kimball, VP Sales Southern Group for CentiMark Roofing. Prior to the skylight installation, electric lighting provided approximately 30 lumens of interior light.

“The skylights alone provide between fifty and seventy lumens,” said Kimball, adding that the light dispersed evenly throughout the facility. “Even with a skylight thirty-six feet high, the light doesn’t fluctuate more than one foot candle between them.”

NOTICEABLE EFFECT ON EMPLOYEE MORALE

The installation of natural interior daylighting had a noticeable effect on employee morale and even productivity, according to Kijak.

“We call it the ‘wow’ factor,” he said. “With the skylights, people just have an uplifted feeling, they want to do better.”

As skylights were installed, employees began requesting them in their work areas, according to Kincer.



PYRAMID PRISMATIC SKYLIGHTS

Initially, CentiMark presented Volvo samples of Sunoptics skylights.

“The biggest impact was in the warehouses where we put together kits for individual trucks,” said Kincer.

DAYLIGHT IN OVER 65% OF THE PLANT

CentiMark was brought in initially to replace the facility’s built-up asphalt roof with a modern, heat-reflective, white thermoplastic polyolefin single-ply roofing membrane. Their expertise in both roofing and daylighting were instrumental in the successful execution of the plan over the plant’s 1.6 million square feet of roof space.

“We like CentiMark’s single-ply membrane roofing systems,” said Kijak. “We used the white reflective roof with insulation to help conserve energy.”

CentiMark installed barrel vaulted skylights over much of the manufacturing and warehouse space, along with smaller prismatic skylights and tubular daylight devices. Skylights of varying size were chosen depending on what each section of the facility required. Some sizes were more suited to particular areas, depending on how the structural roof members were framed.

“There is a variety of daylighting going on,” said Kimball. “We’ve done a series of things over the last six years: large radiant skylights, prismatic skylights, light tubes, and others.”

“We liked the barrel vaulted skylights, both large and small, so we used a lot of those,” said Kijak. “They really let a lot of light in.”

The installation brought daylight to more than 65% of the plant’s interior.

Other green efforts at the Volvo facility include a building automation system to control

THE VOLVO TRUCK FACILITY REDUCED ITS ENERGY INTENSITY BY NEARLY 30 PERCENT IN JUST ONE YEAR

The plant reduced its MMBtu per truck (the DOE metric for energy intensity) from 79.64 in 2009 to 60.42 – a reduction of 29.6 percent.

temperatures, lighting, and infrared heaters. Additionally, rooftop solar PV panels, solar thermal water heaters as well as eight rooftop windmills were installed by CentiMark Roofing.

“The windmills generate a ton of electricity” said CentiMark’s Kimball.

SKYLIGHTS ON A MAJOR ROOFING PROJECT

With CentiMark already replacing the sprawling plant’s 38 acres of roofing, adding rooftop skylights to a roofing project was an easy choice. “CentiMark helped us out quite a bit, it was kind of divine intervention,” said Volvo’s Kincer.

“CentiMark saw our older skylights and asked if we were interested in having more,” said Kijak. “They brought samples in and installed a couple of Sunoptics skylights to try. We picked the ones we liked and it grew from there. It has lit the place up significantly.”

The challenge was to avoid disrupting the plant’s substantial ongoing production as CentiMark needed to install the skylights directly above the assembly floor.

“We were cognizant of what’s going on underneath, and that

we’re not causing any issues, be it noise, dust falling in, debris, anything that would cause a safety issue or loss of manufacturing,” explained CentiMark’s Kimball.

CentiMark also protected the roof surface from damage during installation and ensured the skylight penetrations were flashed and sealed properly, and provided the extra assurance of both a roof warranty as well as a labor and materials warranty.

The New River Valley plant has included daylighting in their budget plans for the next several years, according to Volvo’s Kijak. “And we’re still not totally finished, we have more to do.”

Because of the preexisting rooftop systems, CentiMark had to leverage the available roof space to eliminate interior shadows while optimizing for the most amount of light.

“They’ve got racks thirty-six feet high, and we’re able to illuminate the entire aisle for them,” said Kimball.

In addition, a large interior garden was created on the plant floor underneath the first installed skylight providing a

pleasant natural element in an industrial setting.

THE FIRST FACILITY TO MEET THE DOE ENERGY REDUCTION CHALLENGE

Thirty-two companies participated in the DOE’s original ten-year LEADER energy reduction program, now known as the DOE Better Buildings, Better Plants program, which sunsets in 2016.

“These companies’ commitments to energy efficiency not only generate significant energy and carbon savings, but also show the entire business community the profitable steps that can be taken to move us all toward a clean energy future,” said former Secretary of Energy Steven Chu.

After the New River Valley plant formed an energy committee to identify and implement energy-saving projects, the initial investment led to cost savings of more than \$2 million in the first year—with a payback period of just six months.

In that first year, energy use at the plant dropped by 30%, surpassing the 25% goal and making the New River Valley plant the first participating facility to meet the ten-year DOE challenge.



SUN-LIT TROPICAL GARDEN

Volvo filled a deep, twenty ft. hole with earth and sand to create a tropical garden and installed the first large skylight above.

Following Volvo Group North America’s success at its New River Valley plant, similar measures are being implemented at its other North American manufacturing facilities in Maryland and Pennsylvania.

“What we’ve done here has spread to our other plants,” said Kijak. “They saw what we were doing here and followed our lead.”

RESULTS EXCEED EXPECTATIONS

Eneref found that everyone involved in the project was satisfied.

Customers who visit the plant to test drive trucks and view Volvo’s production facilities have also noticed the improvements, according to Kijak.

“We get a lot of questions and discussion about our energy program. People want to know about the skylights,” he said. “When customers and other guests visit the plant, a lot of my time is of course spent talking about the trucks, but I also spend a lot of time answering questions about the plant and our energy program.”

Research and reporting compiled and provided by Eneref Institute. Additional information generously provided by Volvo Trucks America and CentiMark Roofing, Canonsburg, PA.



LEAD BY EXAMPLE.

THE NATURAL INTERIOR DAYLIGHT INITIATIVE IS A CAMPAIGN TO PRESERVE OUR NATURAL RESOURCES AND PROMOTE NICER LIGHTING IN OUR HOMES AND BUILDINGS.

ENEREF INSTITUTE launched the Natural Interior Daylight initiative to champion solutions in line with our mission, that deliver sound ideas to significant market influencers. The initiative is designed to encourage responsible behavior within public and private organizations, municipalities and corporations by offering common sense solutions that can achieve effective results.

Our Natural Interior Daylight Virtual Campus is the repository for our Advocacy Reports and Web Forums.

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