PRODUCT GUIDE

SOLAR STRUCTURES

NUCOR®

CONTENTS

1 Energy Solutions
3 Sustainability
5 Closed Loop Recycling
7 Solar Structures
9 Types of Buildings
11 Types of Solar Structures
13 Solar Structure Projects
13 Brentwood School System - Brentwood, CA
14 Tesla V3 Supercharger Station - Healdsburg, CA
15 Tesla V3 Supercharger Station - Las Vegas, NV
17 Ikea - Baltimore, MD
19 PowerShingle®
21 Benefits
23 320W Panel Technical Specifications
24 320W Panel Dimensions
27 Types of Structures
27 Foundation Designs
28 Wind & Ground Snow Capacity
29 PowerShingle® Projects
29 Bonipak Produce - Santa Maria, CA
31 Emory University - Atlanta, GA
33 Taylor Farms - San Juan Bautista, CA
35 Contact Us

NUCOR ENERGY SOLUTIONS

As North America's most diversified steel and steel products company, Nucor's Energy Solutions team serves as your trusted partner to deliver world-class results. We're dedicated to the success of your renewable energy projects from start to finish.

Unparalleled customer care. Building trusted partnerships. Creating sustained value.

That is our vision.

WE UNDERSTAND YOUR CHALLENGES

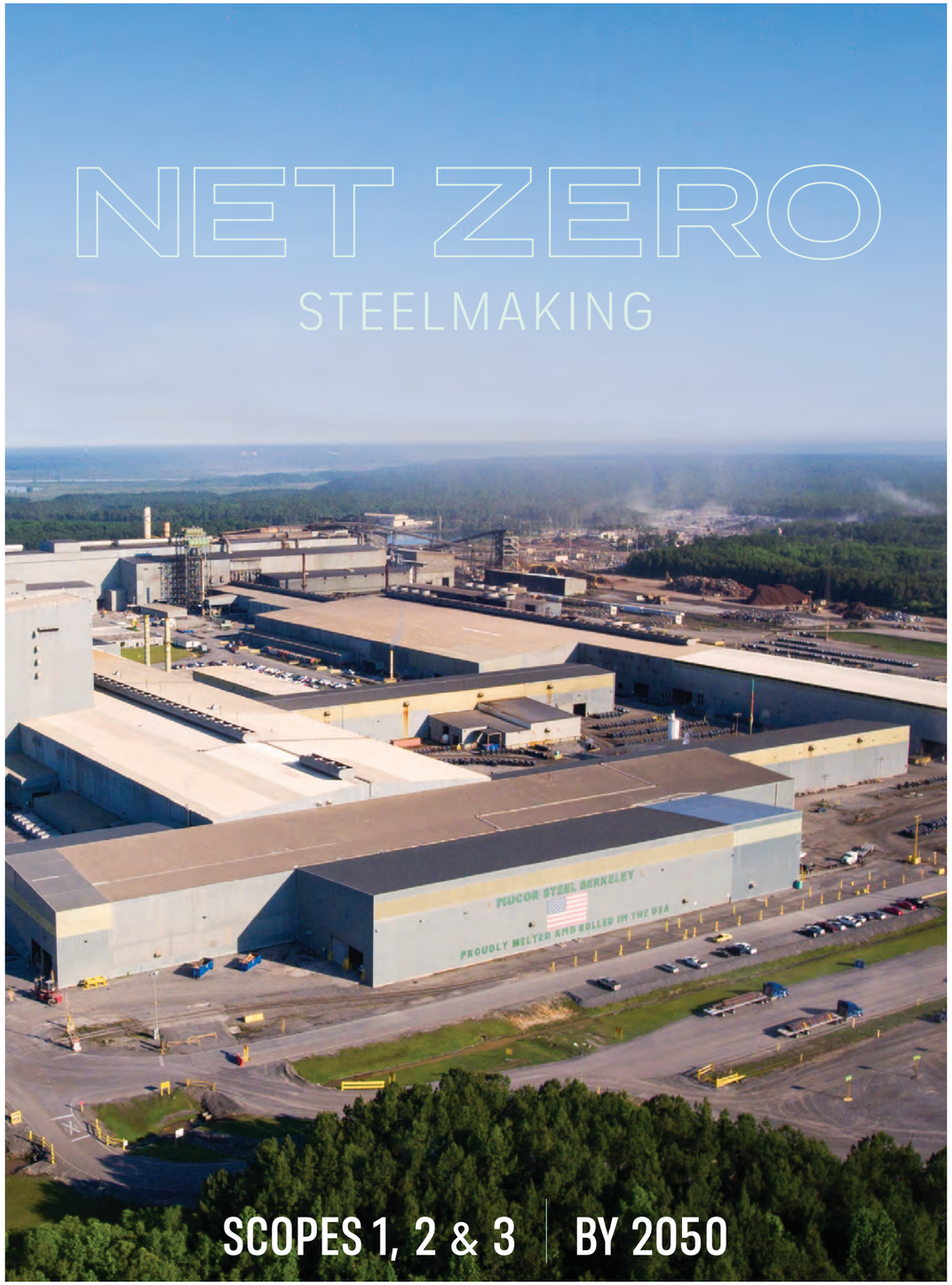
From highly architectural solar canopies to large institutional, commercial and utility-scale solar installations., we produce a wide range of steel and steel products for modern renewable energy projects. As your partner, our Energy Solutions team understands the rigorous safety, certification, quality, and environmental challenges you face every day. Our team is committed to responding quickly so you can keep your solar projects moving forward.

CONNECTION TO INDUSTRY EXPERTS
With deep roots in the renewable energy industry, we partner with you to facilitate dialogue with experts in connection and member design, helping you find innovative solutions to the most complicated challenges.

SCHEDULE IMPROVEMENTS
By engaging a steel producer at the onset of a project, potential schedule bottlenecks or alternative design approaches can be determined together.

BUILT-IN SUSTAINABILITY
We are a world leader in sustainable steel production and North America's largest recycler. Our efficient steelmaking process is built around recycling scrap into high-quality new steel—with a GHG intensity that is 1/3 the global blast furnace average. That means greater sustainability and a lower carbon footprint built right into your solar projects.

DEPTH OF PRODUCTS
We produce a wide range of standard and specialty steels for the solar sector. Our casting facilities produce a broad range of custom components and castings, making Nucor a one-stop shop for every aspect of your most demanding renewable energy projects.



DRIVING SUSTAINABILITY

Sustainability drives the business decisions of leading companies around the world. As a trusted partner, we are committed to helping you be more sustainable by reducing the emissions impact of our products.

A LEADER IN DECARBONIZATION

- Our circular steelmaking process uses electric arc furnace (EAF) technology to produce recycled steel with greenhouse gas (GHG) intensity less than one third* the global extractive steelmaking average for Scopes 1, 2 and 3. Extractive steelmaking methods require mining iron ore and coal to produce steel using blast furnaces.

- We are reducing the carbon footprint of our steelmaking operations by expanding the clean energy sources that power our mills today and investing in advanced nuclear technologies that could power our steel mills with carbon-free electricity in the future.

- We are investing in technologies to help us reduce and capture CO_2 at every point in our value chain.

ECONIQ™

CERTIFIED LOW-EMBODIED CARBON STEEL

Econiq™ is the world's first certified low-embodied carbon steel solution, introduced to offer steel consumers a portfolio of certified products to achieve their sustainability goals.

The Econiq certification can be applied to all of Nucor's steel and fabricated steel product lines, the most comprehensive in the U.S. market.

ENVIRONMENTAL PRODUCT DECLARATIONS

What is the environmental impact of a steel product? Explore Nucor's Environmental Product Declarations.

NET ZERO STEELMAKING BY 2050

Nucor is committed to a 2050 net-zero, science-based greenhouse gas target as defined by the Global Steel Climate Council (GSCC), which includes Scopes 1, 2 and 3.

1/3

Nucor produces recycled steel with GHG intensity less than one third* the global extractive steelmaking average for Scopes 1, 2 and 3.

77%

Our steel products are made from an average of 77% recycled content.**

∞

As a circular material, steel can be infinitely recycled with no loss of quality

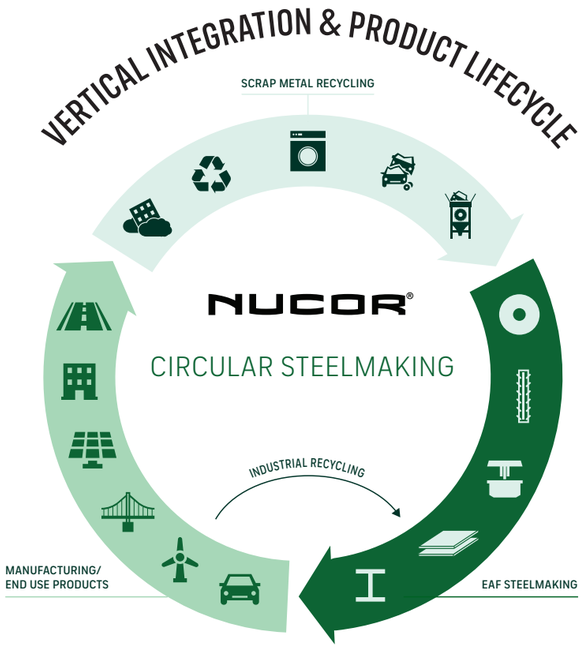
*Worldsteel **2022 data

SUSTAINABILITY

CLOSED LOOP INDUSTRIAL RECYCLING

When you enter into scrap programs with **Nucor Industrial Recycling** (NIR), we create a closed loop environment. As part of the circular economy, a closed loop environment means we're conserving natural resources and diverting waste from the landfill. Our team can also provide you on-site equipment, logistics services, and marketing expertise.

- Our nearly 70 recycling locations process scrap or directly supply industrial scrap, end-of-life railcars and vehicles.
- The scrap is used by 25 Nucor steel mills to make sheet, plate, beams and steel for approximately 200 Nucor steel products facilities.
- The David J. Joseph Company (DJJ) supplies 100% of scrap to Nucor Mills. DJJ has six regional companies across the U.S. with the capacity to sort and recycle over 5 million tons of ferrous and nonferrous scrap annually.
- Scrap-for-steel agreements are available if you're looking to fix a steel price directly to the value of your returned scrap. We also work with local service providers and truckers to ensure your operations aren't negatively impacted.



HELPING MEET ENVIRONMENTAL, SOCIAL, AND GOVERNANCE (ESG) CRITERIA

By participating in our scrap programs, you're taking part in creating a closed loop environment that's consistent with the circular economy. That also means you're better positioned to meet ESG criteria many investors use when choosing companies that appeal to them.

SOLAR STRUCTURES

With a wide range of steel and steel products available, we serve a variety of needs in the solar energy market. Our team is committed to working closely with you during all phases of your solar projects.

energy@nucor.com

Nucor Buildings Group provides custom-designed and engineered solar structures that support photovoltaic (PV) systems. We design and manufacture solar structure installations from coast to coast, ranging from highly architectural solar canopies to large institutional, commercial, and utility-scale solar installations. Our experience and expertise have earned us DSA pre-check approval, allowing California projects to move faster.

SOUTHERN CONNECTICUT STATE UNIVERSITY NEW HAVEN, CT

SOLAR STRUCTURES

CARPORTS

STANDARD CARPORTS

- Designed to extend over one or two rows of parking spaces
- Positive or negative pitch
- Three, four, five, or six panels high

CUSTOM CARPORTS

- Straight
- Tapered
- Y-shaped column
- Curved facade
- Water management features

CANOPIES

GROUND CANOPIES

- Larger canopies with long spans that can extend over an entire parking lot
- Flat, single slope, or gable

GARAGE CANOPIES

Long span canopies that sit atop a multistory garage

CHARGING STATIONS

STANDARD CHARGING STATIONS

- Eco-friendly
- Visually appealing

CUSTOM OPTIONS

- Y-shaped column
- Select Finishes (prime shop coat, hot dipped galvanized, or bare steel)

BATTERY STORAGE BUILDINGS

- Pre-engineered, built to your specifications
- Metal wall systems or insulated metal panels
- Produced from sustainable steel

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TYPES OF SOLAR STRUCTURES

STANDARD CARPORTS

Smaller canopies that are designed to extend over one or two rows of parking spaces. Canopies can have a positive or negative pitch and can be 3, 4, 5 or 6 panels high.

CUSTOM CARPORTS

Options include Y-shaped columns, a curved facade or a water management feature.

SOLAR STRUCTURES

GROUND CANOPIES

Larger canopies with long spans that can extend over an entire parking lot. Can be single slope or flat.

GARAGE CANOPIES

Long span canopies that sit atop a multi-story garage.

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DSA PRE-CHECK APPROVED

BRENTWOOD SCHOOL SYSTEM

BRENTWOOD, CA

- DSA pre-check approved
- Ground solar carports
- ~72,000 sq. ft.
- ~1.2 MW
- 181 tons of steel

Nucor can provide DSA pre-check approved structures for your public school or community college.

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TESLA V3 SUPERCHARGER STATION

HEALDSBURG, CA

- Ground mounted carport
- ~26,400 sf
- ~462 kW
- 73 tons of steel

Covered parking and charging stations, like this one installed for Tesla, can provide additional power and reduce energy costs at your facility.

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TESLA V3 SUPERCHARGER STATION

LAS VEGAS, NV

- Solar ground canopy
- Over 7,600 sq. ft. parking lot
- Two T-carports, 6 high
- 138 kW
- 20 tons of steel

When your city is illuminated 24/7, electricity is a big deal. Las Vegas took a green step forward when a Tesla Supercharger V3 station was installed next to the High Roller observation wheel. This system was equipped with a solar ground canopy that's both eco-friendly and visually appealing.

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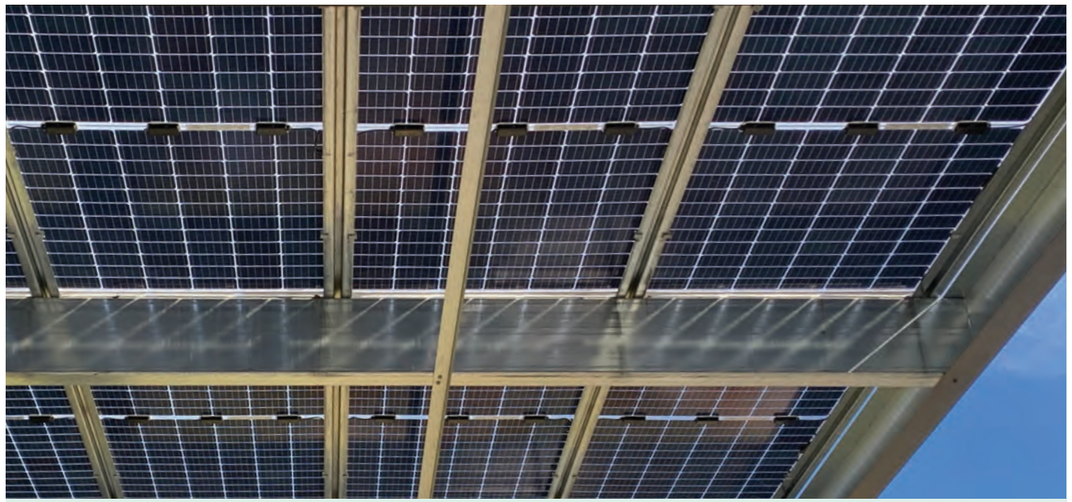

Tesla asked for a structure that looked less industrial than the standard carport. To satisfy that request, we designed Y-shaped columns that made the vertical posts look thin and light and also allowed us to drastically reduce the depth of the rafter. As a result, the unique structure blended seamlessly into the beautiful surroundings.

IKEA

BALTIMORE, MD

- Ground canopy
- Over 78,000 sq. ft. parking lot
- 10 T-carports, 6 high
- 1490 kW
- 190 tons of steel

IKEA, the world's largest furniture retailer, is known for their flat-packaged goods and Swedish meatballs. But lately they've been recognized for their sustainability. The brand has committed to being 100% powered by renewable energy by 2025. One way they're working toward that goal is utilizing their parking lots for solar power generation.

IKEA had a few requirements: the structures had to be cost effective, quickly deployable and non-intrusive on parking spaces. To meet these requirements, Nucor developed T-carport and canopy solutions that left ample car room. This was made possible by minimalist support beams and longer span canopies.

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SOLAR STRUCTURES

Once installation was complete, the impact was almost immediate. The generated solar power significantly offset the energy the store needed to purchase.

OVER A THREE-MONTH PERIOD, THEIR COMMERCIAL DEMAND FOR ENERGY FELL 84%.

Nucor Solar Structures has worked with DSD Renewables and IKEA on eight US retail locations. The projects will provide a total of nearly 11 GWh of clean energy production each year — the carbon equivalent of planting 125,000 new trees.

BEYOND

NEW PRODUCT

POWERSHINGLE®

PowerShingle — from the structure to the solar panels — is proudly manufactured in America. Featuring a highly effective water-shed design that keeps everything below clean and dry, PowerShingle eliminates the need for costly subroofing typically required to weatherproof conventional solar systems.

energy@nucor.com

BI-FACIAL PANELS HARVEST LIGHT FROM BOTH SIDES, MAXIMIZING ENERGY PRODUCTION.

POWERSHINGLE®

HIGHER SYSTEM PERFORMANCE
Generate power on front and back
with bi-facial technology

PROUDLY MANUFACTURED IN THE USA

SHIPPED WITH POSITIVE TOLERANCE

DUAL-GLASS SOLAR MODULES
With anti-reflective coating on glass

3RD PARTY RELIABILITY TESTING

QUALITY WEATHER PROTECTION
Designed so water sheets down the panels,
elimating the need for a subroof

COMPATIBLE WITH ANY PURLIN DESIGN

HIGH-DENSITY POWER GENERATION
UL 61730; UL 1703 Fire Type 3

25 YEAR LINEAR PERFORMANCE WARRANTY
15 YEAR PRODUCT WARRANTY

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POWERSHINGLE®

POWERSHINGLE®

410 WATT | BI-FACIAL SERIES

MECHANICAL SPECIFICATIONS	
FRAME	PowerShingle Frame
DIMENSION (L x W x D)	69.25″ x 46.75″ x 1.97″ 1759mm x 1187mm x 50mm
WEIGHT / PC	28.44kg / 62.7lbs
PALLET	26 pcs per crate
LOADING CONTAINER	24 crates x 26 each = 624pcs / 40′ FTL
MAXIMUM LOADS	5400Pa (snow) 3600Pa (wind)

AXN6M610Bxxx	FRONT SIDE PERFORMANCE	TOTAL POWER OUTPUT FOR DIFFERENTIAL BI-FACIAL GAIN COEFFICIENTS			
		5%	10%	20%	30%
MAXIMUM POWER (+3%)	410W	431W	451W	492W	533W
Voc (V)	37.54	37.54	37.54	37.54	37.54
Isc (A)	13.86	14.55	15.25	16.63	18.02
Vmp (V)	31.55	31.55	31.55	31.55	31.55
Imp (A)	13.00	13.65	14.30	15.60	16.90
MODULE EFFICIENCY (%)	19.0%	19.9%	20.9%	22.7%	24.6%
SERIES FUSE RATING	30A				
JUNCTION BOX PROTECTION	IP68				
MAXIMUM SYSTEM VOLTAGE	VDC1500				
OPERATING TEMPERATURE	-40°C to 85°C				
NUMBER OF CELLS	108				
CONNECTOR TYPE	MC4 Compatible				
CERTIFICATION/FIRE RATING	UL 61730; UL 1703 Fire Type 3				

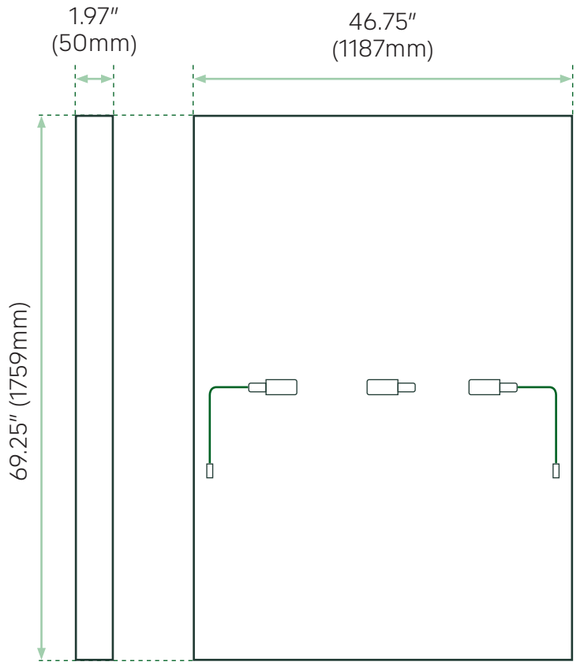
Electrical measurements at STC. Electrical parameter tolerance +/- 10%

Bi-facial modules produce power on both front and back. Nominal bi-facial module gain coefficient can run from 10% to 30%, depending on the installation and the amount of direct irradiance. It is recommended to design the electrical circuits with safety factor that accounts for the additional power in order to protect electrical hardware.

TEMPERATURE COEFFICIENTS	
NOCT	45°C
SHORT CIRCUIT CURRENT	+0.044% / C
OPEN CIRCUIT VOLTAGE	-0.244% / C
MAX POWER OUTPUT	-0.319% / C

STANDARD TEST CONDITIONS (STC)	
IRRADIANCE	1000W/m²
MODULE TEMPERATURE	25°C
AM	1.5

Specifications subject to change without notice.



POWERSHINGLE®

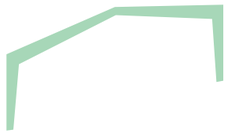
POWERSHINGLE®

QUALITY WEATHER PROTECTION

WATER SHEETS DOWN THE PANELS, ELIMINATING THE NEED FOR A SUBROOF

POWERSHINGLE®

TYPES OF STRUCTURES



GABLE ROOF

This provides a roof with two sloping sides and a ridge. The roof slope can be as low as ¼:12 or as steep as 6:12.

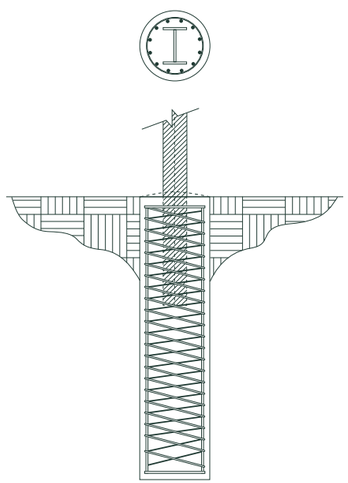
GABLE - MODULAR RIGID FRAME

Our modular rigid frame's interior columns provide multiple spans on wider buildings. It is available in both gable and single slope designs.

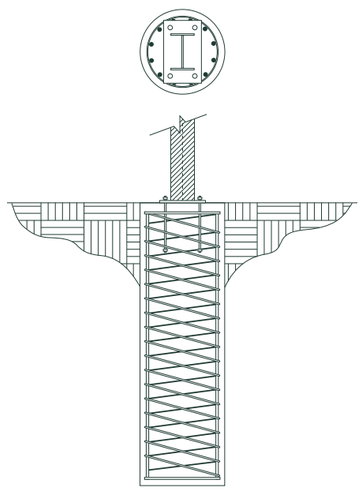
SINGLE SLOPE

These buildings have one roof surface. The roof slope can be as low as ¼:12 or as steep as 6:12.

FOUNDATION DESIGNS



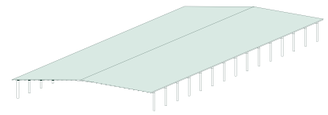
EMBEDDED COLUMN



COLUMN WITH BASE PLATE

POWERSHINGLE®

PS-1 Covers 1 row of parking	PS-2 Covers 2 rows of parking	PS-4 1 MW of storage
EXAMPLE: 15′ x 98′ x 10′ (3 x 25 array)	**EXAMPLE:** 37′ x 98′ x 14′ (7 x 25 array)	**EXAMPLE:** 146′ x 398′ x 20′ (102 x 27 array)



WIND & GROUND SNOW CAPACITY

Safe for use in appropriate site conditions for wind and snow.

Requires engineer investigation

PS-1 / PS-2
EXPOSURE B
MONOSLOPE / FREE ROOF

WIND SPEED (mph) \ GROUND SNOW (lb/ft²)	<	85	90	95	100	105	110	115
120	■	■	■	■	■	■	■	
125	■	■	■	■	■	■	■	
130	■	■	■	■	■	■	■	
135	■	■	■	■	■	■		
140	■	■	■	■	■	■		
145	■	■	■	■	■			
150	■	■	■	■				
155	■	■	■	■				
160	■	■	■					
165	■	■						
170	■							
175								

PS-1 / PS-2
EXPOSURE C
MONOSLOPE / FREE ROOF

WIND SPEED (mph) \ GROUND SNOW (lb/ft²)	<	85	90	95	100	105	110	115
90	■	■	■	■	■	■	■	
95	■	■	■	■	■	■	■	
100	■	■	■	■	■	■	■	
105	■	■	■	■	■	■	■	
110	■	■	■	■	■	■		
115	■	■	■	■	■	■		
120	■	■	■	■				
125	■	■	■					
130	■	■						
135	■	■						
140	■							
145								

PS-4
EXPOSURE B
GABLED / PITCH FREE ROOF

WIND SPEED (mph) \ GROUND SNOW (lb/ft²)	<	50	55	60	65	70	75	80
115	■	■	■	■	■	■	■	
120	■	■	■	■	■	■	■	
125	■	■	■	■	■	■	■	
130	■	■	■	■	■	■	■	
135	■	■	■	■	■	■	■	
140	■	■	■	■	■	■	■	
145	■	■	■	■	■	■	■	
150	■	■	■	■	■	■	■	
155	■	■	■	■	■	■	■	
160	■	■	■	■	■	■	■	
165	■	■	■	■	■	■	■	
170								

PS-4
EXPOSURE C
GABLED / PITCH FREE ROOF

WIND SPEED (mph) \ GROUND SNOW (lb/ft²)	<	50	55	60	65	70	75	80
85	■	■	■	■	■	■	■	
90	■	■	■	■	■	■	■	
95	■	■	■	■	■	■	■	
100	■	■	■	■	■	■	■	
105	■	■	■	■	■	■	■	
110	■	■	■	■	■	■	■	
115	■	■	■	■	■	■	■	
120	■	■	■	■	■	■	■	
125	■	■	■	■	■	■	■	
130	■	■	■	■	■	■	■	
135	■	■	■	■	■	■	■	
140								

All load calculation provided by Nucor Building Group Engineers upon final design drawings in submittal package.

Reach out to our product specialists for latest offerings. energy@nucor.com

BONIPAK PRODUCE

SANTA MARIA, CA

- Two ground solar canopies
- ~120,000 sq. ft.
- ~2 MW
- 346 tons of steel

This 180-foot clearspan structure is the first of its kind. The two structures were built to produce 1 MW of power for the facility's cooling facilities while providing storage for produce and equipment. The two structures are separated by an insulated panel fire wall.

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POWERSHINGLE®

EMORY UNIVERSITY

ATLANTA, GA

- Garage top solar canopy
- ~34,000 sq. ft.
- ~587 kW
- 74 tons of steel

As part of their green initiative, Emory University utilized Nucor's PowerShingle® for the Musculoskeletal Institute building, which will be the first solar project completed for the initiative.

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POWERSHINGLE®

TAYLOR FARMS

SAN JUAN BAUTISTA, CALIFORNIA

- PowerShingle® solar ground canopy
- Over 75,000 sq. ft. dry storage
- 1.32 MW
- 143.5 tons of steel

Taylor Farms in San Juan Bautista cannot afford to be without electricity, even for a few hours. The 450,000-square-foot facility is a 50-acre farm processing operation where vegetables are trimmed, mixed into salads and packaged for shipment and sale. The need for constant refrigeration to help ensure the safety of the nation's food supply is paramount.

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The PowerShingle® system didn't require Taylor Farms to give up any valuable farmland to install the elevated solar structures. The PowerShingle arrays consist of three 585-foot long canopies elevated 14 feet, offering more than 75,000 square feet of weather-protected canopy and clean power generation. This structure can generate up to 1.32 MW of clean energy per hour, while allowing produce to be stored and cars and other equipment to operate freely underneath.

PowerShingle's pre-engineered solar structures, which work with any Nucor purlin design and can be customized with spans of up to 200 feet, are made from 80% recycled domestic steel and can be certified Econiq™, Nucor's net-zero carbon steel.

PowerShingle maintains greater efficiency than standard solar arrays. Over the lifespan of a typical array – typically 30 years – solar panels lose about 1% of efficiency per year. PowerShingle, however, loses only about 0.66% efficiency per year, meaning an array can be in service for 10 years longer than standard arrays.

SOUTHERN CONNECTICUT STATE UNIVERSITY
NEW HAVEN, CT

CONTACT US

Our goal is to partner with you to deliver world-class results. If you'd like to learn more about how Nucor can benefit your business, please contact us.

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