

**THE GUIDE TO
ELECTRICAL CONDUIT
FOR RENEWABLES
PROJECTS**



RENEWABLES INDUSTRY UPDATE: SOLAR, WIND, EV PROJECTS GROW

In the United States, renewables projects are growing exponentially, driven in large part by wind and solar farms. In their report [Renewables 2022](#) released late last year, the International Energy Agency wrote, “The first truly global energy crisis, triggered by Russia’s invasion of Ukraine, has sparked unprecedented momentum for renewables.” It posits that renewable capacity expansion in the next five years will be much faster than what was expected even a year ago.



In terms of investment, U.S. energy transition spending is the [second largest in the world](#) (to China). The renewable energy market, including solar and wind power, accounts for a substantial portion of total investment. The U.S. solar industry expects to add 32 gigawatts (GW) of new capacity in 2023, a 52% increase from 2022, according to the [U.S. Solar Market Insight Q3 2023](#) in a report released by the Solar Energy Industries Association (SEIA) and Wood Mackenzie.

Other than wind and solar, renewables projects include EV charging stations and consumer-implemented DERS (distributed energy resources) such as rooftop solar panels, wind-generating devices and battery storage.

By 2050 renewable energy is expected to manage [more than 40%](#) of the country’s electricity, more than double what it manages today. One recent project that is coming together quickly is the [development of an EV charging network](#) across the U.S. and Canada, a joint venture between seven automakers. Other EV charging networks are being [developed at the state level](#) via funds procured through the Federal Highway Administration’s National Electric Vehicle Infrastructure (NEVI) Formula Program.



Challenges Facing The Industry

As renewables projects connect to the grid, utilities are finding the grid requires updates. Additionally, these projects can include more involved installation such as concrete encased duct bank and multiple circuits. Complex installations – open trench excavation, buried duct banks and use of conduit spacers and underground burial of cable-filled conduit – mean specifying the right electrical conduit for the job is critical to project success. The team at Champion Fiberglass® has 35 years of experience in guiding complex projects to a successful completion.

The renewables industry has not escaped the supply chain issues that have plagued other sectors in recent years. As new projects develop some common challenges include long lead times and limited supplies of some types of conduit. Throughout the pandemic and beyond, Champion Fiberglass conduit has remained [consistently available](#) with short lead times to help keep large-scale utilities, transportation and infrastructure projects on track.



Electrical Conduit Requirements for Renewables Industry and Utilities Projects

In order to protect transmission lines to the local grid, electrical conduit must be rigorously strong and durable. As many in both the public and private sectors are impacted by inflation, identifying potential savings on materials and labor (without sacrificing strength) is more important than ever.

Electrical conduit must be lightweight and easy to maneuver in trenches, as well as have a broad temperature range to tolerate environmental shifts in temperature. Custom bends can be especially helpful for projects that require significant trenching and other similar challenges.

Additionally, Champion Fiberglass offers mechanical and dielectric strength to protect dense cabling within.



Recent Renewables Project Success: Solar, Wind Farm, EV

Champion Fiberglass offers extensive experience in renewables sector projects, including wind and solar farms as well as EV charging stations, supplying durable, lightweight conduit quickly. The potential cost savings on both materials and labor when specifying fiberglass conduit instead of PVC-SCH 40, PVC-SCH 80, PVC-coated steel, GRC, aluminum or stainless steel can be huge. A simple run of our [conduit calculator](#) can provide comparative estimates for materials and installation.

Continue reading to learn how fiberglass conduit benefited an underground burial application in a Virginia solar farm and protected cabling for New York's first offshore wind farm.



CHAMPION ELBOW **CHAMPION DUCT®**

CHAMPION FIBERGLASS® CONDUIT PROTECTS CABLING FOR NEW YORK'S FIRST OFFSHORE WIND FARM



Challenge

Southfork Wind Farm is New York's first offshore wind farm. It consists of 12 turbines and a state-of-the-art transmission system that will generate enough clean energy to power 70,000 homes and offset tons of emissions each year. Located 35 miles east of Montauk Point, the underground transmission line will deliver power to the local grid in the town of East Hampton. It is a joint venture between Ørsted, a clean energy company, and Eversource, the electrical provider.

At the time of the project, there were supply disruptions due to global market factors. Limited supply of some types of electrical conduit resulted in rising material costs. On top of that, weather issues and the pandemic were causing long lead times that were affecting project timelines. Finally, this project involved a complex buried installation requiring minimal disruption.

Solution

This project necessitated a strong and durable conduit capable of adequately protecting transmission lines to the local grid. Champion Fiberglass® manufactures fiberglass electrical conduit as an alternative to PVC that was available with shorter lead times. Additionally, the product proved more cost effective than other types of conduit, which made bottom lines more attractive.

This was a complex installation with unique requirements including open trench excavation along four miles of railway and roadway with buried duct banks and use of conduit spacers. Champion Fiberglass conduit was lightweight and easy to maneuver into the trenches which facilitated installation. (Alternative conduit types such as PVC would have been heavier.) Also, Champion Fiberglass created custom bends that were helpful at certain points of the install. In short, fiberglass conduit's light weight and ease of installation helped make this long buried installation fast and seamless.

Results

Champion Duct®'s high dielectric strength helped protect cables along four miles of trenched installation delivering power via a single, 138kV alternating current (AC) transmission line. Better product availability, the lightweight nature of fiberglass conduit and ease of installation helped facilitate an on time and successful completion. Finally, lower costs helped the project stay within budget.

QUICK FACTS

PROJECT NAME

South Fork Wind Farm

APPLICATION

Renewables (Wind) /
Utility

CHAMPION FIBERGLASS PRODUCT(S)

[Champion Duct®](#)
[Champion Elbows](#)



BENEFITS

- > Conduit was easy to maneuver which facilitated a complex buried installation
- > Product procured on-time
- > Lower material and installation costs
- > Customized help from Champion Fiberglass for installation

FIND A REP

MAXIMUM TEMPERATURE RANGE AND STREAMLINED UNDERGROUND BURIAL BENEFIT SKIPJACK SOLAR CENTER



AES Corporation, a clean energy company, was planning a new solar farm in Charles City, Virginia. Called the Skipjack Solar Center, the facility is built on former working timber land.

This project consisted of the installation of five 35 kV circuits in a single 3.2 mile corridor. Each circuit has the capacity of transmitting 44 MW of solar generation (a total of 220 MW) to the grid. Construction included underground burial of conduit encased wire (0.75 mile in one continuous pull), as well as pole risers. The project involved significant trenching and the navigation of material shortages due to COVID-19.

Phase two of the project included a 230kV underground transmission gennie (generator tie line), capable of transmitting 320 MW of solar generation to the grid. Installation involved a 4,500 foot duct bank with a continuous run (long pull) of 230 kV underground transmission cables through cultivated fields between two new H-frame riser structures. Contractor Booth & Associates and their subsidiaries provided full engineering, equipment procurement, management and construction.

Challenge

This solar project presented a number of challenges. First, there were multiple circuits coming through the project. An interconnection facility was designed and installed bringing the solar facility to the grid. This involved five 35 kV circuits along 4 to 5 miles of cable to a new substation where voltage stepped up to 230 kV to connect underground to the grid.

Additionally, there were special requirements for long segment installation due to landowner agreements forcing overhead lines underground. Buried installation posed a challenge as concrete encased duct banks can be a bit more complex than other types of installation. The engineers and project managers desired to eliminate as much cable, conduit and equipment as possible.

The last challenge was procurement due to COVID-19 product delays. Lead times and costs of some products such as PVC conduit were long.

Solution

The engineers and project managers developed a scenario running cable underground in a straight line pull. Fiberglass conduit was ideal for the job due to its broader temperature range, up to 250 °F (121 °C), so it tolerates more heat. PVC conduit was not seriously considered due to its limited temperature range. Fiberglass conduit allowed for the maximum cable rating of 105 °C for this project. The more capacity a conduit can hold, the more heat is generated, so temperature range was a key factor in conduit selection.

QUICK FACTS

PROJECT NAME

Skipjack Solar Center

APPLICATION

Solar/Utilities

CHAMPION FIBERGLASS PRODUCT(S)

[Champion Duct®](#)



BENEFITS

- > Solar farm project included buried conduit installation and pole risers
- > Broad conduit temperature range was able to handle heat generated by the cables
- > Streamlined installation beat deadlines
- > Conduit procured with short lead times

FIND A REP

MAXIMUM TEMPERATURE RANGE AND STREAMLINED UNDERGROUND BURIAL BENEFIT SKIPJACK SOLAR CENTER



Use of fiberglass conduit allowed project managers to consider a more straight forward burial type. Durable, corrosion-resistant medium wall (MW) and heavy wall (HW) conduit provided mechanical protection so the conduit and cable could be buried directly without the need to pour concrete.

Champion Fiberglass® conduit (55,000 feet) was procured within a faster time frame, 6 to 8 weeks, half the time of other conduit types that were experiencing supply chain issues.

Installation was easy. Trenches, 60 to 80 feet, were buried, conduit was laid and connected with a slip fit connection that was hammered into place. There was no need for epoxy, so fewer materials were needed and installation took less time.

Results

- > Optimized design included durable, corrosion-resistant fiberglass conduit capable of handling a significant cable load due to its wide temperature range.
- > Product secured in half the time of competing conduit. Low material costs were easy on project budgets.
- > A complex project with significant underground burial in tight corridors was streamlined with an installation that shaved weeks off the timeline, enabling the contractor to meet important deadlines.
- > Excellent customer service helped the project reach a successful conclusion.



QUICK FACTS

PROJECT NAME

Skipjack Solar Center

APPLICATION

Solar/Utilities

CHAMPION FIBERGLASS PRODUCT(S)

[Champion Duct®](#)



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[FIND A REP](#)

SUSTAINABILITY PROGRAMS: ISO 14001-CERTIFIED CHAMPION FIBERGLASS® MANUFACTURES RESPONSIBLY



Sustainable Manufacturing Benefits Customers

Champion Fiberglass® values being a good steward of the environment, as validated by ISO 14001 Certification.

ISO 14001 Certification ensures our facility meets the world's premier environmental management principles. The designation certifies that the facility's environmental management systems lead in environmental performance, fulfillment of compliance obligations and achievement of environmental objectives.

The company strives to be a responsible corporate citizen in terms of the solid and water byproducts created in manufacturing. Leadership has found that protecting natural resources like water and the land the plant sits upon, as well as reducing landfill load, has beneficial results for the environment and customers.



Water Filtering System Lowers Water Consumption

The Champion Fiberglass water filtration system cleans water used in manufacturing so it can be reused. It works by collecting manufacturing water in a large green tank. A small black canister between two green tanks purifies the water using an activated carbon filter to absorb organic residues. The water then flows out clear into a second tank, where it is stored until reused in the cooling water system.

This filtering system has helped lower water consumption. It has also lowered the cost of disposal considerably, a savings passed along to customers in competitive fiberglass conduit pricing.





Hammer Mill Grinder Reduces Solid Waste Footprint

Manufacturing conduit creates solid waste in the form of broken and unusable pieces of fiberglass. The hammer mill machine grinds down these pieces to allow for a dramatic reduction in solid waste.

Further, this machine allows Champion Fiberglass to reduce its solid waste footprint 80 to 90% in contributions to the landfill. That is a significant reduction that translates into savings of thousands of dollars in chemical and landfill disposal costs.



Champion Duct® is Environmentally Friendly

Champion Fiberglass conduit is safe for both humans and the environment. It is low smoke and does not release toxic halogens into the atmosphere unlike PVC conduit.

Results from sustainability efforts include:

- 1** Achieved ISO 14001, the world's premier environmental management principles
- 2** Water filtering system reduces water consumption by approximately 33%
- 3** Reduced solid waste footprint up to 90%
- 4** Cost savings passed along to customers in the form of competitive pricing

SPECIFYING MADE EASY

Compare electrical conduit and strut products with these tools:



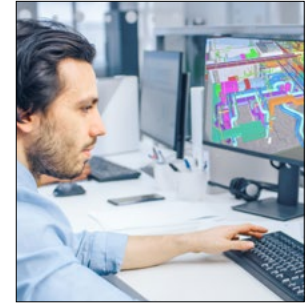
BUYER'S GUIDE

[DOWNLOAD](#)



PRODUCT CATALOGS

[DOWNLOAD](#)



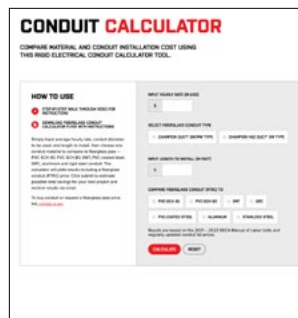
BIM MODELS

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ESTIMATING CALCULATORS

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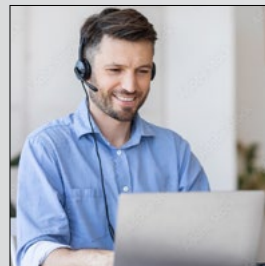


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