SAND #2013-4107P

Achieving Overall Betterment of Energy Resource Use in Tribal Communities

Logan Slock
Org. 6124: Sandra Begay-Campbell, Technical Advisor
Sandia National Laboratories[1]
Albuquerque, NM
August 10, 2010

I came to the Tribal Energy Program (TEP) with a background that was slightly different than many of the previous applicants. The plan of study for my Bachelor of Arts degree includes a primary focus on Environmental Studies and has a secondary focus on Psychology and Anthropology (more specifically, Native American Studies). After graduation, I hope to return to New Mexico and work with people on Native American reservations to help them to develop more sustainable relationships with the environment while at the same time preserving their autonomy. With that goal in mind, I will briefly discuss my training and education before this internship, the major things that I have learned over the past 12 weeks and finally how my goals have changed due to this experience.

The primary focus of my education has been, Environmental Studies, specifically, examining human interaction with their environment. Through my classes, I have developed a better understanding of the causes and consequences of current environmental issues. The

[1] Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Company, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

secondary focus on Psychology emphasizes mental processes and behavior through the study of the human mind. I have been able to use the knowledge gained from classes in this domain to better understand how psychological differences affect people's behavior in relation to their environment. I have also used the classes in this domain to develop a better understanding of how personality and multicultural differences influence how people think and act. Being able to develop a better understanding of how the mind and mental processes influence how people behave has allowed me to use this information to increase my understanding in relation to behavior regarding environmental issues. The final focus of my degree is on Anthropology, the social science that studies the origins and social relationships of human beings. I believe that since my long-term goal is to work in a culturally diverse environment, it is especially important to have an understanding of cultural variation among people who have different beliefs or come from diverse backgrounds. I also want to better understand the impact of spiritual differences on local cultures. As a Native American student, I think the consideration of these differences is particularly important. Finally, by allowing and encouraging traditional ways to continue, we, as Native people, can maintain and pass down our culture to the next generation. Through the unique contributions of each of these areas, I hope to increase and develop problem-solving skills that help Native Americans, as well as communities in general, achieve a more sustainable relationship between themselves and the natural world. "If we take care of Mother Earth, then she can take care of the people".[2]

[2] Sandia National Laboratories, (2001). Enduring Seeds. *The Solar Way, Photovoltaics on Indian Lands* (p. 15). United States of America: Sandia National Laboratories.

In addition to my current plan of study, I have received training in more applied aspects of energy use and management. I received a certificate in Residential Wiring, which involves training in diagnostic equipment repair and in AC/DC electrical circuits, from Central New Mexico Community College. I also attended a 10-day, 80-hour workshop on solar panel design and installation at the Solar Energy Institute located in Paonia, Colorado.

The overarching goal of my academic career is to develop skills to accurately assess and examine the feasibility of renewable energy (RE) on the lands of Native American tribes in the Southwest United States. The courses and trainings that I have taken unites all three areas of my chosen degree, examining sustainable energy practices among Native peoples and understanding how factors such as personality and multicultural differences influence how viable sustainable energy practices are on Indian Reservations.

Over the course of this internship our group has been able to have unique experiences meeting with professionals in the field. Having the opportunity to interview and ask questions has been a very valuable experience. Between our time working at Sandia National Labs and our field visits, we were able to speak with a very diverse group of individuals, each with their own specific job titles and responsibilities. Although each person brought a unique background to the situation, all of the individuals shared the common goal of achieving overall betterment of their Tribal community. Some of the professionals in the field who were particularly memorable to me were: Reginald “Reggie” Agunwah, Debby Tewa, Roger Tungovia, and Todd Hooks.

2010 TEP Interns at Indians Canyon Trading Post-Agua Caliente Band of Cahuilla.
Photo credit: Mark Dansby

One project that stands out to me was our visit to the Ramona Band of Cahuilla tribal lands. There we met with and were given a tour by Reginald "Reggie" Agunwah, EPA Director, of the Ramona Band of Cahuilla. The Ramona Band of Cahuilla tribal lands are located in an area where, because of their location, large-scale utility poles are not an option. The tribal members have been able to power their homes with Renewable Energy options, especially photovoltaic (PV) and small wind. This small tribe has also developed an ecotourism facility located in a "dark sky" area with the goal of attracting stargazers and astronomers. This ecotourism facility was designed with the goal of establishing a revenue generating facility powered by RE.

Solar and wind energy sources for ecotourism facility at Ramona Band of Cahuilla Indians tribal land.
Photo credit: Sandra Begay-Campbell

The ecotourism facility is located at a site where additional development (e.g., tribal offices and a tribal cultural center) is already planned for the future. Preserving this location also held great significance for the tribe because of its importance in relation to the gathering of traditional medicines and its great relevance for spiritual ceremonies. Because of the importance of the land, it was an important balancing act for members to create an attractive tourist designation while having as little impact on the land as possible. During the visit to this site, Reggie mentioned the fact that he needed a qualified individual to oversee and perform maintenance to their PV systems. This is an example of the potential of job creation by these types of projects.

Yurit, ecotourism lodging facility for guests.
Photo credit: Sandra Begay-Campbell

Another individual that I was fortunate enough to meet with was Debby Tewa, a Hopi tribal member, former TEP intern, and former member/employee of NativeSUN. Debby is currently employed by the Arizona Department of Commerce and is the Renewable & Tribal Energy Coordinator. Debby Tewa escorted our TEP team to the Hopi villages of Moenkopi, Hotevilla, and Old Oraibi to visit some of the PV installations that she had installed. While working with NativeSUN, Debby stated that she had installed over 300 PV systems for residents in and around the Hopi and Navajo reservations. This occasion gave me an opportunity to ride along with Debby and "pick her brain" for information about her own personal experiences.

Personally, I am very interested in the technical side of the PV world, so being able to get answers to questions that I have had about PV systems was a priceless opportunity. Debby was very open and willing to share her knowledge on every topic that we could think of, from what brand of voltmeter to use, to tips on how to be professional even when a client did not have the money to pay for a service call, to tips on how to think ahead and prepare personal tools so that you can be as efficient as possible. We were also given the opportunity to go on a "real"

residential troubleshooting call with Debby in Old Oraibi. Debby explained step-by-step the process to follow when responding to a troubleshooting call and allowed us to use our own training to diagnose the problem. Another valuable experience was when she gave me the opportunity to explain to an elderly Hopi resident the problem and her possible solutions. We were instructed to explain in "non-technical" terms so that the resident could understand what we had discovered and what her (the resident's) options were. This part of the troubleshooting call was invaluable because it really emphasized the importance of being able to communicate effectively with residents and community members. Debby told us to do our best explaining the situation in layman's terms and that she would help us out if she felt we were struggling. From what I gathered, I think that she was pleased with our explanation to the resident and the whole experience gave me more confidence in my own abilities. I really enjoyed this time on our tour and I feel fortunate to have been able to spend this one-on-one time with Debby. As a result of this experience, I now have a clearer idea of what it is that I want to do in my own career and what it means to be a true professional.

Debby Tewa at Mother Earth Symposium
Photo credit: http://nmai.si.edu/sites/1/files/motherearth/2009/audio_archive.html

On our field visit to Hopi Arizona, Roger Tungovia who is the director of the Hopi Energy/Utility Office also gave us a presentation. Roger stated that the education of children

regarding all aspects of science and energy efficiency was of the utmost importance and that his office was stressing this issue to the community. His presentation also highlighted the important fact that each tribe has their own unique traditions, values, and issues. His presentation echoed my academic goals in regards to the importance of educating the next generation, not only in traditional ways but also in regards to what the future holds from an energy standpoint. In this way, every tribe can maintain cultural variation and autonomy as new energy technologies develop.

Different types of corn.
Photo credit: http://www.blackmesatrust.org/aboutus.htm

He also stressed the importance of honoring and respecting the wishes of tribal leaders when dealing with issues within a specific tribe. Mr. Tungovia gave some examples of beliefs and concerns that tribal elders have had regarding specific RE technologies. For example, a tribal member once commented "*we don't want wind (turbines) because you're calling the wind to come"* and *"we don't want solar because you're asking the sun to stay out longer*." Mr. Tungovia stated that it is sometimes a difficult balancing act to promote green energy technologies to some of the elder community members. He stated that he explains to these elders that PV technology is not all bad and, "that the sun is also necessary to grow corn, so that our bellies will be full and we will all be happy." I am from Second Mesa, the village of Shungopovi,

so during this project, visiting people in Hopi had a significant meaning to me personally. To be able to see for myself how my education and training could assist the Hopi community was a good feeling.

A field example of community development was our visit to lands owned by the Agua Caliente Band of Cahuilla Indians. In a presentation given by Todd Hooks, Economic Development Director of The Agua Caliente Band of Cahuilla Indians, he described the unique relationship between several different groups of people from the local community. His presentation focused on a land status map that very clearly displayed a very detailed overview of their tribal land borders and land status. The Agua Caliente Band of Cahuilla Indians tribal lands consist of 32,000 acres with 12,000 of these acres located on the valley floor in the town of Palm Springs, California. The tribal lands are checker boarded in a location with some key city blocks located in the heart of downtown Palm Springs. The Agua Caliente Band of Cahuilla Indians entered into a land use agreement with the City of Palm Springs and the land in these areas is leased to the city. By entering into this land use agreement, the tribe allows the City of Palm Springs to act on their behalf to process permits within the city limits. What this agreement has accomplished is the ability to unify a government-to-government relationship between the tribe, the city, and the county. This agreement has been beneficial to all parties involved because it has limited the differences in jurisdiction and has basically formed a large community between tribal people and the non-tribal residents of Palm Springs. This large community is a great example of how I could use my education to benefit both tribal and non-tribal people by developing and encouraging a more sustainable relationship between different groups, which in turn benefits all members of the overall community. Being able to have an understanding of personality and

multicultural differences and how these different influences effect how people think is great asset to this overall process of relationship forming. I think the tribal and non-tribal people of the Palm Springs area are a great example of the success that is possible in large diverse communities.

During this internship with TEP, we also focused on and were trained in Strategic Planning, (i.e., how to facilitate RE planning meetings in Indian country) by an outside entity, the Alire Group. The focus of this unique training involved learning how to prepare for and lead a focused conversation, assist groups in reaching a consensus, and setting in place an action plan to help reach these goals. One of our field visits involved putting into action the actual application of the training that we received with members of the Gila River Indian Community (GRIC). Members of our group consisted of the TEP interns, the facilitators (Alire Group), and members of Sandia National Laboratories. The focus of this planning session was to explore all the options that the Gila River Indian Community (GRIC) has in terms of RE options for their community.

Collectively and through the facilitation process, we were able to help brainstorm ideas and try and come up with a consensus as to where the GRIC wants to be in the year 2020 in regards to RE. Through the facilitation process, the group came up with some concrete statements concerning GRIC's goals for RE. With these statements and goals identified, the group from Sandia was able to give presentations specific to the goals and desires of the GRIC and present to them the possible options for them to reach their goals. The presentations included everything from small and large scale PV, water turbines, biomass/biofuel, computer models and system analysis, green building, and smart-grid basics. I found this particularly interesting because I was able to see the way in which professionals in the field were able to present these

sometimes complex topics to groups of people that included community members and lay people. Through this Strategic Planning process, we were able to assist, prioritize, and set an action plan into place. The presentation given by the engineers from Sandia was a unique opportunity to listen in on the latest cutting edge technologies that are available not just in Indian country but in the world. It was a great experience and complemented our training in Strategic Planning. It is great to be able to see someone apply the things that I have learned in school coupled with this internship and through our Strategic Planning training to real life scenarios with real people who have genuine concerns and questions.

Overall, this process has also made me realize how difficult it really is to get a large group of people to agree and come to a consensus when it comes to environmental and economic issues. Something important that I learned is that sometimes people just want their voices to be heard; they want to be acknowledged for their contributions because this allows them to have ownership over the entire process. By the end of the three-day conference, I felt that a lot had been accomplished in identifying what ideas and values the community wanted to achieve for their future regarding RE. It was really nice feeling when an elderly community leader, whom I had met throughout our interactions during the process, approached me at the end of the conference and told me he was, "happy to see young Indians involved in these issues and getting their education." His comment gave me a sense of pride in what we are doing and it made me realize that we are making a difference.

According to Database of State Incentives for Renewables & Efficiency (DSIRE) in the New Mexico Renewables Portfolio Standard the standard is set for Investor-owned utilities to provide 20% of their utilities by renewable sources by 2020 and in rural electric cooperatives

10% by 2020. With these standards in place I feel that tribes in the Southwest will have a great opportunity to develop resources and to become an important player in energy production. All these projects, whether small or large, require a specialized trained technical staff that is able to safely and efficiently maintain these projects. Not only do these individuals need to be well trained, they also need to be able to communicate effectively with tribal leaders and the community as a whole. For people to buy into RE, community members need to feel that they are able to express their concerns; a good example of this open communication path was given by Senior Planner, Dan Malcolm of the Agua Caliente Band of Cahuilla Indians. Dan was given the responsibility of converting the diesel generator powered trading post to a primarily PV powered system. Dan gave an example of the situation in which he noticed a large voltage drop in the system while performing routine monitoring/maintenance. Through his conversation with an employee at the Trading Post, he discovered that the source of the large voltage drop was the use of a toaster oven used by a small concession stand. Dan took this opportunity to research and purchase a more energy efficient toaster for the Trading Post. This is an example of being able to listen to what the needs of the community are and then addressing those specific needs in the most sustainable way possible. It is an important interpersonal skill and crucial for success to ask what the community's needs are and then knowing how to address them.

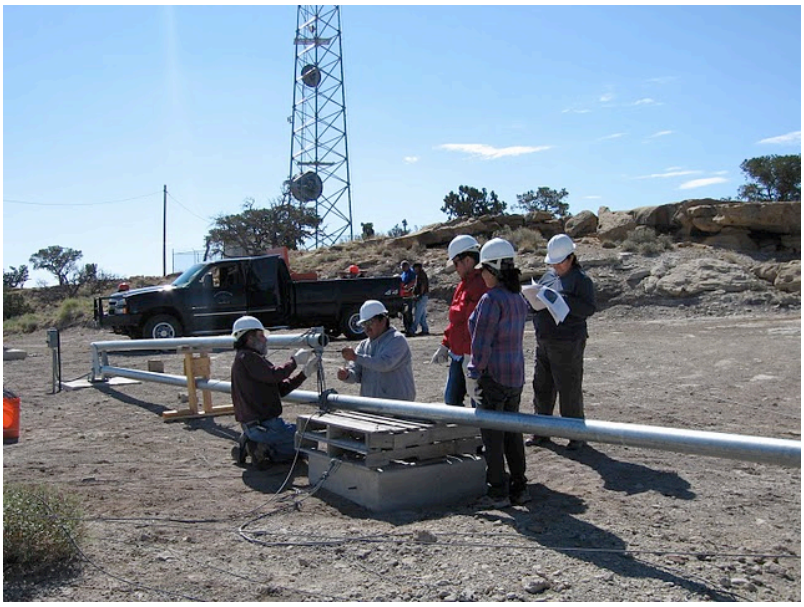
A common theme that was repeated throughout the summer from various individuals representing tribal communities with both small and large population bases was the fact that Indian people are constantly approached by RE vendors. These vendors are always trying to pitch their products. This is very similar to lessons that I learned from my previous employment in a tribal casino, where similar to RE vendors, casino table games vendors were always trying to

pitch the “latest and greatest” games. Through questions and knowledgeable assessment, a person can separate the new technologies that are junk from the ones that are worthwhile. This issue really exemplifies the importance of having highly skilled and trained individuals to filter though and evaluate the sometimes misleading information that vendors are often pitching to Indian people. These trained individuals are a necessary bridge between vendors, who are often overly focused on the financial bottom line, and the tribal leaders, who are in charge of choosing the direction that they feel is best for their people. For example, these individuals can help leaders ask the right questions (e.g., “if these new latest and greatest products are so beneficial why are they not in other locations that are not on Indian land?”). This internship has shown me that there is a real need for individuals like myself to assist these tribal communities in the filtering process and that having qualified personnel is an important tool in the decision making process for any tribal leadership.

Agua Caliente Band of Cahuilla Indians Tribal Administration Plaza
Photo credit: Sandra Begay-Campbell

Two tribal communities that we visited that have formed protocols to follow to combat these issues are The Navajo Tribal Utility Authority (NTUA) and the Agua Caliente Band of Cahuilla

Indians. The NTUA has developed a framework that requires 51% Tribal Council approval to move forward with any vendors "latest and greatest technology." With these guidelines in place and with Sandia's TEP technical support and assistance, the Navajo Nation is able to make informed choices concerning their future. Similar to the NTUA framework the Agua Caliente Band of Cahuilla Indians have also formed the Water and Resource Authority whose sole purpose is to filter and rely relevant information to their Tribal Council.



Small wind turbine workshop hosted by Navajo Technical College
Photo credit: Sandra Begay-Campbell

Small wind turbine workshop hosted by Navajo Technical College
Photo credit: Sandra Begay-Campbell

A more hands-on example of the need for qualified and trained individuals occurred while we were trying to solve a problem during a Small Wind Turbine workshop at Navajo Technical College. Even though we had personnel with substantial knowledge, the operational manual in our hands, and several individuals with significant electrical experience in RE systems, it took a phone call to the manufacturer to solve this problem. In the operating manual an optional break switch diagram that was a necessary component to utilize the break system was left out of the original plans. Had it not been for the brainstorming and phone calls, this solution would have been very difficult if not impossible for us to come up with. It is likely that the operation of the wind turbine would not have ever occurred without the resolution of this problem. This example demonstrates how difficult it can be for tribal communities to get answers to questions that occur with the maintenance of these systems without qualified technical assistance. This also exemplifies the difficulties faced by individuals working for smaller tribes with fewer resources available and who may not have as much access to qualified support.

Small photovoltaic systems display
Photo credit: Logan Slock

Besides the site visits and learning opportunities through contact with professionals, a fellow intern and I had the opportunity to complete a very unique hands-on project. We had the opportunity to troubleshoot a solar power kit that had previously been designed by former intern Debby Tewa with the intention of using it for instructional/educational proposes. The system had not been working for several years, so our mentor, Sandra Begay-Campbell, asked if we could use our education and technical training to diagnose and repair the kit. Sandra also asked us to install new connectors to the three different PV panels and most importantly to the PV panel located in a notebook size binder for ease of usability and transportation. Being able to work together to diagnose and repair the solar kit was a great opportunity because it allowed us to showcase our unique training and talents.

The troubleshooting process involved trial and error and checking every connection and every conductor. Without the proper tools, (e.g., a voltmeter) it was difficult to pinpoint the problem. This process also reinforced the idea of how important it is to help customer awareness

of the tools that they could also possibly need in maintaining their own systems. I made phone calls and spoke with a technician from a local company and explained to him our process and what our results were. After speaking with the technician and explaining our problem to him, he gave me a suggestion and we were able to correctly identify the solution.

In addition to fixing the kit we were also able to insert the same interlocking connectors to all three of the PV panels resulting in a uniform fit of the previously non-uniform connectors. We also put together an operating cheat sheet and safety procedures to follow while operating the solar kit so that future interns will be able to experiment, conduct demonstrations, and perform the necessary maintenance on it safely. We also made labels for all the components of the kit, so as to make it easy to identify the different devices that make up the kit.

Navajo Tribal Utility Authority employees demonstrating PV system to Tribal Energy Program interns
Photo credit: Sandra Begay-Campbell

This project was a lot of fun and offered some real life training applications. We were able to practice what we learned in our electrical training classes and on PV troubleshooting and apply it on a much smaller scale. The PV kit that we worked on was very similar to systems that we could potentially work on in the future on a larger scale. This project also gave us some real

world experience by being able to call and visit several PV companies in the Albuquerque area. It was helpful because we learned how to better communicate and to explain issues to future customers. Similarly, it was important to see the types of places where customers might go to ask questions or gather information for maintenance of their own systems. This was a very rewarding project and I hope it will be a useful "tool" for the Tribal Energy Program.

My overall experience with my TEP internship has given me the guidance and direction needed to move forward in my career. The field of RE is as large and diverse as the communities that we serve. There are so many different aspects, possibilities and needs, that the options for growth are limitless. There is a need for planners, installers, field technicians, facilitators, research & development, electricians, economic developers, and individuals involved in the maintenance of these systems to insure the continued use of the projects. What this internship has provided me with is the knowledge and experiences that gained by the field visits and the great technical support provide by Sandia National Laboratories, specifically the great mentorship provided by Sandra Begay-Campbell. This internship also solidified and reaffirmed my specific niche in the whole RE world as a field technician, research/development assessor and/or a contracted RE electrician.

This internship has also helped solidify and supplement my education by providing real-life learning experiences related to my areas of study. This internship has allowed me to work on RE projects with Native American tribes interested in RE systems through instant immersion working on current RE projects. It has also provided the opportunity to see how professionals are required to maintain projects and has helped me to visualize possible career opportunities. Trained professionals are as important as the equipment itself in the overall production of

energy. A possible career that I can see myself involved in is being a contracted technician responsible for maintenance of small and large-scale projects. RE projects are relatively new technologies that I feel is still at the beginning stages in Indian country. Being able to achieve sovereignty over their own energy future with the development of PV and wind power is an important piece of the RE pie. This sovereignty can be achieved from many diverse projects including small residential home units to large-scale utility scale power generation.

My academic education and training coupled with this internship has formed a solid foundation that is an important element if I am to reach my ultimate career goal. I believe that each individual component of my degree and internship has provided support to my overall goal of working in a job that focuses on the promotion of more sustainable relationships between people living in rural and underserved areas of New Mexico and their environment. My education has led to an understanding of the Earth and its environment; the psychology component has helped me understand how and why people behave in certain ways within that environment. Having knowledge about the human mind and how personality and multicultural differences affect how people behave within their environment are particularly important because humans are not only the cause of many of the current environmental crises but also the only hope of things ever changing. To be successful it is important to keep in mind the unique perspective of diverse Native American communities particularly in regards to spiritual and cultural differences. My goal is to educate non-tribal people about cultural relativism, and, “the ability to view the beliefs and customs of other peoples within the context of their culture rather than one’s own.” As I am primarily interested in working with Native American communities, this internship, has really allowed me to extend my classroom experience to the real world. I

think that each of these experiences, in addition to the classes and training that make up my plan of study, will allow me to be able to achieve my goal of helping Native American tribes in the Southwest develop ecologically, economically, and culturally sound ways to exist in today's world.

Tribal Energy Program: Gepetta Billie, Prestene Garnenez, Sandra Begay-Campbell, Joni Fuenmayor and Logan Slock at Monument Valley Tribal Park, UT
Photo credit: Melissa Parrish