BURNS McDONNELL

CASE STUDY / **SUFFIELD SOLAR INSTALLATION**

SOLAR PROJECT OVERSIGHT ADDRESSES CLIMATE CHALLENGES

Utility-scale solar energy projects are being connected to the grid throughout North America. However, geographical considerations require different approaches for design and construction. A 23-MWac solar installation near Suffield, Alberta, illustrates some of the challenges and solutions required for projects being installed in higher latitudes.

OWNER'S ENGINEER ROLE CRUCIAL TO SOLAR PROJECT SUCCESS

Utility-scale solar installations in higher latitudes face more complicating factors than similar projects in more moderate climates.

PROJECT STATS

CLIENT
Canadian Solar

LOCATION
Suffield, Alberta

89K+
SOLAR MODULES

25-kV
DISTRIBUTION FEEDER INTERCONNECTION

23 MW
NET AC OUTPUT

CHALLENGE

A utility-scale solar project for Canadian Solar had to account for seasonal temperatures during construction as well as corrosive soil conditions at the site near Suffield, Alberta, a community in southern Alberta, approximately 100 miles east of Calgary.

A geotechnical report found the soil at the project site to be extremely corrosive, primarily due to many years of chemical fertilizer runoff from area agriculture. This made it likely that the metal components of piling foundations would degrade and need replacement much sooner than the 25-to-30-year design life of the project.

Much of the construction of the piling foundations had to be performed during the winter season because ground conditions in that part of the province become too soft in warmer months to accommodate heavy trucks and other equipment needed for construction. The piles had to be embedded to a depth of approximately 16 feet, to provide a safety margin far below the frost line of 6 feet common in this part of Alberta.

In addition, the project had to account for high snowdrifts and battery performance on-site during winter seasons, where temperatures routinely drop to minus 40 degrees Celsius. The trackers that keep the solar modules optimally positioned in relation to the path of the sun could be rendered incapable of doing so if heavy snow loads cover the tops of the panels.

SOLUTION

After a change in tracker racking vendors, Burns & McDonnell provided guidance as owner's engineer on design options to mitigate the very real possibility of early failure of the solar module support system. Additional studies included a review of cathodic protection systems as well as various configurations for the rack system.

As owner's engineer, design solutions were reviewed to assess effectiveness in mitigating early failure of the module tracker system. After reviewing options for cathodic protection — a technique in which corrosion of the metal surface is controlled by making it the cathode of an electrochemical cell — that approach was rejected due to high cost. The preferred solution was to

fabricate the pile foundations with an additional sacrificial metal surface that could degrade over time while protecting the structural integrity of the inner metal posts.

In addition, options were explored to provide heating elements to keep the trackers operating during ultracold temperatures, but ultimately were rejected as being too energy intensive. The trackers were instead designed with control logic that stowed the system so that the panel trackers would remain stationary during periods of extreme cold or when drifting snow covers the module surfaces.

As owner's engineer, the project scope included:

- Review at 30% design
- Review at 75% design
- Engineering studies review
- Issued-for-construction (IFC) document and design review
- Compliance monitoring of the testing and execution plan
- Response coordination for requests for information (RFIs)
- Factory acceptance test observance
- Utility coordination support
- Site visits for:
  - First-in-place reviews
  - Installation quality checks
  - Mechanical completion walk downs
  - Commissioning oversight

The solar plant is interconnected to the regional grid via a 25-kV distribution circuit running from the local utility's substation.

RESULTS

The Suffield solar installation was successfully completed and commissioned in the fall of 2020 and was fully operational in time for the following winter season. The battery system providing power needed to move the module tracking mechanisms performed as designed during more moderate temperatures and stowed the modules to stationary positions when necessitated by high snow events and extremely low temperatures.

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