Recipient Organization:	**Bishop Paiute Tribe**
Project Title:	Bishop Paiute's Residential Solar Program Phase III
Date of Report:	April 30, 2021
Award Number:	DE-IE0000099
Total Project Costs:	$539,477
Technical Contact:	Bishop Paiute Tribe Environmental Director, Brian Adkins brian.adkins@bishoppaiute.org
Project Partner:	GRID Alternatives Inland Empire, Executive Director, Jaime Alonso, jalonso@gridalternatives.org

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DISCLAIMER

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2. Executive Summary:

The project consisted of the design, installation, inspection, interconnection and monitoring of 40 grid-tied solar electric systems, totaling up to 108 kW rated capacity, on qualified existing low-income single-family homes located within the Bishop Paiute Reservation. The systems are to provide at least 30-75% savings in displaced electricity totaling 175,000 kWh/year. After the DOE grant contract was signed, the Tribal Employment Rights Ordinance (TERO) board voted to reduce the tribal tax to work on the reservation for these low-income projects from 4% to 1%. This generous reduction was applied back into the community solar project and two additional tribal homes were added for a new total of 40 grid-tied solar electric systems, totaling up to 113 kW rated capacity (two more than originally planned) projects. Additionally, each homeowner was educated on energy efficiency, how solar electric systems work to reduce the energy purchased from the utility and how that will save money on electric bills. The estimated 75% savings on monthly electric bills brings financial relief to tribal homeowners and makes a significant difference on the reservation; giving low-income families money to spend on other essential items, while reducing their carbon footprint in this remote tribal reservation. The GRID IE program and this tribal project had a training component for tribal members to get free hands-on job training on 8 of the 40 homes. Those tribal members that came out to train with GRID IE could then be eligible for the “train to hire” portion of the program, on the remaining 32 homes. Overall, the triple impact of the Bishop Paiute Tribe Residential Solar Program Phase III—affordable energy for low-income families, on-site clean energy production, and hands-on solar installation jobs for local workers—these all help build the Tribe’s energy, economic, environmental goals and offers local self-sufficiency while supporting energy independence to the neediest on the Reservation.

3. Project Objectives:

The overall project goal is to deploy clean energy systems 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.

Project goals were to:

1) Install 40 grid-tied, net-metered rooftop solar electric systems on owner-occupied, single-family homes of low-income families living on the reservation with tribal job trainees
2) The new clean energy systems deployed will have at least 113 kW – AC rated capacity
3) The energy displaced was to be least 30-75 % of total electricity used, totaling at least 175,000 kWh/year

4. Description of Activities Performed:

The project consisted of a large outreach campaign, to identifying the potential homeowners. The tribe worked with the sub-recipient GRID Alternatives Inland Empire (GRID IE) to get the information out to the community in a timely way, to create a first come first serve, fair application process. GRID IE worked with the tribe to create content such as flyers, newsletters announcements, radio PSA's and a direct mail post card that was mailed out to all tribal residents to insure they received the program information. Once the homeowners applied and provided the program documents with GRID IE program, a list was created. The next step was to ensure the homes were solar suitable and a site inspection was completed. The roofs were inspected, measurements taken, and solar system sizing completed. The application list of fifty homes was reduced due to 40 due to construction factors such as:

- ✓ Roof in disrepair: shingles missing, roof leaking
- ✓ Age of roof/old roofing: roof needs to have at least fifteen year left to be solar suitable
- ✓ Shading: from trees, vents, other equipment on roof such as air conditioner
- ✓ Permanence: modular home or mobile trailer homes not on permanent foundation

All these factors are taken into consideration when approving a residence for a solar electric system. The final list then went to the tribal council for review and their final approval process. The solar systems were design and contracts were generated. Meetings and appointments were set with the 40 approved tribal families to review and explain the contract documents, go over what was to be expected during the solar installations, and share information timelines of the interconnection process happens and how their utility bills were going to change.
GRID IE selected 8 homes to provide the hands-on job training education. GRID IE worked with the TERO office to get flyers out to those interested in signing up to learn solar installation. TERO helped facilitate the meetings for the GRID IE orientation classes. There were several in person and remote orientations offered and set up on different dates and times to provide folks with easy to attend meetings. There was a total of 15 people trained: 6 female and 9 males they completed a total of 136 hours of hands-on job training. TERO facilitated the program for the trainees to then be hired and paid $15 dollar per hour on the remaining 32 homes receiving solar installations. Each of the 32 homes has 1 paid trainee and the list was rotated so everyone who trained received an opportunity to get hired at least on one home.

As the solar installations were completed, all 40 homes went through a thorough independent third-party inspections process. GRID IE processed all 40 local utility interconnection applications and all systems received permission to operate. After the interconnection process all 40 homeowners participated in home warranty meetings. Homeowners were provided warranty packets, which contains solar equipment guide sheets, energy saving tips, program feedback questionaries and utility guide sheets to explain the new looking utility net metered electric bills. GRID IE takes this opportunity to review any questions homeowners may have about their new solar systems. Additionally, each homeowner was provided information and education on other California clean energy programs and encouraged to continue practicing conservation methods with energy efficiency behaviors. GRID IE shared other local savings

assistance programs with utility company and clean vehicle programs. GRID IE conducted one year of monitoring of the solar electric systems installed to ensure solar performance and system energy reductions. These 40 solar electric solar systems produced above the goal and have a 75.7% electrical offset, 7% more than the original estimated. The breakdown and schedule was as follows:

- Months 1-5: Homeowner clients re-qualified and educated
- Months 6-14: Site visits conducted; systems designed
  Homeowner client contracts signed. Solar rebates reserved.
  Interconnection application submitted
  TERO Compliance Plan and fee completed. Equipment and materials procured.
  Systems installed.
  Job trainees hired and supervised
- Months 9-21: Systems interconnected (clients received Permission to Operate [PTO])
- Months 12-28: Warranty training provided. Systems performance verified
- Months 29-30: Final reports completed

Task Schedule

Task Number Per Statement of Work	Title or Brief Task Description	Task Completion Date				Progress Notes
		Original Planned	Revised Planned	Actual	Percent Complete	
1	Task 1.0 NEPA; Re-Qualify and Educate Homeowners	10/1/2018-2/28/2019		40	100%	All applications are updated and complete
2	Task 2: Conduct System Design Site Visits and System Design	10/1/2018-6/30/2019		40	100%	40 homes are designed for in house and sub-contractor installation
3	Task 3: Complete Client Contracts, Rebate Reservations, and Interconnection Applications	3/1/2019-11/30/2019		40	100%	8 GRID in house and 40 sub-contracted projects are in contract and installed 10 are in process of inspection and interconnection
4	Task 4: Prepare for Solar System Installations	3/1/2019-11/30/2019		40	100%	All 40 projects installed
5	Task 5: Install Solar Systems with Job Trainees	3/1/2019/-11/30/2019		40	100%	40 homes have been installed w trainees and/or paid trainees
6	Task 6: Perform Post-Installation, Verification, and Final Reporting	4/1/2019-3/31/2021		40	100%	40 homes have been interconnected
7	Task 7: Monitoring	12/31/2019 12/31/2020	Q2	40	100%	1 year of monitoring 40 systems

The Tribe and GRID are proud that the project was featured in Scientific American on-line:

https://www.scientificamerican.com/article/solar-powers-benefits-dont-shine-equally-on-everyone/

Here are training photos:

Presentation - Educational Information shared with tribal participant homeowners:

About GRID Alternatives

Who we are

We are a 501(c)(3) certified nonprofit organization that brings together communities, volunteers and job trainees to implement solar power and energy efficiency for income qualified families.

What we do

We install solar electric systems exclusively for income qualified homeowners providing energy cost savings, valuable hands on experience, and a source of clean, local energy that benefits us all.

How we do it

With the help of Gov't grants, Corporate funding, in kind donations, volunteers & job trainees.

We also host special events (i.e. Solar Futures, Veteran's build) that help raise these funds.

GRID Service Areas

6 CA Regional Offices

1. North Valley
2. Bay Area
3. Central Valley
4. Greater Los Angeles
5. Inland Empire
6. San Diego

4 National Offices

1. Colorado
2. Washington D.C.
3. National Tribal Program

And now International…

1. Nicaragua
2. Nepal
3. Mexico

GRID IE's Workforce Development Program

- Recruitment from TERO
- Free & Paid Training
- Placement
- Paid Internship Positions

Energy for All Program

The Energy for All Program makes solar power accessible to families who need the savings most, while providing hands-on solar installation experience to volunteers and job trainees.

Our motto:

1. PEOPLE: Income qualified homeowners
2. PLANET: GRID solar electric systems
3. EMPLOYMENT: Hands-on training for volunteer installers, no experience needed. Females are encouraged to apply!

Client Qualifications

Household Size	Maximum Household Income
1	$42,100
2	$48,100
3	$54,100
4	$60,100
5	$64,950
6	$69,750
7	$74,550
8	$79,350

*SASH Income Limit INYO COUNTY 2020

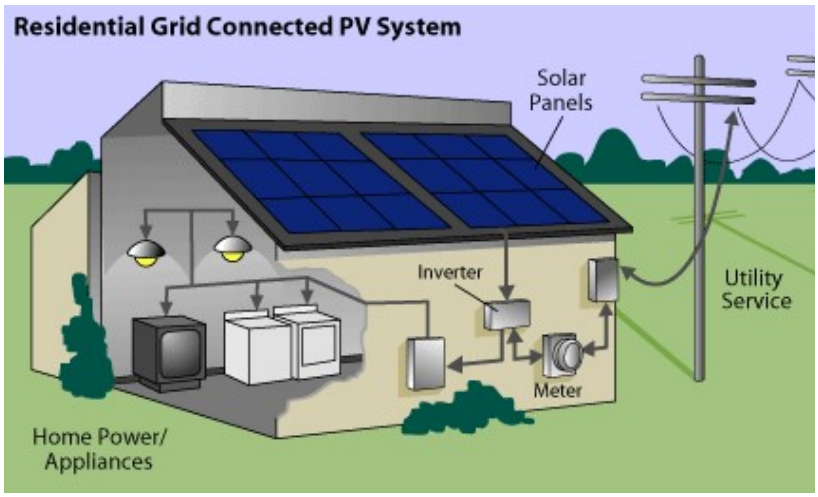
- Live on the reservation
- Be a Tribal member or linked to member
- Meet Income limits [at or below]
- Solar appropriate roof
- If you meet these qualifications, our program is at NO COST to you!

Photovoltaic (PV) Systems

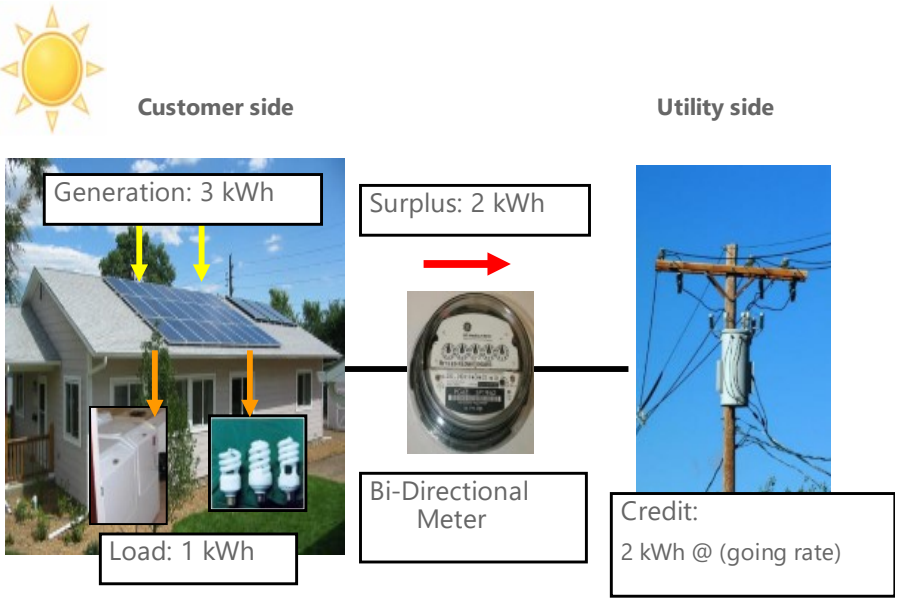
Solar Electric System

- Use the sun's light, not heat ("Photo" + "Volts")

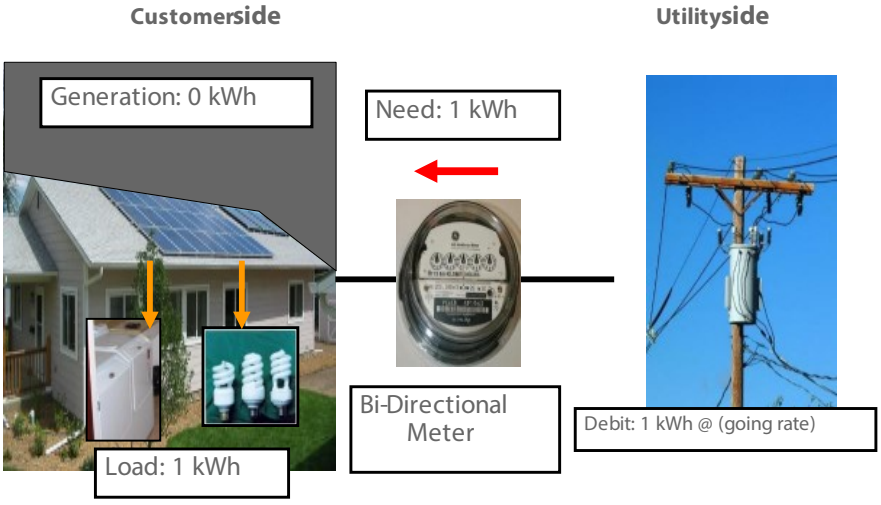
Grid-tied System

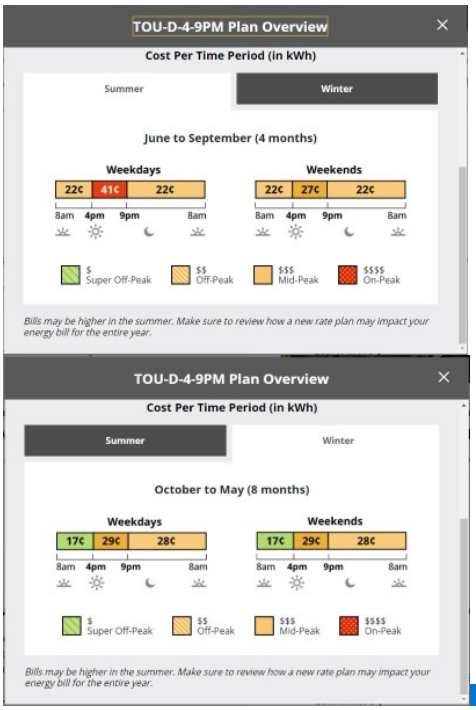


Net Metering



Net Metering



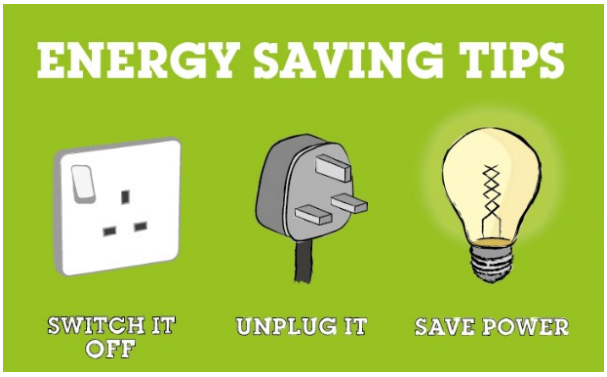


NEM and TOU Rates

- All solar customer in Southern California Edison will be switched to Time -of-use (TOU) rates when they receive permission to operate
- With TOU, electricity is more expensive during “peak times” currently set at 4 -9PM (as of April 2019)
- The new TOU 4 -9PM and 5 -8PM plans offer low prices while the sun is shining and solar power is contributing to the power grid
- Electricity prices are typically lower early in the day, over night, and on the weekends
- Bills may be higher during the summer but overall annual energy costs can be lower
- You have options, call Southern California Edison at 1-866-743-1645 if you would like to switch from the default TOU -D-4-9-PM rate
- You can still be on CARE/FERA after going solar!

PV System Maintenance

Energy Saving Tips



ENERGY FOR ALL
A program of GRID Alternatives

$200

Homeowner Referral Program

Refer your family, friends, and coworkers to GRID! Once their system is installed, you get $200. There is no limit to the number of referrals, so start today!

Clean Vehicle Assistance Program

GRID has partnered with Clean Vehicle Assistance Program (CVAP) to share information about a grant program to help you buy an electric vehicle. We also have information about other clean vehicle assistance programs! https://cleanvehiclegrants.org/

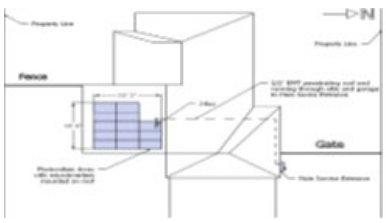
Clean Vehicle Programs: Here's how it works

1. Talk with GRID staff about your needs
2. Look at the options and decide what's right for you
3. We'll walk you through the application process

GRID Program Steps

1. Application all documents received
2. Construction Site Visit- Inspect roof
3. System sized and designed
4. GRID returns with Contract
5. 1-2 Day Solar Installation
6. Independent Inspections (Third-party)
7. Permission to Operate from SCE
8. Warranty Training and bill review
9. Start Saving with Solar Energy!

Construction Site Visit



1. Evaluate Roof Space Requirements
2. System Orientation
   - South and Southwest is best
3. Age of the Roof
4. Shading [Trees, Vents, Chimney]

GRID will bring back the roof layout showing you plans at contract time!

Installation day(s)

- 1-2-day Solar Installations
- Lead by GRID staff and a team of job trainees or Sub-Contractor
- Homeowner provides lunch for crew for 1-2 days
- Homeowner allows use of restroom
- Homeowner invites others
- Driveway must be clear
- Someone 18+ must be home the entire time

ENERGY FOR ALL
A program of GRID Alternatives

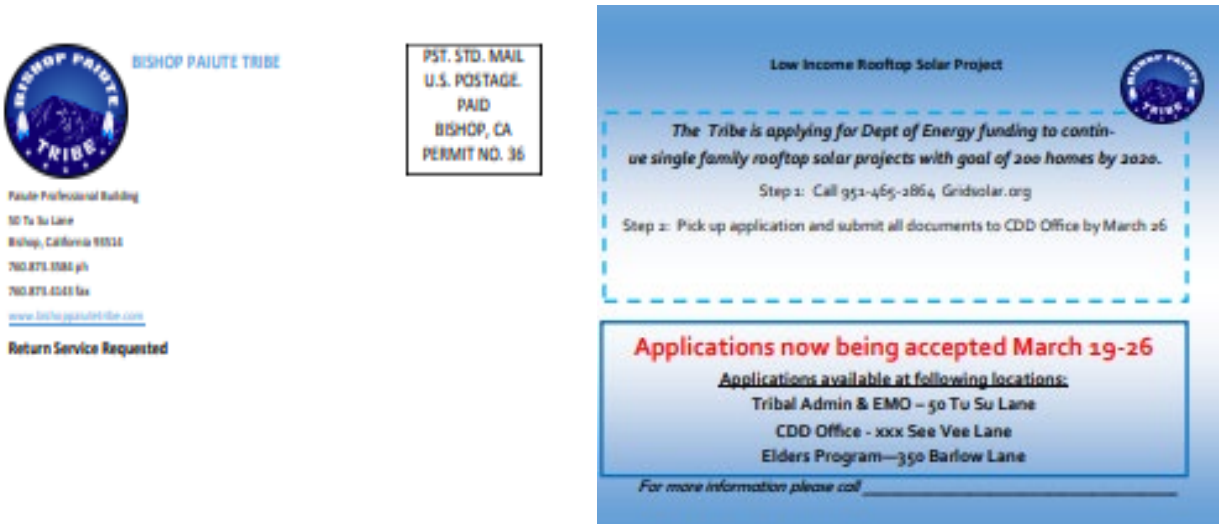
Apply today at CDD

Funds are ending

First come First serve!

www.EnergyforAllProgram.org

Example mailer: Post card mailed by Tribe:



5. Conclusions and Recommendations:

Below are examples of the impact of the installed electric systems.
Chart #1 shows the homeowner the direct impact of their solar system in solar electric savings, systems details and environment impacts. Chart #2 shows the impact of all 40 solar systems and the total kilowatts installed. The conclusion of the impact reports on these projects is that the solar systems performance was greater than expected. The solar systems provided more of an offset than expected, that will translate in more utility bill saving for the homeowners. The recommendation is to continue with search for homeowners who are interested in getting solar and continue looking for match funding. There were 50 applicants interested in getting solar, 7 of the 10 homeowners were disqualified due to roof issues, it would be recommended to see how funding could be identified to assist those tribal members needing roof repair, as GRID IE does not have program funds for that:

Total kWh Historical Usage	248061
Total Annual kWh Electrical Offset	187823
Total Annual Savings	75.70%

Example #1: Impact report for a home:

Estimated Solar Savings	
Estimated Savings from Solar (1st year)	$501.51
Estimated Savings from Solar (20 years)[1a]	$11,016.88
Estimated Annual Bill Reduction from Solar	64%
Annual Electric Bill Before Solar	$1,114.15
Estimated Annual Electric Bill After Solar[1b]	$284.01

Solar System Details and Production	
Solar System Size	3.15 kW DC
Historic Electric Usage (pre-solar)	5094 kWh
Annual Solar Production	4124 kWh
Your Original Rate Schedule	D
Your New Rate Schedule[4a]	TOU-D-4-9PM-NEM2

Estimated Environmental Impacts Over Solar System Lifetime	
Equivalent Number of Tree Seedlings Planted	785
Equivalent Number of Cars Taken off the Road	6
Greenhouse Gas Emissions Prevented	33.73 tons of CO2

Example #2: Impact report for all projects:

$0.171	National Average cost per kWh
113.0	Total Kilowatts of Solar Installed
4,637,393	Lifetime kWh production - California
0	Lifetime kWh production - Colorado
0	Lifetime kWh production - NY/Tri-State
0	Lifetime kWh production - Mid-Atlantic
0	Lifetime kWh production - National Average
4,637,393	Total Lifetime kWh Production
$843,707	Value of energy produced over systems' lifetimes - California
$0	Value of energy produced over systems' lifetimes - Colorado
$0	Value of energy produced over systems' lifetimes - NY/Tri-State
$0	Value of energy produced over systems' lifetimes - Mid-Atlantic
$0	Value of energy produced over systems' lifetime - National Avera
$843,707	Total value of energy produced over systems' lifetimes
1,610	Tons of Greenhouse Gases Eliminated Over the Systems' Lifetime
0	Tons of Greenhouse Gases Eliminated Over the Systems' Lifetime
0	Tons of Greenhouse Gases Eliminated Over the Systems' Lifetime
0	Tons of Greenhouse Gases Eliminated Over the Systems' Lifetime
0	Tons of Greenhouse Gases Eliminated Over the System' Lifetime
1,610	Total Tons of GHGs Eliminated **Over Systems' Lifetimes**
308	Equivalent number of cars taken off the road for 1 year
Source	https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator
37,455	Equivalent number of trees planted
Source	https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

Monitoring report: 75.7% Total annual kWh offset

Monitoring Report
Title: DOE 3 Bishop Tribe Residential Project Phase III
Award Number: DE-IE000099
Sub-recipient: GRID Alternatives

	HISTORIC USAGE				kWh Produced by Solar												
Project Address	**January**	**February**	**March**	**April**	**January**	**February**	**March**	**April**	**May**	**June**	**July**	**August**	**September**	**October**	**November**	**December**	**Total**
488 S Pa Ha Ln	1,604	2,014			333	410	501	554	620	560	573	460	392	271	254	221	5149
2260 Taboose Ln	421	341	235	226	120	168	250	268	302	271	300	288	246	208	175	94	2690
387 N Tu Su Ln	764	461	412	443	435	526	622	680	762	698	757	645	544	526	422	327	6944
481 Pa Me Ln	548	455	492	405	236	300	401	656	745	686	543	439	362	282	224	173	5047
645 Seawave Ln	811	855	856	794	269	371	533	465	561	521	720	559	436	306	306	191	5238
426 N Pa Ha	474	589	346	378	203	256	346	397	490	457	483	371	288	227	212	146	3876
2827 Diaz	668	627	684	572	451	536	620	648	732	666	710	606	523	497	442	320	6751
629 N See Vee Ln	1218	1161	796	634	330	412	502	548	631	570	602	499	412	384	320	305	5515
2242 Taboose Ln	638	578	517	492	418	515	600	661	714	695	740	652	540	508	477	311	6831
325 N See Vee Ln.	428	451	441	406	202	258	360	400	463	415	460	386	290	221	214	162	3831
1167 Brockman	537	465	392	452	198	249	352	390	448	405	458	383	270	216	208	140	3717
982 N. Barlow	1203	1186	729	790	140	199	251	280	334	290	355	311	294	234	220	111	3019
2334 Diaz Ln	588	510	428	443	335	416	510	568	622	575	622	508	425	390	333	202	5506
865 N. See Vee Ln.	680	649	547	646	145	200	258	607	690	633	695	600	479	416	360	316	5399
269 S. Pa Ha Lane	771	687	415	395	157	230	380	474	570	206	543	432	338	214	118	114	3776
299 N Barlow Ln	382	251	348	340	152	212	354	399	464	415	470	399	310	252	183	104	3714
2829 Diaz Ln	1033	1013	664	454	218	274	377	420	496	444	502	438	346	229	136	168	4048
506 NuuMu A	415	693	698	215	150	205	351	389	457	401	459	390	291	225	211	105	3634
159 North Barlow Lane	508	412	373	424	139	205	347	459	572	564	571	471	337	225	137	98	4125
374 S. Pa Ha Ln.	718	605	619	552	177	235	362	430	511	482	570	492	430	384	326	132	4531
74 Winuba Lane	639	528	472	498	178	270	449	587	687	607	640	505	366	223	128	118	4758
2257 Taboose Ln #B9	809	843	671	614	260	358	470	590	699	615	674	560	481	409	324	194	5634
446 N Pa Ha Ln	597	540	511	455	230	332	440	501	588	523	592	511	370	249	162	155	4653
715 Seawave	1050	1111	979	698	265	386	490	547	620	563	599	530	382	329	270	200	5181
2505 W Line St.	246	235	273	243	180	222	261	273	309	284	304	261	220	192	162	135	2803
82 N. Winuba Ln	770	653	627	687	334	418	546	643	777	711	739	566	436	338	270	250	6028
861 N See Vee Ln	865	477	356	331	253	312	425	500	599	564	597	474	373	282	218	181	4778
328 N See Vee Ln	239	209	217	212	126	159	208	253	304	285	301	248	205	156	130	91	2466
704 N. Tu Su Lane	335	260	217	216	146	190	262	310	369	343	360	288	230	173	127	102	2900
935 N Tu Su Ln	509	505	443	499	441	518	583	552	540	491	528	500	474	455	400	318	5800
759 See Vee Lane	333	378	400	259	244	306	430	499	593	564	597	485	359	278	215	165	4735
564 N. Winuba Lane	615	567	389	353	304	380	471	525	559	542	590	505	421	370	265	222	5154
2820 Diaz Ln	477	345	356	368	247	307	383	441	549	506	526	389	308	247	189	171	4263
2579 W. Line St.	233	193	196	200	164	216	310	351	416	394	422	341	251	195	174	108	3342
706 Tu Su	404	382	298	302	215	285	398	473	570	533	557	441	353	273	195	151	4444
371 N. Barlow Ln.	294	281	249	218	194	225	262	276	315	290	313	269	229	200	177	143	2893
805 N. Winuba Ln.	1515	834	596	636	417	372	719	749	876	816	867	716	599	519	431	341	7422
453 N. Tu Su Ln	289	362	392	324	223	284	374	438	522	479	495	390	307	242	183	151	4088
867 N See Vee Ln	738	736	616	507	423	493	607	621	690	633	695	600	479	416	360	316	6333
132 N. Tu Su Ln.	1099	1060	952	735	359	449	615	708	843	787	841	684	546	414	314	247	6807
	26465		19202	17416		12659	16980	19530	22609	20484	22370	18592	14942	12175	9972	7499	187823
					0	11.94245	0.884283	1.121383	1.384592	1.095284	0.94039	0.806524	0.72944737	0.685568	0.5341475	0.3456875	0.757165

	248061
Total kWh Historic Usage	187823
Total Annual kWh Electric Offset	75.7%
Total Annual Savings	

Grant proposal: Energy displaced will be at 35-70% of total electricity used (or 175,000 kWh/year) reducing annual usage to 175,000 kWh

Recommendations: For future phases of solar implementations, it was agreed upon by the Tribe and GRID IE to maintain a close partnership while keeping the community apprised of future application opportunities. The GRID IE applications was printed and kept in various offices throughout the reservation. This was an effective plan and will continue moving forward.

6. **Lessons Learned:** There were lessons learned in two (2) areas: workforce and communications:

Workforce: To obtain a TERO tax reduction or waiver a formal written letter must be sent to the TERO commission prior to any scheduled commissioner meeting. The request must be put on in writing and placed on a scheduled agenda meeting, reviewed, voted on and approved by the TERO Commission. This task should be started at the onset of the grant application for two reasons: one reason if waiver is approved to reduce or be waived this would allow the tribe to count this as a greater portion of an in-kind grant contribution and second reason is it makes balancing the budget and keeping the reports simpler.

Job training to hire program for tribal members: this model works best when the training is completed and the train to hire program is relatively close together. During this grant the job training and the hiring were a bit spread out and many of the trained tribal members found other paying jobs or returned to school.

Communications: As it related to outreach to tribal members GRID Alternatives organization started a small referral reward program, to help promote the California SASH II program and increase client acquisition with less GRID staff effort. This model worked well on the reservation and many homeowners referred their family and friends to apply and were rewarded with a small incentive to promote the program.
Outreach by postcard physically mailed to all tribal residents worked very well in this tribal community. The post card did not have a lot of details like a letter, and no one needed to open an envelope, so we believe this method of outreach will continue in the next campaign.