

# **Bishop Paiute Single Family Solar Home Project: Phase 4** **FINAL TECHNICAL REPORT**

Funded by:

- Department of Energy Office of Indian Energy Federal Grant IE00000133
- GRID Alternatives (CA DAC SASH)
- Bishop Paiute Tribe



<b>Recipient Organization:</b>	<b>Bishop Paiute Tribe</b>
<b>Project Title:</b>	<b>Bishop Paiute Tribe Residential Solar Program Phase IV</b>
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<b>Recipient Share</b>	<b>\$189,887.00</b>
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## **DISCLAIMER**

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**2. Executive Summary:**

The project consisted of the design, installation, inspection, interconnection and monitoring of 19 grid-tied solar electric systems, totaling up to 67 kW rated capacity, on qualified existing low-income single-family homes located within the Bishop Paiute Reservation.

The systems were designed to provide at least 30-75% savings in displaced electricity totaling up to 120,000 kWh/year. Each participant was provided information along with energy reducing educational materials on energy efficiency, how solar electric systems work to reduce the energy purchased from the utility and how that will save money on their electric bills. The estimated utility reductions equate to financial savings on monthly electric bills for participants. This financial relief supports low-income participants to have money to spend on other essential items, while reducing their carbon footprint in this remote mountain tribal reservation.

The project included a job training component for local Tribal members to join in the solar installations and get free hands-on job training on three (3) of the nineteen (19) homes and then employment on the remainder of the projects.

The Tribe set a goal of completing 200 solar installations by 2020 and this batch of projects helped toward that Tribal goal. In this remote area job training opportunities are scarce, and the solar training model supports Tribal members to come and try a new trade in a safe, supportive way with no costs or prior experience required.

**3. Project Objectives:**

The overall project goal is to deploy clean energy systems to tribal community members to achieve the Bishop Paiute Tribe’s long-term goals of energy self-sufficiency, environmental protection, and better lives for our Tribal members and community. The Project goals of this phase of the project were to:

- 1) Install 19 grid-tied, rooftop solar systems on the homes of low-income Tribal participants to reduce their energy consumption by 30-75 % and help them save money
- 2) To install new clean energy systems deployed will have at least 67 kW AC rated capacity and reduce climate changing air pollution the reduction totaling at least 120kWh/year
- 3) Provide Tribal members an opportunity to develop new skills in the deployment of renewable energy installations and offer paid employment opportunities to those who complete the hands-on training

#### **4. Description of Activities Performed:**

This grant funded project was a continuation of the previous DOE grant funded projects and a part of an ongoing campaign to solarize as many homes on the Bishop Paiute reservation as possible. At initial phases of the program there was a large outreach campaign, to identify project participants. The Tribe worked with GRID Alternatives Inland Empire (GRID) as a vendor to create a first-come, first-served, fair application process. GRID worked with the Tribe to create content such as flyers, newsletters announcements, radio public service announcements and direct mail postcards that were mailed out to all tribal residents to insure they received the program information. Twenty-five people responded and applied for the solar program. The homes were then qualified after a site inspection was completed; roofs were inspected, measurements taken, and solar system sizing completed. The application list of twenty-five (25) homes was reduced to nineteen (19) due to construction factors such as: inadequate roofing, shading issues and certain mobile trailer homes that met structural or permanence standards. The final list then went to the Bishop Paiute Tribal Council for review and final approval. The solar systems were then designed, and contracts were generated. Meetings and appointments were set with the nineteen (19) approved Tribal participants. Contract documents, utility interconnection processes and expected utility bill savings were explained in several group appointments and offered remotely for those who could not attend in person. GRID chose the three (3) project sites for the hands-on job training/ education GRID led builds.

GRID worked with the Tribe's Tribal Employment Rights Office (TERO) to obtain the upcoming training opportunity/ news out to the community. Due to the low registration numbers TERO helped facilitate the online remote orientation meeting as many Tribal residents still had concerns about COVID 19. Three (3) Tribal participants completed the solar orientation [2 males and 1 female] and two (2) showed up to train [one male and one female] with one [male] Tribal participant completing the full week. TERO worked with the two local subcontractors to facilitate the program for the three trainees to then be eligible for the paid \$16 dollar per hour on the remaining 16 homes. There was one male trainee hired for all sixteen solar projects. After the solar installations were completed, all nineteen projects went through an independent third-party inspections process. All projects were interconnected with the local utility. All project participants have participated in the post installation warranty training meetings.

All participants have been provided warranty packets, with solar equipment guide sheets, operation and maintenance information, energy saving tips, program feedback questionnaires and utility guide tip sheets to explain the new looking utility net metered electric bills. GRID reviewed all participants' energy accounts to ensure solar production and enrolled fifteen participants in other low income utility saving programs. GRID will continue to conduct monitoring of the solar electric systems installed to ensure solar performance and energy bill reductions. These nineteen solar electric solar systems

produced above the goal and have a 78% electrical offset, 3% more than the original estimate. Overall, the triple impact of the Bishop Paiute Tribe Residential Solar Program Phase IV—provided affordable energy for low-income families, on-site clean energy production, and hands-on solar installation training and jobs for local Tribal members. The program has helped the Tribe’s energy, economic, environmental goals and offers local self-sufficiency while supporting energy independence to the neediest on the reservation.

### **Project Process/Scheduled Followed**

<b>Months 1-5:</b>	Participants identified, qualified and/or re-qualified and program explained
<b>Months 6-14:</b>	Site visits conducted; systems designed, client contracts signed, solar rebates reserved, utility interconnection application submitted. TERO Compliance Plans and Tribal approvals completed, equipment and materials procured. Projects scheduled job trainees hired and solar systems installed.
<b>Months 9-21:</b>	Systems interconnected (clients received Permission to Operate [PTO])
<b>Months 12-28:</b>	Warranty training provided. Systems performance verified
<b>Months 29-30:</b>	Final reports completed




## About GRID Alternatives

GRID Alternatives is a nonprofit organization that makes renewable energy technology and training accessible to underserved communities.

## Start Training Now for a Job in the Solar Industry!

The **Virtual Installation Basics Training (IBT) Program** is an online 40 hour program designed to help you develop advanced solar knowledge and skills to help you launch your solar career.

The completion of the **Virtual IBT** program will also qualify you for GRID's paid hands-on solar installation training opportunities in your community.

### Program Requirements

- Available for 40 hours over 2 weeks
- Comfortable using a computer
- Must have a gmail (google) account
- Create a job trainee account with GRID Alternatives
- Complete **ALL** quizzes and assignments

### Knowledge You'll Gain

Job Site Safety Fall	Electrical Safety
Protection Array Layout	Electrical Layout and Mounting Conduit
Racking Installation	Bending and Installation Electrical
Module Installation	Wiring
Customer Service	Monitoring and Communication
	Employment Readiness

**Get Started:**

Join thousands of trainees who have gained skills in solar installation with GRID Alternatives. No prior experience is needed!

**Contact:** Kayla Stone, TERO Office Coordinator  
**Email:** [Kayla.Stone@bishoppaiute.org](mailto:Kayla.Stone@bishoppaiute.org) **Phone:** (760) 873-7893 ext2400

# Bishop Paiute Tribe

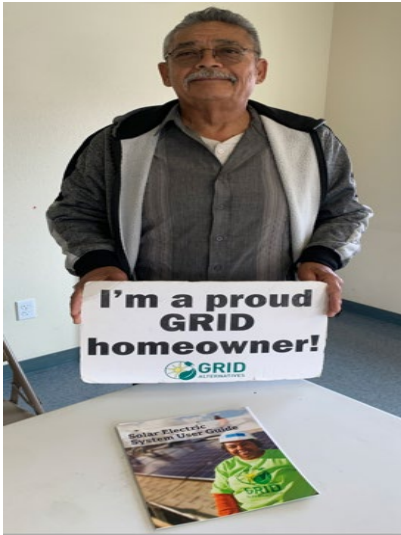
Figure 1: FLIER TERO PROMOTED ABOUT SOLAR TRAINING & PAID OPPORTUNITIES

Figure 2: TRIBAL CAREER EVENT PROMOTING SOLAR TRAINING OPPORTUNITIES.



Figure 3: SUCCESSFUL EVENT OFFERING INFORMATION AND SIGNING UP TRAINEES

Figure 4: TRIBAL TRAINEE EMPLOYED TODAY IN SOLAR BECAUSE OF DOE FUNDING



**Figure 5: WARRANTY TRAINING**

**Figure 6: ROOF INSTALLATION**

**Figure 7: TRAINEE**

**Figure 8: TRAINEE LEARNING ABOUT MOUNTING BRACKET PARTS/GROUND TRAINING**



**Figure 9: CHILD FROM PARTICIPATING FAMILY AT WARRANTY TRAINING.**

**Figure 10: PROUD HOMEOWNER AND TRAINEE HOLDING BANNER AT SOLAR INSTALLATION**

## 5. Conclusions and Recommendations:

Below are examples of the impacts of the installed electric systems:

Figure 11: is the overall impact of 67 kW on the nineteen homes and that kilowatt estimate of 2,749,604 over 30 years. The 19 homes are estimated to produce on average 3,075,267

Figure 12: is a participant's electric utility bill showing net generation, chart below the grid line and -52 kWh as compared to 2 years ago before solar

Figure 13: is a system overall impact summary on one project showing an estimated 76% reduction proposed on GRID's calculation before solar installation

Figure 14: is the actual overall production chart from all nineteen solar systems with a 12 month total generation calculated from April through March showing 78% production

Figure 15: is the overall production verses our claim

The conclusion of the impact reports on these projects is that the solar systems' performance was greater than expected. The solar systems generated provided 3% more offset than the original estimated to expect, that savings will translate into a greater utility bill savings for the homeowners.

Total Kilowatts of Solar Installed	67.0
Lifetime KWh Production	2,749,604
Value of Energy Produced over systems' lifetimes	\$500,251
Tons of Greenhouse Gasses Eliminated over Systems Lifetimes	955
Equivalent # of Cars Taken Off Road for One (1) year	182
Equivalent # of Trees Planted	22,208

Figure 11: IMPACT SUMMARY BASED ON 30 YEARS

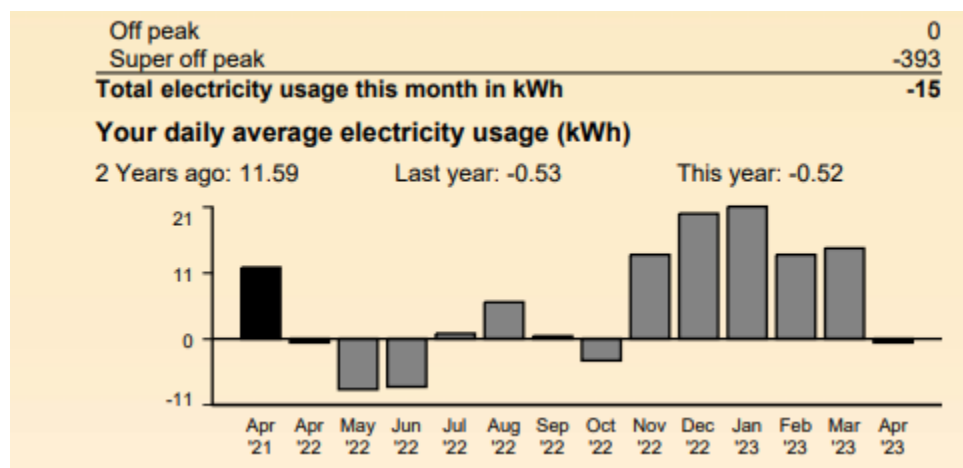


Figure 12: EXAMPLE OF PARTICIPANTS MONTHLY UTILITY BILL USAGE SINCE SOLAR 4/2022



Estimated Solar Savings	
Estimated Savings from Solar (1 <sup>st</sup> year)	\$848.92
Estimated Savings from Solar (20 years) <sup>1a</sup>	\$19,419.24
Estimated Annual Bill Reduction from Solar	76%
Annual Electric Bill <u>Before</u> Solar	\$971.87
Estimated Annual Electric Bill <u>After</u> Solar <sup>1b</sup>	\$260.85



Solar System Details and Production	
Solar System Size	4.225 kW DC
Historic Electric Usage (pre-solar)	7587 kWh
Annual Solar Production	6272 kWh
Your Original Rate Schedule	D-CARE
Your New Rate Schedule <sup>4a</sup>	TOU-D-4-9PM-NEM2 CARE



Estimated Environmental Impacts Over Solar System Lifetime	
Equivalent Number of Tree Seedlings Planted	1,193
Equivalent Number of Cars Taken off the Road	10
Greenhouse Gas Emissions Prevented	51.3 tons of CO <sub>2</sub>

### 20 Year Cumulative Net Savings<sup>1a</sup>

Figure 13: SUMMARY OF SAVING & IMPACT

Figure 14: Project Production/Offset (*names redacted for privacy*)

Project Address	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	TOTAL	Apr 2022	May 2022	Jun 2022	Jul 2022	Aug 2022	Sept 2022	Oct 2022	Nov 2022	Dec 2022	Jan 2023	Feb 2023	Mar 2023	TOTAL	
266 Brockman Ln	318	248	251	245	239	248	232	261	251	256	278	268	3095	320	335	310	304	278	274	275	255	218	211	234	280	3284	
358 Winuba	265	229	217	217	219	223	292	271	230	210	213	231	2817	306	376	351	325	258	215	152	96	87	98	129	222	2616	
455 N. Tu Su Ln	667	638	635	408	210	331	437	460	472	531	392	564	5745	740	796	724	713	661	632	574	487	390	399	476	603	7186	
565 Seawave Ln	722	555	584	704	656	679	924	925	910	713	601	591	8564	464	543	510	515	435	361	310	244	186	205	253	324	4360	
2834 N Sierra HWY #1	1343	1058	1077	1187	941	868	1106	1053	1141	1141	1211	1187	13313	841	985	938	901	768	669	549	402	338	359	438	658	7848	
82 N. Barlow Ln	410	379	299	285	326	300	427	450	406	363	363	350	4358	524	551	530	522	475	416	299	185	142	170	216	302	4332	
114 N. Winuba Ln	1007	986	911	883	899	1071	1121	1159	1114	846	695	899	11591	783	841	752	715	640	579	483	370	306	341	418	580	6803	
787 N Pa Ha Ln	1000	981	672	653	721	672	836	736	662	599	703	826	9061	842	975	669	596	790	667	555	412	321	350	388	269	8231.8	
85 Pa Ha 19	728	420	621	418	414	418	582	419	417	418	585	495	5935	674	769	718	686	612	521	359	219	211	221	277	431	5888	
503 Winuba	406	259	256	256	325	335	340	343	325	216	286	533	3880	373	422	403	399	360	336	286	193	165	176	206	273	3582	
104 N. Pa Ha Ln	—	—	—	47	138	171	—	210	150	202	—	—	918	424	471	438	432	394	370	346	263	203	217	267	346	4171	
359 S Pa Ha	867	906	877	845	841	825	990	840	229	603	814	866	9503	883	1000	946	237	832	737	621	403	351	363	453	665	7451	
584 N Tu Su Ln	592	460	369	453	451	507	527	478	503	478	472	517	5807	678	775	730	722	717	698	399	257	223	239	280	355	6073	
279 S Pa Ha Ln	681	614	605	555	600	586	729	611	652	652	548	555	7388	594	608	556	137	521	495	424	292	260	258	326	528	5009	
248 N. Barlow Ln	1198	1025	448	476	438	466	517	543	551	618	845	1200	8325	725	757	660	663	634	610	523	336	266	292	366	528	6380	
393 S. Pa Ha Ln	378	336	291	536	563	487	752	675	622	383	342	394	5759	801	880	818	207	735	713	651	299	230	303	462	637	6798	
533 N Pa Ha Ln	604	510	508	611	536	736	1306	1154	1192	691	464	518	8830	646	754	718	689	589	521	447	278	245	281	333	471	5872	
2478 Diaz Ln	1177	1066	1772	1996	1016	969	826	1083	871	821	753	952	13292	578	634	590	587	529	468	385	273	221	244	292	417	5218	
784 N Barlow Ln	417	315	263	262	277	368	361	325	305	242	221	254	3610	394	433	399	391	356	325	256	183	139	159	191	291	3517	
	12780	10985	10656	11037	9810	10250	12305	11996	11003	9983	9786	11200	131791	Tot	11590	12905	11157.9	9741	10584	9607	7894	5447	4502	4896	6005	8180	102603.8
														%	1.05010	1.31549	1.08858	0.79163	0.88229	0.87313	6.05833	4.77388	4.60327	1.27189	1.45625	1.34806	0.77781

Figure 15: Overall production vs claim

Total kWh Historical Usage 131,791
Total Annual kWh Electrical Offset 102,508
Total Annual Savings 78%

Figure 16: Impact Report for DOE funded homes

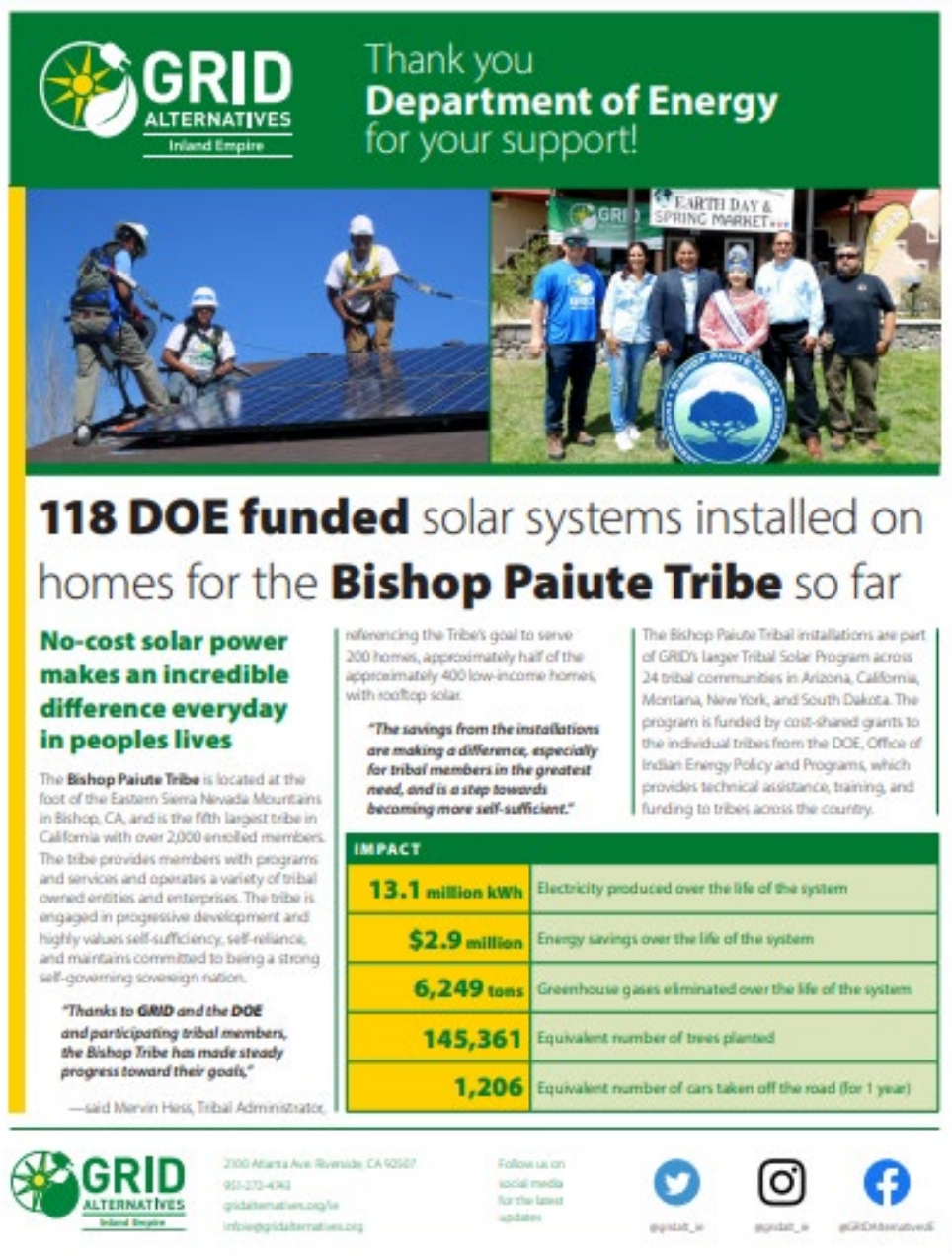


Figure 16: Impact Report for DOE funded homes

Recommendations: For future projects the recommendation is to continue with the search for Tribal participants who are interested in installing solar electric systems and continue working with GRID for additional matching funds. There were twenty-five applicants interested in getting solar, six were disqualified due to roof issues, or shading. It would be recommended to see how unrestricted funding could be identified to assist those tribal members.

In California the state investor-owned utility, Southern California Edison, has changed their net metering policies and they are now using net billing. Due to the lowered expected savings from the new policy, it would also be recommended to add backup battery systems to all new solar projects and for the Tribe to consider retrofitting all Tribal homes with batteries in the future. Adding backup battery power would provide true clean reliable resilience for Tribal residents ensuring they have power during outages and emergencies. The batteries would also support the utility grid during outages and peak demands times.

Publications / Presentations:

4/06/2023, GRID Alternatives Inland Empire Newsletter:

<https://gridalternatives.org/regions/ie/news/grid-ie-and-bishop-paiute-tribe-reach-goal-over-200-homes-solar>

3/13/2023, Sierra Wave Media:

<https://sierrawave.net/bishop-paiute-tribe-completes-goal-serves-over-200-of-400-potential-homes-with-clean-renewable-solar-energy/>

8/24/2021 <https://www.facebook.com/watch/?v=1538327246559437&ref=sharing>

6/01/2021, GRID Alternatives Inland Empire Newsletter:

<https://gridalternatives.org/regions/ie/news/solar-bishop-paiute-tribal-member>

RADIO PSA Job training: file:///C:/Users/lcastilone\_grid/Downloads/GRID%20SOLAR.DOE4-VO-PSA.mp3



Figure 17: Earth Day 2023 Celebrating 208 Solar Systems Installed with Miss Bishop Paiute



Figure 18: DOE 4 Elder with solar, "GRID is a good program, it saves us elders a lot of money on our power bills, a lot of folks can use their electric heaters and don't have to burn wood because they now have solar. I have signed up a lot of people for the GRID program, it really helps us."



Figure 19: DOE 4 Elder with solar. “I am thankful for saving money on my electric bills with the GRID solar program”.



Figure 20: DOE 4 Homeowner, “I am so proud to have solar on my home, I love it. I am always sharing about the GRID program”.

## 6. Lessons Learned:

Workforce: There were many challenges during this three-year grant cycle and the COVID 19 pandemic. The turnout for volunteer trainees and workers was exceptionally low. The Tribal TERO office was closed and for a time only doing remote or online support services. Many people living on the Reservation do not have computers and it was challenging for

them to sign up and do the orientation on the phone. Many Tribal members were not ready to come out and train and take the chance of being exposed to the COVID 19 virus. Many participants were hesitant to interact with others, this made outreach to identify trainees' employment part of the program very difficult. Also, when the hiring for solar installers happened many of the potential participants were getting COVID relief benefits from tribal and/or government sources, and they did not want to lose their main source of income for temporary employment.

Outreach & Community Development Recommendations: The Tribe will continue to promote the partially state funded program and encourage residents to sign up to increase access to renewable solar energy. The Tribe has set a new goal adding an additional 93 installations, to the currently installed 207, to a target of 300 installations by the end 2030. The Tribe will need to continue seeking the match funding needed, so the low-income residents can continue to receive no cost solar systems.

Collaboration with Tribal Departments and Communications: The Tribal members are difficult to reach due to COVID 19. Many in-person outreach activities had to shift to remote zoom calls or phone conversation to accommodate Tribal members. The Tribe collaborated and was very instrumental in getting word out to the community and supporting the solar program and job training opportunities. The Tribe supported the program in publishing a direct mail postcard and by recording and playing a new radio ad on tribal radio station, and posting flyers in Tribal offices as well as social media and in the Tribal newsletters. These efforts helped to get the word out to the community about the opportunity to job train and encouraged residents to apply for the residential solar program.