**COVER PAGE** 

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# **Executive Summary**

Aha Macav Power Service (AMPS) is a full-service electric utility company serving tribal lands located on the Fort Mojave Indian Reservation in Arizona, California and Nevada. AMPS provides all transmission, distribution and customer related services to the residents and businesses of the Fort Mojave Indian Reservation. AMPS was created by the Fort Mohave Indian Tribe in 1991.

The Fort Mojave Indian Tribe (FMIT) is one of only a handful of tribes in the United States that have established a tribally owned and operated electric and natural gas utility. Aha Macav Power Service (AMPS) was incorporated under a Tribal Charter authorized by the Fort Mojave Tribal Council in July 1991. The Charter enumerates the purpose and powers of AMPS, its initial assets, and the makeup of the AMPS Board of Directors. Starting from one installed meter in 1991, the company has grown to approximately 1000.

AMPS provides electric power service to homes and businesses located within the Fort Mojave Indian Reservation, which stretches along the Colorado River in the area where California, Nevada and Arizona meet. Currently, AMPS gets 3 MW from a wholesale energy supplier, for a total of 26,280 MWh, but AMPS' term resource expired on December 31, 2020, which left the tribe short 9,317 MWh. There is a great deal of uncertainty about the availability of power on the spot market and relying on those resources for power leaves the tribe exposed to real-time market price fluctuations.

Aha Macav Power Service (AMPS), on behalf of the Fort Mojave Indian Tribe received a Department of Energy Solar grant. Partnering with Stockbridge Energy Group and the Department of Energy, AMPS was able to construct, install, test and successfully put into operation a 2.3 MW solar field. As provided in the solar data, this project has helped to offset the cost of open market purchase power needed to meet the needs of the Tribe. The estimated value of the solar energy produced in FY2021 currently is more than \$294,000. Eventual expansion of the solar project is projected to create future energy independence for the Fort Mojave Indian Tribe.

The decision to move forward with production of a 2.3MW solar project has resulted in the production of over 4100 MWh of clean energy in FY2021; reducing dependence on outside energy providers and purchases on the spot market.

The energy vision of the Fort Mojave Indian Tribe is to promote clean, independent energy and the development of energy independence for the members of the Fort Mojave Indian Tribe. The current 2.3MW solar system with the 75% D.O.E. funding is projected to pay for itself within three years and is expected to have a life span of over 30 years resulting in a great return on investment for Aha Macav Power Service and the Fort Mojave Indian Tribe.

# **Project Objectives**

The main objective of the Fort Mojave Indian Tribe Renewable Energy Project is to deploy clean, renewable energy for the Fort Mojave Indian Reservation as well as to develop the use of the technology by training and educating Tribal members in solar maintenance and technology. This is in direct alignment with the goal of energy independence as well as the reduction in the Tribe's carbon footprint.

This project supports a new photovoltaic array with banks of 375-watt modules that would deliver 2.3 MW of sustainable power to meet the needs of the tribe. This solar generation facility makes it possible for AMPS to provide sustainable, stable power for Tribal use at a reasonable and predictable cost, moving the Tribe closer to being energy independent, establishing a basis for future solar array projects on Tribal lands, and providing the Fort Mojave Indian Tribe control over their own energy future.

**Task 1:** Complete electrical, civil, and structural engineering.

During this task all engineering work was completed leading to final plans and designs and providing a full set of specifications for site preparation, permitting and effective equipment specifications and site preparation.

**Task 2:** Purchase of major equipment: solar PV modules, inverters, racking, and site preparation.

This task consisted of the procurement of solar PV modules, inverters, racking for solar arrays as well as the site preparation and grading when applicable. Surveys took place as well as the environmental study. Underground work began with trenching, backfill and installation of pull boxes.

Task 3: Procure balance of system components.

During this task major electrical components, cables, wires, clips, clamps, breakers, fuses and disconnect components were procured. System integration was conducted.

 Task 4: Electrical work, labor, installation and commissioning.

The installation of the system took place, electrical work was completed. Interconnection tasks were completed, and testing was initiated and completed. The System was commissioned.

**Task 5:** General conditions, clean up, testing, monitoring startup. Location cleanup was initiated and completed. The testing and monitoring system was installed. The system verification process for energy production was initiated and began data collection.

**Task 6:** Permission to operate was achieved through Western Area Power Administration (WAPA) after meter installation at the substation; allowing transmission of solar data from the substation to WAPA, Phoenix, AZ. The solar system first began to provide energy to the grid on September 30, 2020.

## **Description of Activities Performed**

During the finalization process Aha Macav Power Service worked with the funding agency in completing the necessary paperwork, signing the acknowledgement of the award and modifications to the award, and participating in the New Awardee Kick- Off Webinar on October 8, 2019. Also, on November 18-22, the project P.I, Fernando Parra traveled to the D.O.E. Annual Conference in Denver, CO where he reported on the kickoff of the solar project.

Site preparation commenced while progress included complete procurement of solar panels, solar racking system and completed electrical and solar engineering work. Installation of solar racking system and solar panels was complete as of June 30, 2020. Solar inverters were installed and completed. Work to install underground conduits was 50% complete as of June 30, 2020.

The completion of final installation work on underground conduits took place and was complete as of September 30, 2020. The installation of the service entry was completed as well as the installation of the high voltage transformer. The balance of system install had also been completed along with all underground work. Concrete work was completed as of September 30, 2020. Testing of the system was then completed.

All installation work was completed for the project as of December 31, 2020. Meters and inverters were installed at the substation in cooperation with WAPA and a work crew was instructed in the care and cleaning of the solar panels. Solar panel cleaning kits and instructions were purchased for the project.

### AHA MACAV POWER SERVICE SOLAR SYSTEM OVERVIEW

- 1. Solar system size is 2.3664 Megawatts
- 2. (6960) Renesola 340-watt panels
- 3. (16) CPS 125Kw inverters
- 4. (24) rows of panels 290 panels per row = 98,600 watts per row
- 5. (2) panels high each row is 17 feet wide 500 feet long
- 6. Gap between rows is 9 feet
- 7. Overall array dimensions are 615 feet wide 500 feet long
- 8. Energy produced per year 4,109,140 Kwh per year
- 9. Solar system located east of No Name sub station





### **Conclusions and Recommendations**

The completion of the 2.3MW solar field has resulted in solar energy production of 4109.14 MWh of solar energy in FY2021 resulting in an estimated energy value more than \$294,000. Once panels, engineering and racking systems were installed, the system was connected to the existing No Name substation and began producing clean, solar energy. Aha Macav Power Service (AMPS) and the Fort Mojave Indian Tribe continue plans for expansion of the solar field to eventually achieve total energy independence. AMPS expects to remain on track with expansion of the solar field and solar data collection as well as addressing any challenges post-testing. We are mindful of continued challenges that could be faced in achieving milestones despite COVID 19 and will work to minimize any impacts on expansion and the project schedule.

FY2021 Solar Generation/Offset	Solar Offset		Solar Generation (MWh)
04.04444.2020 December 2020	é ac	054.00	755.00
Q1 October 2020 - December 2020	Ş 28	3,954.06	/55.99
Q2 January 2021 - March 2021	\$ 45	5,076.99	950.97
Q3 April 2021 - June 2021	\$ 107	7,929.23	1244.69
Q4 July 2021 - September 2021	\$ 112	2,173.96	1157.48
Total FY 2021 Solar Energy Value with RMS	\$ 294	1,134.24	4109.14

## Lessons Learned

During this project, it became apparent that delays related to COVID 19 were inevitable. The project continued to move forward at the best possible pace despite staffing shortages, delays in shipping and complications in the procurement of materials.

Similarly, due to COVID 19 the process of obtaining the necessary environmental impact statements and cultural evaluations was also somewhat delayed. Obtaining the necessary documents for legal description and conveyance of ownership were delayed due to the death of parties involved in the transfer of land ownership.

Peak solar production takes place during late morning and midday when customer demand is lower. Peak energy demand occurs later in the evening, creating demand when solar is unavailable. If battery storage were available this would allow maximum solar efficiency. A more thorough examination of cost and necessity of battery backup should have been a part of the initial planning and evaluation of the project. This would have provided interested parties with a more complete understanding of what is required for the long-term success with solar energy production.

Due to matters such as price increases, tariffs, and delays in shipping it was determined that a speedier procurement process was imperative to assure best pricing and delivery of materials. Ordering deadlines have been reviewed and are to be more closely monitored for the next phase of the project.