Coeur d'Alene Tribe
Senior Apartments Energy Efficiency and Solar Project

2022

Final Technical Report

Photo by Laura Laumatia, Coeur d'Alene Tribe

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Environmental Programs Office
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Recipient Organization:	**Coeur d'Alene Tribe**
Project Title:	**Senior Housing Complex Energy Efficiency and Solar Energy Project**
Date of Report:	**November 4, 2022**
Award Number:	**DE-IE0000101**
Total Project Costs:	**$195,000**
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1. Executive Summary:

The Coeur d'Alene Reservation has been the home of the Coeur d'Alene Tribe since time immemorial and it is fitting that the Tribe's name in the Coeur d'Alene language is schitsu'umsh, "the ones who were found here". The Reservation is located in northern Idaho, is approximately 345,000 acres and is comprised of forest land, agricultural land, several streams, Coeur d'Alene Lake and the St. Joe River and a small amount of developed land. The project was completed within the boundaries of the Coeur d'Alene Reservation.

The Coeur d'Alene Tribe's project took place at the Tribe's Senior Apartment building located in Plummer, Idaho on the Reservation. The Tribe completed energy efficiency measures (EEMs) that were identified in the Tribe's Energy Efficiency Feasibility Study and also deployed a solar photovoltaic (PV) system, both for the common area of the Senior Housing Complex.

The Senior Housing Complex, built in 2005, is an approximately 20,000 square foot single-story structure with 4,200 square feet central common area winged on either side by a total of 20 individual apartments. The common area is open to the apartment complex occupants 24 hours per day, 7 days per week. The previously calculated energy use for the common area averaged 114,000 kWh per year and the combination of the energy efficiency measures and solar PV deployment was expected to reduce energy use by 99,420 kWh/year resulting in an 87% reduction and a decrease of $7,600 in energy costs per year.

In the first year of the project, the Tribe generated 67,922.97 kWh of solar energy, saved $7,144.56 in energy costs and reduced the energy used by 95,192 kWh through the energy efficiency upgrades and solar energy production. The solar energy production saved the equivalent to 48.1 metric tons of C02, which equates to 6.1 homes' energy use for one year or 119,483 miles driven by an average gas-powered passenger vehicle.

The Coeur d'Alene Tribe has established goals to protect the cultural and environmental values of the Coeur d'Alene people. Specifically, the goals include preserving, protecting, and enhancing the natural resources, improving the quality of life and providing social and economic benefits across the Reservation. Research, development, and promotion of alternative energy and fuel sources such as wind, solar, hydrogen, and others have been identified as important by the Tribe (Coeur d'Alene Tribe Integrated Resource Management Plan 2012).

2. Project Objectives:

The Coeur d'Alene Tribe's Project Goals for this project were to:

Goal 1: Increase health and safety at the Senior Housing Complex.
Goal 2: Increase energy efficiency and reduce energy costs at the Senior Housing Complex.
Goal 3: Increase use of renewable energy and decrease the carbon footprint at the Senior Housing Complex.

Goal 4: Decrease operations and maintenance costs at the Senior Housing Complex.
Goal 5: Provide a solar energy deployment training and educational opportunity for Tribal community members.

The Tribe's major tasks were to:

1) Install Energy Efficiency upgrades to the Senior Apartments Common Area
    a. Replace incandescent and metal halide lighting with Light Emitting Diode (LED) lighting
    b. Replace propane hot water heater with energy efficient hot water heater
2) Install 52.4 kW solar photovoltaic system to offset electricity use in the Senior Apartments Common Area

3. Description of Activities Performed:

This project had two main items to complete: Energy Efficiency upgrades and Solar Energy PV system installation for the common area at the Coeur d'Alene Tribe's Sennwichen Senior Apartments in Plummer, Idaho.

Task 1.0: Agreements/Contracts

Once the Tribe received the grant award from the U.S. Department of Energy, the first step was to complete an agreement with the Bonneville Environmental Foundation (BEF) for the funding that they had committed to providing to the project. Next, the Tribe completed the contract with the energy efficiency and solar installation contractor. The Tribe completed the solar interconnection agreement with Kootenai Electric Cooperative (KEC) as a third agreement/contract for the project.

Milestone 1.1 Agreement with BEF – Completed
Milestone 1.2 Agreement with KEC – Completed
Milestone 1.3 Contract with Vendor – Completed

Task 2.0: Engineering Design

The contractor developed a solar PV design for review and developed the details of the Energy Efficiency Measures to be installed. Once the plans were reviewed and approved, this task was completed.

Milestone 2.1 Design review - Completed
Milestone 2.2 Design approval - Completed

Task 3.0: Permitting and Compliance

The contractor and Tribe's Environmental Programs Office drafted a construction permit to submit to the Tribe's Public Works Department. The Tribe utilized its memorandum of understanding (MOU) with the State of Idaho to have the project inspected. The Tribe approved the permit. The Tribe's Lead Project Manager completed National Environmental Policy Act (NEPA) compliance and worked with the Tribe's Historic Preservation Officer to complete National Historic Preservation Act (NHPA) compliance. The Tribe coordinated these activities with the Tribe's Natural Resources Committee and Culture Department.

Milestone 3.1 Permit application submitted to Tribe - Completed

Milestone 3.2 Permit approved - Completed
Milestone 3.3 NEPA compliance - Completed
Milestone 3.4 Tribal Historic Preservation Office (THPO) compliance - Completed

Task 4.0: Procurement
The Tribe's installation contractor obtained materials and equipment for Energy Efficiency Measures and solar PV installation.

Milestone 4.1 Materials ordered - Completed

Task 5.0: Installation
The Tribe's Environmental Programs Manager coordinated the installation scheduling between the installation contractor, the Tribe's Facilities Department and the Tribe's Housing Authority. Originally, it was planned to have a kick-off meeting for the installation. Instead, due to the Covid-19 pandemic, this was done by telephone and not all at one time.

The Tribe's Environmental Programs Manager had started to work with Tribal departments and programs to determine if the solar installation would be able to be utilized as a training opportunity. However, the Covid-19 pandemic started and the training idea had to be set-aside.

The Tribe's installation contractor arranged for the interconnection equipment upgrade with the utility company, which was a new meter. The Tribe completed the site preparation for the ground-mount solar PV installation. The installation contractor installed all new LED lighting in the common area for Energy Efficiency Measures to replace incandescent and other lighting. Safety outdoor lighting was replaced with LED lighting in the front and back of the Senior Apartments commons area. A new energy-efficient propane hot water heater was installed for the commons area. A subcontractor to the installation contractor installed the fencing around the solar PV panels. Then, 52.4 kW of solar photovoltaics and four inverters were ground-mounted and installed.

Milestone 5.1 Schedule installation - Completed
Milestone 5.2 Provide training opportunity, if candidates are available – Unable to Complete
Milestone 5.3 Hold installation kick-off meeting – Unable to Complete in one big meeting
Milestone 5.4 Complete project installation of EEMs and solar PV system - Completed

Task 6.0: Inspection
The Tribe inspected the installation of the Energy Efficiency Measures and the solar PV installation to ensure that it met contractual and safety specifications. The Tribe utilized its MOU with the state of Idaho to have the electrical inspections completed. One item was found to be out of compliance and the Tribe had this item fixed and re-inspected. The Tribe received the inspection documents.

Milestone 6.1 Project reviewed by Tribe and inspected for compliance - Completed

Task 7.0: Commissioning
The installation contractor conducted system testing. The installation contractor conducted a walkthrough and system orientation with the Tribe's energy project lead in the Environmental Programs Office.

Milestone 7.1 System commissioning - Completed

Task 8.0: Monitoring and Verification
The Tribe obtained monthly energy and cost data from KEC for one year after the project was installed. BEF assisted the Tribe to analyze the data and provide the analysis for the final report of how much energy and cost savings the project generated in its first year of operation. Some of the cost savings data was not included in the data.

Milestone 8.1 Energy use and cost data obtained and analyzed for monitoring and verification

Task 9.0: Final Report
The Tribe's energy project lead in the Environmental Programs Office wrote this final technical project report. BEF reviewed the report. The Tribe's Manager will route the report for Tribal Council approval. If approved, the Tribe will submit the report to DOE to complete the project.
Milestone 9.1 Final report submitted to DOE upon Tribal Council approval – In process

4. Conclusions and Recommendations:

The Coeur d'Alene Tribe, Bonneville Environmental Foundation and its installation contractor, NextGen Electric, successfully completed the Senior Apartments Energy Efficiency and Solar Project in Plummer, Idaho.

The Tribe and its contractor installed new LED lights and a new propane hot water heater, as well as a 52.4 kW solar photovoltaic energy system at the Senior Apartments to offset the energy use and cost of the common area to the apartments (living room, dining room, kitchen, entryway and public restrooms).

The total estimated solar production for the first year of the project was 72,000 kWh. The actual measured production was 67,922.97 kWh. This may have been affected by smoke from fires in the summer in 2021. The solar energy production saved the equivalent to 48.1 metric tons of C02, which equates to 9.4 homes' electricity use for one year, or 6.1 homes' energy use for one year, or 5,416 gallons of gasoline consumed, or 10.4 gas-powered passenger vehicles driven for one year, or 119,483 miles driven by an average gas-powered passenger vehicle.

TABLE 1. Total KWh Generated

Month	Total kWh generated
February 2021	2,121.4
March 2021	5,127.59
April 2021	8,585.21

May 2021	8,886.59
June 2021	9,090.48
July 2021	9,563.27
August 2021	7,886.38
September 2021	6,800.18
October 2021	5,087.67
November 2021	2,037.35
December 2021	569.97
January 2022	2,166.88
Total Production	**67,922.97**

The estimated cost savings for the project for the first year was $7,648.00. The actual cost savings for the first year was $7,144.56. Again, this could have been affected by the smoke from fires in the region during August particularly. However, this is fairly close to the estimate.

The estimated total energy use savings for the project was was calculated from the utility billing for the first year of the project. The estimated energy use savings was close to 100,000 kWh and the actual savings was 95,192 kWh. The rest of the energy use savings is due to the energy efficiency upgrades (and possibly due to levels of use).

	2020	2021		2020	2021	
	Cost Before	Cost After	Cost Savings	Energy Use Before	Energy Use After	Energy Use Savings
February	$1,902.24	$42	$1,860.24	24,539	27,285	-2,746
March	$1,479.78	$1,105.89	$373.89	18,732	14,978	3,754
April	$1,417.72	$756.28	$661.44	17,949	9,589	8,360
May	$1,021.14	$290.57	$730.57	12,488	3,337	9,151
June	$663.22	$42	$621.22	8,746	-1,649	10,395
July	$432.17	$42	$390.17	5,493	-7,037	12,530
August	$470.04	$42	$428.04	5,211	-10,318	15,529
September	$602.84	$42	$560.84	6,646	-10,068	16,714
October	$1,099.22	$42	$1,057.22	13,291	-1,141	14,432
November	$1,734.27	$1,333.66	$400.61	21,974	17,340	4,634
December	$1,872.07	$1,474.14	$397.93	23,914	19,226	4,688
January	$1,531.61	$1,869.22	$-337.61	20,735	22,984	-2,249
Totals	**$14,226.32**	**7081.76**	**7144.56**	**179,718**	**84,526**	**95,192**

This is the second solar project that the Tribe has completed. The first one was 14.25 kW and was roof-mounted. This one was 52.4 kW and was ground-mounted. The Tribe is learning about solar PV production during these projects and is finding out how solar works within the community. The Tribe has the desire to be as energy secure and self-sufficient as possible. This project has helped the Tribe by having a larger solar demonstration project and has generated good data for planning future projects.

Much of this project occurred during the pandemic so there was no opportunity to have a "cut the ribbon" celebration. However, the Tribe published an article about the project in the Tribal newspaper, "Council Fires" in January 2021.

This project has also helped the Tribe continue building relationships with partners for energy efficiency and solar projects. The Tribe continued to work closely with Bonneville Environmental Foundation, as well as NextGen Electric, the Tribe's installation contractor. The Tribe was also able to maintain and build relationships with Department of Energy, National Renewable Energy Laboratory, Grid Alternatives, and an informal Idaho energy network. These relationships continue to help the Tribe to refine and reach its energy goals.

5. Lessons Learned:

Each time the Tribe conducts an energy project, the Tribe learns a great deal. The Tribe was fortunate with this project. It went fairly smoothly. However, there were a few things that did not go as planned.

Lesson #1: Try to avoid doing projects during pandemics. The Tribe was unable to have large meetings or gatherings during the project period so the training could not happen. The Tribe could not have coordination meetings for the project in a group. Also, the Tribe could not comfortably have a community celebration or "cut the ribbon" ceremony. The only thing that the Tribe was able to do was to have an article in the Tribal newspaper to announce the project to the community.

Lesson #2: Think about where the materials will be stored prior to implementing the project. The Tribe was fortunate that the installation contractor was able to store the materials in their facilities until they needed to install them.

Lesson #3: You cannot get too detailed in the request for proposals or the contract. It is a good idea to think through each step and all of the requirements of the project and include all of the details when asking for contractors to prepare proposals or bids. Then, when the contracting is done, all of those details should be included in the contract. It makes it so much easier when implementing the project. Things such as data monitoring should be very detailed, specifics on equipment should be identified and included in the contract, details about the invoice format and supporting documents, and the list goes on.

Lesson #4: Ensure that all contractors and subcontractors know ahead of time that the Tribe has sovereign immunity, has indemnification clauses and does not sign "hold harmless" agreements. One of the Tribe's subcontractors asked the Tribe to sign a "hold harmless" agreement and the Tribe declined. This resulted in the heavy equipment operator that was going to do site preparation and trenching walking away from the job. The Tribe's workaround was to do the work itself in order to keep the work moving forward.

Lesson #5: Even if you call before you did, you can still hit underground lines. The Tribe had several utility providers come out and mark where the electrical, water and gas lines

were and the Tribe still hit a propane gas line. The Tribe was well-prepared, the gas line was immediately turned off, then repaired and the work carried on.

Lesson #6: Build in contingency to the budget. Materials and labor costs increased between the time the Tribe submitted the funding request and when the project was installed. The Tribe's Development Corporation provided some contingency funding during the project and the Tribe was able to proceed.

6. Gratitude

The Coeur d'Alene Tribe is grateful for the support of the U.S. Department of Energy and Bonneville Environmental Foundation for its funding and technical assistance throughout the Senior Apartments Energy Efficiency and Solar Project. The Tribe is also grateful to NextGen Electric for installing the energy efficiency upgrades and the solar PV system.

The Environmental Programs Office and the Natural Resources Department is grateful for the approval from the Tribal Council to do this project. The Tribe's Development Corporation provided additional funding for unforeseen costs during the project and the Tribe's Environmental Programs Office is grateful for this assistance.

APPENDIX A – PROJECT PHOTOS

New Energy Efficient Propane Hot Water Heater

New Outside LED Lights

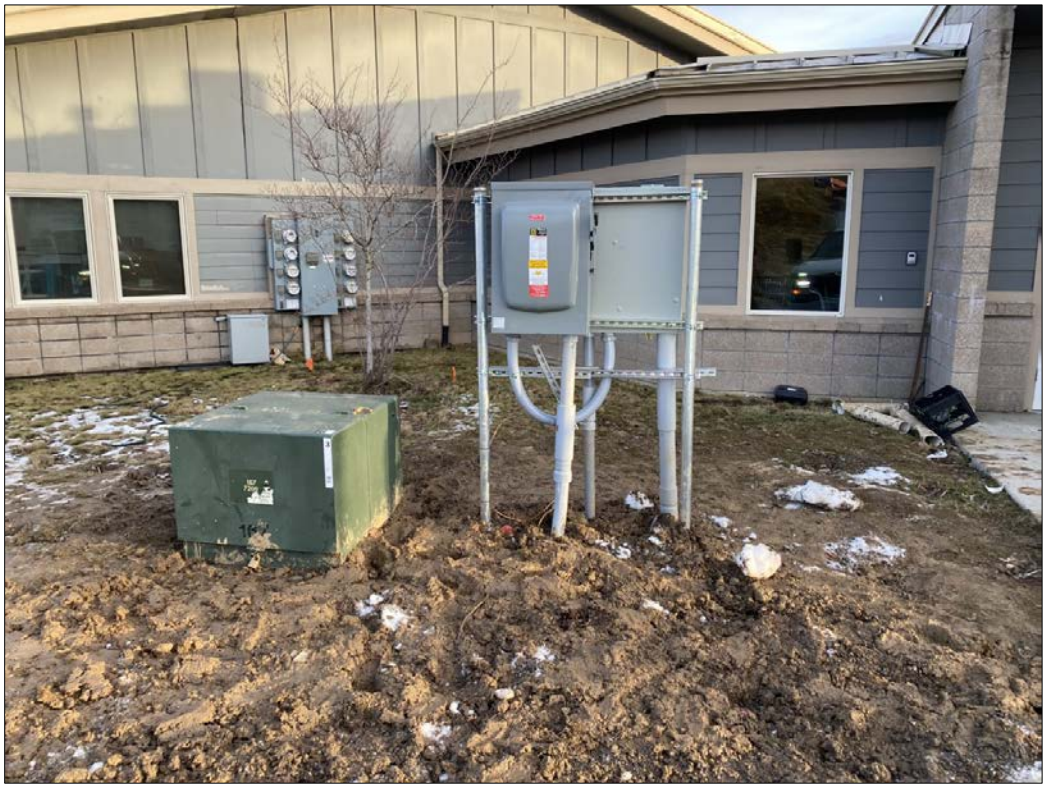
Site Preparation with Grading, Fabric and Rock

Fencing and Racking for Solar PV System

Installing Solar Panels

Completed Solar Panel Installation

Inverters



New Electrical Meter