

## DOE Office of Indian Energy – Final Narrative Report

**Recipient Organization:** Santo Domingo Tribe

**Project Title:** PV Solar Power for the Santo Domingo Tribe's Community Water Pump and Treatment Facility

**Final Report Period** May 2015 to December 31, 2019

**Award Number:** Award No. DE-EE0006954



**Executive Summary:**

The Santo Domingo Tribe (Kewa Pueblo) has been fortunate to receive federal funding through the Department of Energy (DOE) Office of Indian Energy Program for the planning, design and installation of 100,000-watt (W) AC rated solar photovoltaic system. The system is located on Santo Domingo Tribal lands in Sandoval County, NM. The site location sites east of Interstate I-25 and its physical location is 35°37'51.05" N/106°17'41.40" W. This installation consisted of ground-mounted, fixed tilt arrays, mechanically affixed on top of steel and concrete foundations. The system is interconnected at 4800 AC, directly to customer owned distribution feeders/equipment on strict accordance with NEC, LOCAL AHJ, Utility and Equipment Manufacturers requirements. The system operates in parallel with the utility grid per the requirements of the National Electric Code (NEC), State of New Mexico Construction Industries Division and Utility Company's interconnection agreement/contractual requirements.

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## Project Overview:

The Santo Domingo Tribe's endeavor to seek a solution to the high electricity costs for the operation of the drinking water pumphouse was made viable through the Department of Energy (DOE) Office of Indian Energy grant program for the installation of 100,000-watt photovoltaic (PV) solar power system. This source of alternative renewable energy was and is imperative to the Tribe in identifying a solution to off-set the costs of the Water Pump and Treatment Facility (WPT). The Tribe has a great interest in continuing their development of a model for future energy saving projects that will greatly eliminate or reduce costly electric utility bills and save the Tribe money.

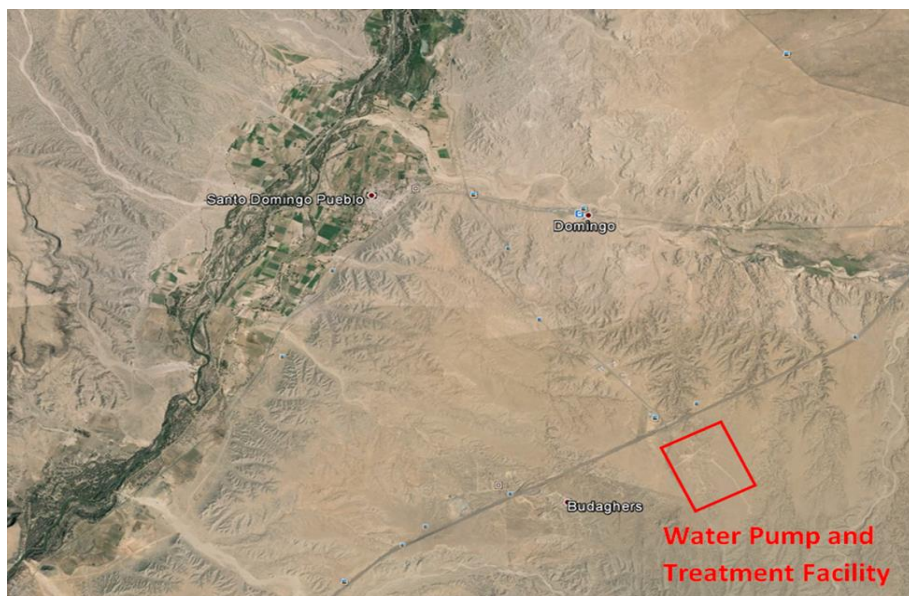
The approach to the design for the PV system for the WPT facility to off-set the maximum amount of electricity extracted from the power grid, while taking maximum advantage of the net-metering and renewable energy certificate (REC) programs offered by the Public Service of New Mexico (PNM).



## Objectives:

Installation of a ground mounted, 115 kW DC Photovoltaic System to roughly produce ~200,000kWh/year on 0.5 acres of land within Santo Domingo Tribal lands, east of Interstate 25. This project was initially awarded in 2015 and unfortunately, due to staff turnover, the project was stalled and efforts to revive it took months as the Interim Director familiarized (now Director) herself with the grant contract, the project, and the company that was selected for design and installation of the photovoltaic system. Initially, the project was set to take two years, but due to turnover in both Santo Domingo and Affordable Solar, the project was not completed until September of 2017.

The Water Pump and Treatment Facility (WPT) is the sole source for providing water to the Pueblo's infrastructure and it's 5,000+ residents. There is one pump house, two water pumps and one water tower, which operated year-round and is remotely located with grid connections. There is no shade or other development in the area, making it a prime location for the project. The annual energy offset for the WPTF is expected at ~80%, with an annual cost saving of ~35%, which is anticipated to reduce





CO<sub>2</sub> emissions by 2.4 million lbs./year. As the Pueblo continues to seek additional information for future energy project, they are hopeful that training and other job opportunities will be afforded to Tribal members.

**Description of Activities Performed (including representative photos and graphs):**



The Tribe has conducted work under all tasks outlined in the workplan for the project. An RFP was issued at the beginning of the project, by former staff, for the design and installation of the PV power system at the WTP. In response to the RFP, the Tribe received five responsive offers, of which three offers were within the price range anticipated by the Tribe. In order to evaluate the offers, additional information was requested from some of the offerors, as necessary. Specifically, offerors were requested to analyze electricity usage and charges at the WTP. Facility and provide a recommendation for the most

beneficial size of a PV power system. The offerors provided recommendations for PV systems ranging from 66 kW DC to 115 kW DC in size.

The Tribe conducted an analysis of the information provided by the offerors to evaluate which system could be expected to provide the greatest benefit and achieve the Tribe's objectives. The Tribe analyzed the estimated production value of solar power from the proposed PV systems based on manufacturer warranties and information and taking into consideration the historic electricity usage at the WTP facility and PNM's net-metering program. The Tribe prepared a summary of this bid analysis, which has been provided to DOE.

The Tribe prepared the award package to present to the selected design and installation firm. Project management also confirmed the availability and readiness of the design and installation firm to perform as required. The Tribe is prepared to award the contract and anticipates doing so within the next month. Once the contract is awarded, Task 1 will be complete, and the Tribe will begin working with the awardee contractor to finalize the design of the PV system. The Tribe has analyzed bids submitted by design and installation firms and made an initial award determination. A summary of the Tribe's analysis of offers has been provided to DOE. The Tribe has prepared internal documentation necessary to make an award to the selected design and installation firm and confirmed the firm's bid, availability and readiness to perform. The Tribe intends to make a contract award late April, early May 2016.

In July 2016, the project manager for the Tribe's DOE Solar Project, Rachel Henderson, resigned and relocated out of state and the [Interim] Director of Natural Resources position was transferred over to Jesse Young, and he began



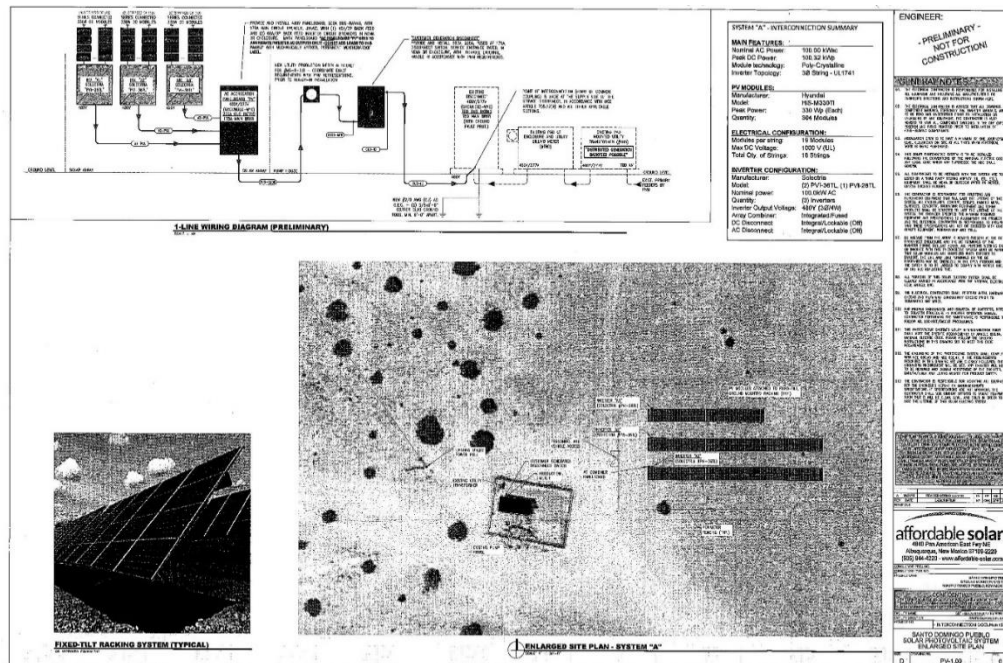
to work with the project management contractor from Environmental International (EI) to continue carrying out work plan objectives and tasks, including the review and selection of the qualified vendor. The Contract was awarded to Affordable Solar, a company based out of Albuquerque, NM and was signed by Governor Daniel Coriz on May 3, 2016. On August 5, 2016, the contract was returned to the Tribe with the President's signature, and thus becoming fully executed upon all parties agreeing.



The Interim Director of Natural Resources, Jesse Young, worked in collaboration with EI to develop a presentation on the Santo Domingo Tribal project at the 2016 U.S. Department of Energy (DOE) Office of Indian Energy Program Review held Nov. 14–17 in Denver, Colorado.

As progress began on the project, the Natural Resource Department (NRD) was able to successfully re-connect with Affordable Solar to identify and understand where the project left off, inquire and review tasks, completed and uncompleted, invoices and worked collaboratively to get the project back on track and to move forward. Wayne Stansfield, Commercial Project Developer, from Affordable Solar worked with Interim Director, Cynthia Naha, and contacted the NRD on March 10, 2017 and introduced himself as our new project manager. Since our initial phone call discussion, two meetings transpired:

- Update of Contract to reflect new program/project managers from Santo Domingo Tribe and Affordable Solar
- Invoices re-submitted for payment
- Public Service Company of New Mexico for the Utility Application and Approval for: Interconnection, net metering, and the REC Program Approvals.
- Mobilization of equipment purchases
- Monthly report submission from Affordable Solar





In April 2017, Affordable Solar completed all preliminary and final solar array designs, submitted applications to the electric utility company (PNM), received feedback and requested distribution screening studies which were performed and approved by the utility company. AS has ordered all major equipment (racking, inverters, solar panels) and identified long lead-time equipment. Once the Tribe received approval from PNM, the Tribe Requested DOE's concurrence to proceed with the procurement of equipment, which was purchased by AS. Santo Domingo Pueblo has provided the initial deposit and first stage/equipment payment.



Affordable Solar and their construction/project group met with the Natural Resources Department (NRD), Cynthia Naha, Tribal Programs Administrator, Everett Chavez and, Tribal Utility Authority (TUA) Director, Steven Pajarito, for a project overview meeting. Locks have been placed on the gate and we have been given keys/codes for our entry and access to site. An approved Memorandum was submitted to Governor Brian Coriz on June 6, 2017, which allowed for AS to begin installation of the Photovoltaic Solar System. The installation took roughly three and half months to complete.

Sub-contractor interviews, selections, and orientation meetings were conducted for various responsibilities by Affordable Solar. The construction staging area was designated and surveys have been performed. AS drilled holes and poured concrete for all piles. Racking and solar modules have been installed and wiring of panels is complete. Solar inverters are on site and have been installed, conduit has been running and switch gear is ready for installation. Monitoring equipment has been ordered and beginning to be configured which was received in July 2017.

Configuration of monitoring equipment took place beginning in August of 2017. The equipment ordered and received for this stage was completed. Conference calls continued to take place with AS and the NRD/TUA to ensure the project remained on task and to discuss disconnect and re-connect conservation and to identify a day in which this could take place; also to ensure that PNM has inspected the system and interconnection to service and provide approval to the Tribe.



Upon receiving the results, the project manager at NRD submitted the results summary to DOE. Staff of the TUA began to familiarize themselves with the PV system and worked with Affordable Solar for training in the operation and maintenance of the system. The SDT began monitoring performance of the system weekly for the first three months, and then switched to monthly monitoring.

Affordable Solar has completed the solar array in September of 2017 and the solar system energized, interconnected, and started producing energy for Santo Domingo Pueblo. A hand-off was coordinated and performed on September 8, 2017 by Dan Rice, Director, Quality Assurance/Quality Control (QA/QC). The objective of this hand-off was

to walk through the components/mechanics of the solar system, suggest O&M best practices, provide equipment specific information, warranties, etc. The project has requested an extension for additional twelve months so that the Tribe can begin monitoring the system to ensure its properly working and to collect and verify data as the system continues to produce energy for the Tribe.



DOE provided a recommendation, as part of the workplan, to extend the project for an additional year, December 31, 2018, to conduct monitoring of the system and look at the overall operation, maintenance, and verification of the system and to ensure that it meets the terms of the grant and expected goals and objectives of the project. A letter of extension was submitted by the Director of Natural Resources via email to Jennifer Luna on October 11, 2017 with acceptance of the modification by the Santo Domingo Tribe on December 20, 2017.



The Director of Natural Resources attended the DOE Annual Performance Review in Denver, CO on November 14, 2017 to provide a presentation on the Santo Domingo Tribe: PV Solar Power for the Santo Domingo Tribe's Community Water Pump and Treatment Facility. The Director of Natural Resources also presented this presentation to staff of the Tribal programs during the monthly Director's meetings held on the Pueblo to inform leadership and other staff of the project.

The Tribal Utility Department continued to monitor the solar array without any issues or problems and seems to be working on track. The Natural Resources Department in coordination with the Tribal Utility Authority continue to monitor the photovoltaic system to ensure that it is working properly with little to no maintenance or other issues. During July 2018, the system did experience an issue, in which the TUA Director contacted Affordable Solar to help troubleshoot.

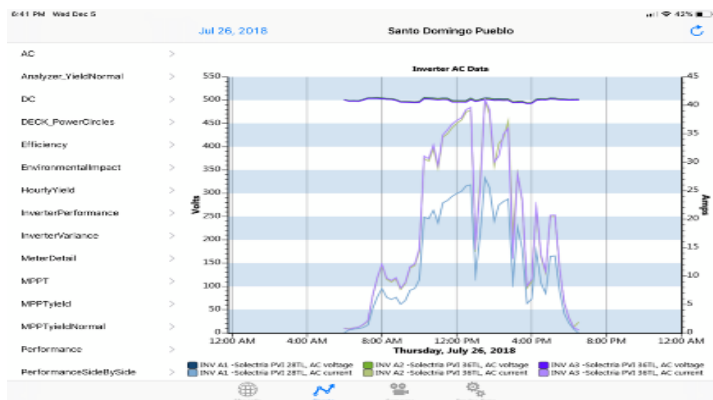
The TUA informed the NRD that the system was offline since July 2018 due to a sever monsoonal storm, in which the solar panels were struck by lightning. TUA staff worked to troubleshoot the problem to no avail. Once they informed the NRD Director, an email was sent out to Dan Rice, Director of Quality Assurance, to assist with troubleshooting the system to identify the problem and to see what corrective action needs to take place. The TUA at one point, after the discovery of the error in the system purchased necessary materials/supplies/parts to fix the problem. To no avail, the system remained offline until contact was made with Dan Rice.



Correspondence took place between the NRD Director and the Utility Director to set up a date and time in which Dan Rice and Affordable Solar could come out to check the monitoring system and to get it back up and running. While troubleshooting



our system, Dan Rice, also brought some solar testing equipment to run on our system to test out his equipment while he diagnosed the problem with our solar array. A date and time were arranged by TUA staff and Dan Rice on dates of availability to meet to review the system. This meeting took place on December 14, 2018 at 10:00 am.



Dan Rice brought a solar module tester to try on the operation PV array, which took about ½ to 1 hour to conduct the procedure as well as diagnosing and fixing the issue the communication of the monitoring system to get it back up and running. This was an effort to ensure the inverters were visible again on the monitoring site itself. Dan Rice was successful in getting the monitoring system functioning again and as suspected, the input port on the datalogger had damage from the storm event in July

2018. Dan Rice was able to switch the monitoring circuit over to the second port on the datalogger and the system was able to function and monitor the inverters, once again.

The week of December 10<sup>th</sup> was the Annual Performance Review for the DOE Indian Energy Program, in which the Director of Natural Resources Department attended on behalf of the Tribe to give our final presentation on our project. The presentation highlighted the successful efforts of getting the system up and running, but to conduct monitoring to ensure that all is working correctly and to work with the contractor, Affordable Solar, to troubleshoot any issues or problems with the system. Since the PV array and solar system was developed to off-set the costs of electricity to the Tribe to run the water treatment pump and facility, the Tribal Utility Department is responsible for ensuring the system is running correctly, to work with Affordable Solar to troubleshoot any problems or issues, to address any problems or issues, if they should arise; and to ensure it operability.



### Conclusion and Recommendations:

The Santo Domingo Tribe has been fortunate enough to receive federal funding for the design, implementation, and monitoring of a solar project, which over the course of time, will have a return of investment and reduce the Tribe's cost to run the Water Pump and Treatment Facility. The Tribal Utility Authority, along with the Natural Resources Department will continue to monitor the system for its effectiveness, troubleshoot any operation and maintenance that will be required of the system over time as well as look into other opportunities for training and building staff's capacity to better understand the system, including training on photovoltaic systems, installation requirements, software needs and updates and other pertinent information that will allow for the Tribe to be successful in future alternative energy endeavors.

Although it is never guaranteed when a Tribe faces turnover, it is ideal for the Department of Energy to have a process or system in place to allow for flexibility of incoming staff's understanding of a project/system of this size to enable successful completion. The Santo Domingo Tribe's Natural Resources Department did receive assistance when the department was turned over, which made it less cumbersome in having to "pick up" where others "left off." It is understanding that the Tribe has responsibility in ensuring there is a smooth transition, however, working with our federal funders is imperative in project and grant management and working together to ensure the Tribe's efforts are successful through the DOE's Office of Indian Energy.

As the Tribe continues to learn more about potential renewable energy opportunities for Pueblo lands, the Tribal Programs and Natural Resources Department looks forward to additional prospects for increasing alternatives to the heavy costs associated with being connected to the grid and utilizing electricity from the Public Service Company of New Mexico, PNM.

### **Lessons Learned:**

Lessons learned are results of past project management and the need to develop a "Renewable Energy Team," made up of staff and community members interested in developing and increasing Santo Domingo Tribe's capacity for solar, wind and other possibilities that will enable self-governance and the opportunity to disconnect from the grid and sell energy into it. By establishing a Renewable Energy Team, it allows for the Tribe to continue to move forward with projects already awarded and in progress versus starting from scratch. Another lesson is to enable staff through capacity building and trainings to better understand a photovoltaic system of this magnitude, as well as conducting research on other option available to the Tribe.

