FINAL TECHNICAL REPORT

DEPARTMENT OF ENERGY

DEPLOYMENT OF CLEAN ENERGY AND ENERGY EFFICIENCY PROJECTS ON INDIAN LANDS

Recipient:	**Washoe Tribe of Nevada and California**
Project Title:	**Washoe Tribe Clean Energy Project**
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APPENDICES

SF428

SF428B

SF428S

Black Rock Solar Original Project Quote

Black Rock Solar Invoices

EXECUTIVE SUMMARY

The Washoe Tribe of Nevada and California constructed seven ground-mounted photovoltaic solar arrays throughout three Washoe communities in Nevada, with the support of Department of Energy (DOE) funds through the Deployment of Clean Energy and Energy Efficiency Projects on Indian Lands opportunity. The solar arrays offset electrical costs to these Tribally-owned buildings, which helps the Tribe fund other services with the energy dollar savings. The development of solar energy on Washoe Tribal lands reduces Tribal fossil fuel dependence, increases Tribal members and employees' exposure to clean energy technology, and reduces fossil fuel emissions from Tribal energy use.

The project was designed to accumulatively reduce the imported energy use of the seven buildings, all located on Tribal trust land, by 100%. The size of the building, past energy use, projected energy use, and adjacent available space for arrays were taken into account when designing the size of each array. NV Energy's SolarGeneration Program incentives were used as a cost-share match. The project was successful implemented in the limited amount of time required to receive the expiring incentive packages. Valuable lessons were learned by WEPD staff, which continues to expand Tribal capacity and improve future projects.

PROJECT OVERVIEW AND GOALS

The Washoe Tribe of Nevada and California constructed seven ground-mounted photovoltaic solar arrays throughout three Washoe communities in Nevada, covering approximately two acres and providing 159.3 kW accumulatively. The solar arrays offset electrical costs to these Tribally-owned buildings, which helps the Tribe fund other services with the energy dollar savings. Additionally, development of solar energy reduces Tribal fossil fuel dependence, increases Tribal members and employees' exposure to clean energy technology, and reduces fossil fuel emissions from Tribal energy use.

Black Rock Solar (BRS) was hired by the Washoe Tribe to provide specifications and construct the proposed solar arrays. NV Energy's SolarGeneration Program incentives were used as a cost-share match.

PROJECT OBJECTIVES

The project was designed to accumulatively reduce the imported energy use of the seven buildings, all located on Tribal trust land, by 100%. The size of the building, past energy use, projected energy use, and adjacent available space for arrays were taken into account when designing the size of each array.

Carson Community – Washoe One Stop: 37.9 kW array

Carson Community – Gym:	14.6 kW array
Stewart Community – Wellness Center:	35.2 kW array
Dresslerville Community – Elder Center:	36.9 kW array
Dresslerville Community – Healing Center:	8.2 kW array
Dresslerville Community – Head Start:	11.2 kW array
Dresslerville Community – Community Center:	16.3 kW array

DESCRIPTION OF ACTIVITIES

Planning and Analysis Phase

The Washoe Tribe entered into a contract with BRS for the specifications and construction of the proposed solar arrays. The physical site analysis was conducted by BRS to determine suitable sites, WEPD solicited community input on proposed sites, and final decisions on array locations were made. WEPD completed environmental assessments all sites prior to breaking ground. The Tribal Historic Preservation Office (THPO) was contacted, and determined that a cultural Tribal Monitor would be required to be onsite during any ground disturbance activities.

The electrical service of the facilities was evaluated for interconnection, the power usage of the facility was determined, and the location for the interconnection was established by BRS. Consumption data and NV Energy's guidelines were used to design and size the systems. BRS completed the plan sets for each array location. Plans were submitted to and approved by NV Energy. NV Energy provided one-line electrical drawings.

Construction and Implementation Phase

All material were ordered by BRS and arrived onsite as work began on each array. Vegetation and obstructions were cleared as needed. Some trees were removed and/or trimmed to prevent shading of solar panels.

All sites were surveyed. Electrical trenches were dug and conduits were installed. THPO cultural monitors were present during trenching. Posts and racking system were installed. THPO cultural monitors were present during post-hole digging. Electrical inverters and BOS were installed by late July. All grid interconnections were completed by early August.

Post-Construction Inspection and Energizing

The electrical inspections were completed on all solar arrays between late June and early August. An electrical engineering firm, Dynamic Engineering, was hired by Black Rock Solar to conduct a

preliminary electrical inspection of the solar arrays, inverters and sub electrical panels. Mr. Clowers recommended to install another ground at the end of the solar arrays and additional ground clips in between the solar panels. These recommendations were implemented. Herb Clowers, P.E. provided the documentation of the Final Electrical Inspections to BRS and the Tribe.

NV Energy set the solar meters at all seven solar array sites in September. An inspector from NV Energy came and toured the Stewart Wellness Center to confirm the required signage was posted on the Service Panels and confirm the required poster was in place. All of the posters have been delivered and hung in prominent locations as required by the NV Energy Incentive Rebate requirements.

After the solar meters were set, BRS turned on the arrays and they began to produce power. BRS conducted an 'Owner's Maintenance and Troubleshooting' meeting in October, attended by WEPD staff and building maintenance employees of the Tribal buildings with solar arrays. BRS reviewed safe operation and maintenance for the arrays and troubleshooting tips. BRS created informational binders for each array and were given to WEPD. NV Energy Incentive Package forms were submitted with Tribal and BRS signatures, with the documentation of the materials utilized in the project. BRS received the incentive packages from NV Energy, which were used as the cost share match, and reduced BRS's overall invoice amount to the Tribe.

BRS and WEPD conducted a walk-through to confirm the solar arrays were functioning properly. Final invoicing and reporting were completed.

PROJECT PHOTOGRAPHS

Carson Community Washoe One Stop

Installation of post and racking system

Installation of electrical components box

Panel installation

Completed solar array and fencing

Installed inverter box and electrical components

Site grading and staking

Trenching and laying wire

Post and racking installation

Installed inverter box and electrical components

Completed solar array and fencing

Trench excavation and post installation

Post installation

Competed solar array and fencing

Installed inverter and electrical components

Installed solar meter and junction box

Post installation

Completed solar array and fencing

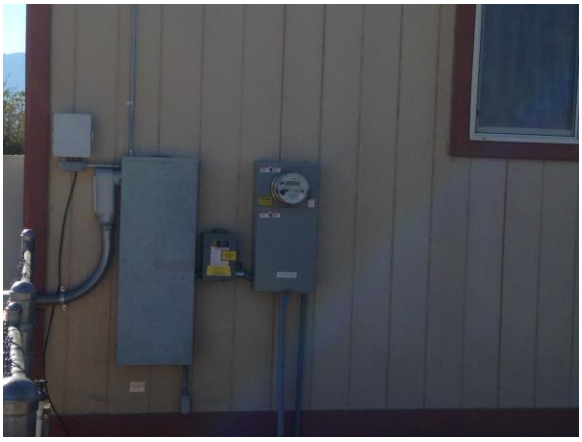
Installed inverter and electrical components

Installed solar meter and junction box

Post installation

Completed solar array and fencing

Installed inverter and electrical components

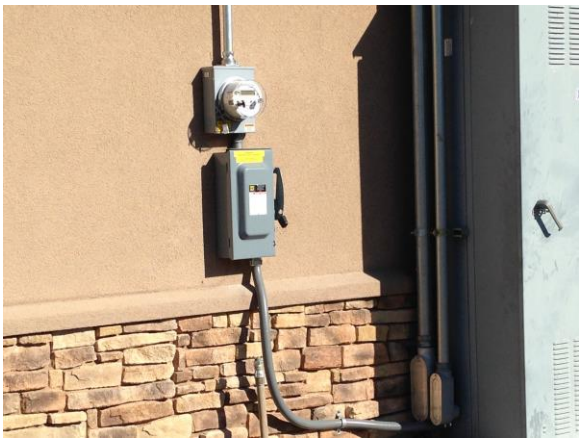


Installed solar meter and junction box

Panel installation

Panel installation

Installed inverter and electrical components



Installed solar meter and junction box

Completed solar array and fencing

LESSONS LEARNED AND RECOMMENDATIONS

Many lessons were learned throughout the project and will contribute towards improved projects. Knowledge gained by WEPD staff expands the department capacity to complete clean energy projects in the future.

The Washoe Tribe received approval from the Department of Energy for a waiver of the DOE's 50% cost share match requirement, to a reduced requirement of the incentive package totally provided by NV Energy through the SolarGenerations Incentive Program. The incentives were received by BRS in the fall of 2015. The utilization of public utility cost incentive packages for solar or alternative energy projects was an excellent provision of a cost share match. However, as public utilities decrease or stop their incentive packages, as seems to be the trend in Nevada, identifying alternative forms of cost share matches will be difficult, and may hinder new alternative energy project development. Additionally, a reduction of credit received per kW contributed back to the utility company (from ~ $0.105 retail rate to ~ $0.045 wholesale rate per KW) may make these types of project less financially beneficial in the future.

The completion of NV Energy Incentive Packages took longer than expected and required 3 rounds of revisions and signatures by Tribal Leadership. The equipment used in the projects, for which documentation was required on the Incentive Package forms, changed slightly during the course of the project due to equipment availability. As equipment changed, forms were required to be resigned and resubmitted. Additionally, there was some confusion at the Tribal level concerning the clearances required for the signatures of the forms. Ultimately, the Tribal Chairman was determined to be the proper authority, and some forms were required to be resign. On future projects, WEPD will attempt to streamline redemption of Incentive Packages, as Tribal Leadership and BRS showed some frustration with the process and the length to which it was drawn out.

WEPD observed the need for increased Tribal knowledge of maintenance and operations of solar arrays by Tribal building and maintenance staff. Staff held an operation and maintenance training day in October for building maintenance staff, in conjunction with BRS, but continued training programs may be beneficial to allow the Tribe to function as a sovereign entity. In an incident related to a previous solar installation, it was observed that building maintenance staff may not be aware of issues concerning solar array equipment malfunctions. In the review of NV Energy billing for 2015, the Finance Department observed significant increases in the electrical bill for the Washoe Tribe Health Clinic in Dresslerville, which had a 40 kW AC system installed in 2011. With the assistance of BRS, WEPD determined the inverter was faulty and warrantied the part. However, the system was down for several months without any notice by building staff. WEPD suggested building staff walk by the system daily and conduct a visual assessment to confirm the arrays are functioning properly. Tribal building staff would likely benefit from ongoing education related to solar array maintenance or be more actively involved in the construction process. Additionally, funding for WEPD staff to conduct maintenance may also ensure the longevity of the solar arrays around the community. As with other programs and funding

the Tribal departments receive, initial projects are completed successfully, but operations and maintenance costs and time are difficult to fund and operate, which can reduce the effectiveness of the programs of the life of the project.

The Washoe Tribe and the THPO determined that cultural Tribal Monitors were necessary onsite during ground disturbance activities. The primary function of cultural Monitors is to observe if there may be any disturbance to items of cultural patrimony and inadvertent discoveries of cultural human remains on Tribal projects within the Tribe's aboriginal territory during any sub-soil disturbance, e.g. during site preparation, trenching, and backfill. There was an oversight to not include a line item for the use of the Monitors for this project. During a conference call with the DOE Project Officer, it was determined that ½ of the Travel Line Item, which identified two trips to Denver, could be utilized towards the cost of Tribal Monitors, and since one of the required trips was past due. Temporary procedures were developed between the Tribe's Environmental Department and Black Rock Solar for the use of Tribal Monitors for cost control. On future projects, the WEPD will be sure to allocate appropriate funds for monitors during ground disturbance activities.

Building operators and the directors of department's housed by the building expressed their gratitude for projects once the array's went online, as building operations cost have been significantly reduced. The money saved is put towards programmatic funding and community services through various programs, equipment, and materials.

FUTURE PLANS

The Washoe Tribe's Financial Department is planning to review energy costs on all buildings outfitted with solar on a yearly basis. At the end of 2016, they will compare the energy costs of the 7 buildings with new solar during 2016, to 2014 energy costs, to better understand if the size and scope of the arrays were able to accumulatively reduce the imported buildings energy use by 100%, as originally planned. This data will be used to prioritize and plan future projects.

WEPD will continue to advise building maintenance staff on the maintenance and troubleshooting of the solar array systems, and provided technical assistance where possible.

WEPD Director is planning to attend and present at a DOE conference in fall 2016 regarding the successful outcomes of this project. As this grant will be closed at that time, DOE Project Officers have agreed to fund the travel as necessary.

WEPD will continue to review opportunities for solar on new development projects (new travel plaza, casino) and existing buildings, in conjunction with Tribal Leadership and the Washoe Development

Group. WEPD is also hoping to partner with the Washoe Housing Authority on the potential for residential roof-top solar arrays.

As solar and clean energy project increase on Washoe Tribal lands, there will be an increasing need for solar maintenance within the community, and WEPD is researching opportunities to fund a position within the department to provide array maintenance, troubleshooting, community outreach and education, and continued project development. WEPD hopes to expand Tribal capacity by educating maintenance staff, encourage BRS to involve Tribal members and employees in the construction process, and explore the possibility of an alternative energy team that can maintain and assist with the construction development of alternative energy projects, rather than contracting out the entirely of work to local partners. There may be a potential for training tribal members on alternative energy development for job opportunities on tribal lands and in surrounding communities.

CONCLUSIONS

The project was successful implemented in the limited amount of time required to receive the expiring incentive packages. Significant staff turnover did not affect the completion of the project. Valuable lessons were learned by new WEPD staff, which continues to expanding Tribal capacity and improving projects.

WEPD staff continued the positive working relationship with BRS and DOE Project Officers, which will assists WEPD capacity to continue with the development of alternative energy projects. Excellent lessons were learned which will be applied towards future projects, and will ultimately improve the clean energy outcomes on Washoe Tribal lands.