

**COVER PAGE**

**Recipient Organization:** Colusa Indian Community Council

**Project Title:** Solar Canopy Expansion Project

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**Award Number:** DE-IE0000117

**Total Project Cost:** \$2,335,228.00

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**Partners:** N/A

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**2. Executive Summary:**

This project is a parking-lot canopy solar photovoltaic system, consisting of four canopy structures and 1,080 470-watt (W) modules. The nameplate rating of the project is 507.6 kilowatts direct current (kWDC) at Standard Test Condition (STC), and 448 kilowatts alternating current (kWAC). It is interconnected to the existing Tribe-owned medium-voltage micro-grid generation system via a step-up transformer and short medium-voltage line.

This project offsets energy usage from more expensive existing sources, specifically the Tribe-owned gas-fired engine generators providing the primary power source for existing Tribal facilities and the electric utility, which provides an alternate source. The solar photovoltaic system is a renewable source, which has the benefit of reducing reliance on fossil-fuel burning sources.

By reducing demand on existing Tribe-owned conventional generators, the project has avoided the need to add more conventional generation and has prolonged the lifespan of existing gas-fired engine generators.

The project reduced energy costs and reliance on fossil-fuel burning power sources, increasing Tribe-owned generating sources and self-reliance, and prolonging the lifespan of existing generators. A side benefit to the project is the production of dozens of covered parking spaces in the existing parking lot.

**3. Project Objectives:**

This project is a solar photovoltaic (PV) system integrated with a carport canopy in the parking lot to the east of the Colusa Casino Resort and north of the existing parking canopy solar system. The completed system rating is 507.6 kW DC at Standard Test Conditions and 448kW AC (total inverter output rating).

The proposed project was intended to interconnect with the existing Tribe-owned micro-grid generation system at medium-voltage and to use existing electrical infrastructure from the existing parking lot canopy solar system to reduce system costs.

**4. Description of Activities Performed:**

Engineering and construction work were done by subcontractors under the oversight of Mr. Ahmann. The selected engineering firms were responsible for all design work with review, feedback and oversight from the Colusa Indian Community. The Colusa Indian Community directly procured all major equipment for this project.

The solar carport structure, modules and inverters were provided by a vendor.

The selected contractor installed the equipment per plans and specifications under the oversight of Mr. Ahmann.

The selected contractor, selected engineering firms, and the Colusa Indian Community worked together during the design phase to develop workable designs that achieve the goals of the project cost effectively. Drawings were reviewed by the Colusa Indian Community and the contractor for completeness and errors.

The design and engineering team continued to be engaged in the project after construction began to ensure critical handoffs to the construction team were successfully met.

## 5. Conclusions and Recommendations:

This project has helped the Tribe to realize its long term goals of energy self-reliance and of reducing their carbon footprint. There were several hurdles to overcome during the construction of the solar PV parking canopies, but ultimately the project was a big success.

The new solar PV parking canopies have produced a total of 869,229 kWhrs during the verification period, which is right on target with the original power production expectation for this project. This represents an annual savings over the local utility's commercial rate electricity of \$422,010.68. The payback on this entire project is expected to be realized in just over 5.4 years.



**Image 1: Initial construction phase**



**Image 2: Construction progress**



**Image 3: Paving complete before canopies were erected**





**Image 4: Completed canopy construction**



**Image 5: Completed inverter/transformer yard**

## **6. Lessons Learned:**

One of the challenges we encountered was with one of the primary vendor's subcontractors, who was tasked with the erection of the canopy steel. They had a very difficult time getting the canopies to sit level and without any waves across the PV panels. They had to return to the site several times to adjust the canopies for aesthetics alone.

However, once the arrays were level, literally every other aspect of the project came together as planned. Electrically, we had zero surprises. The commissioning of the new canopies went flawlessly and all equipment has functioned without issue ever since.

The monitoring phase consisted of daily checks on the inverters and communication equipment to ensure that everything was functioning normally, and it was for the entire 12-month verification period. We also collected monthly meter readings to verify that energy production was meeting expectations and it has been.

In the future, the Tribe would be more likely to consider smaller companies for the installation, considering how difficult it was to get the canopy steel to sit level and look normal. The vendor, while eventually correcting the issues, had some major communication issues and delays with regards to their subs. Otherwise, the project was a big success, and the Tribe is thrilled with the clean energy production of their new solar arrays.