Energy Planning for Indian Nations within the WRAP: A Field Guide

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Introduction

Energy in the form of electricity is a hot topic among tribes within the Western Regional Air Partnership (WRAP). For too many, energy is too expensive, not reliable, or even non-existent. For many tribal members, up to 20% or 30% of income is spent on energy which is unbelievably high compared to non-tribal people in the same area. Many houses and buildings within Indian Nations connected to the existing electrical power grid are at the end of these lines and far away from the power source. As a result, any interruptions throughout the line will disrupt power to these houses and buildings. Thousands more homes and buildings are not connected to the existing grid and have no electricity. Creating energy plans specific to the needs of the tribal members will help bridge the gap between the current energy situation and the energy system tribes envision.

The first critical step in establishing an energy plan is to have a complete and specific energy destination in mind. A stock of what is currently possessed needs to be determined to better understand the resources needed to reach the destination. This destination needs to meet common needs of members of the tribe and should go hand-in-hand with other tribal objectives, such as economic development, creation of jobs, and cultural values.

It is necessary to define the baseline electrical energy profile for the tribe. This profile should include inventory of total current and expected electricity generation capacity and production expressed in megawatts (MW) and megawatt-hours (MWh). An inventory of renewable energy electricity generation capacity and production (expressed in MW and MWh) also needs to be determined. Also, the percentage of total electricity generation capacity and production due to renewable energy needs to be established.

This paper provides an overview of the process for developing a tribal energy plan. The process includes the following steps: developing a tribal energy vision, energy efficiency programs, renewable energy resource development, electrification programs and energy plan implementation. Working with the Hualapai Tribe in Arizona, the workshop curriculum was presented and led to instantaneous energy efficiency projects. Tribes should begin the process of energy planning due to the following issues: economic development (cost savings, revenue generation, job creation, and profit creation), increasing tribal sovereignty, energy independence, and cultural integrity.

Background

The Grand Canyon Visibility Transport Commission (GCVTC) created by the 1990 Clean Air Act Amendments, quickly agreed to address regional haze in the Grand Canyon National Park and 15 other National Parks, Monuments, and Wilderness Areas on the Colorado Plateau. The Western Regional Air Partnership (WRAP) was created in 1997 in response to the specific GCVTC recommendation to do so. Research done under WRAP showed that *the foremost recommendation was for the 237 tribes within the WRAP to complete energy plans.* [1]

The Technical Committee of the GCVTC has prepared the most comprehensive estimations of the causes of regional haze in the West which estimated in part that pollution from

[1] See Acker, Auberle, Duque et al. (2002), Acker, Auberle, Duque et al. (2004) and Acker, Auberle, Eastwood et al. (2003), Acker, Auberle, Eastwood et al. (2004 a, b, and c) for details.

utilities in the West during 1990, contributed to approximately 17 percent of the "human-caused (light) extinction on an annual average at Hopi Point" in Grand Canyon National Park.[2] So, although the WRAP was organized and the studies were produced in response to the haze issues at the Grand Canyon, tribes can get involved with the process of energy planning for other purposes.

The most obvious reasons for developing energy plans are costs and revenues. Creating an energy plan which incorporates energy efficiency and renewable energy programs can lead to increased tribal revenues or cost reductions, but also leads to environmental improvement and help the GCVTC reduce regional haze in National Parks and Monuments. Electrification is another type of energy program that might be of interest to some tribal governments since tribal lands have the highest level of households without access to electricity.[3] Along with other advantages, energy planning can lead to tribal economic and political sovereignty.

Energy efficiency programs can reduce expenses by 10-50 percent, which can provide substantial savings for tribes and tribal members. These direct savings are monies that can be used for alternative purchases and thus improve the economic well being of the tribe. Many efficiency programs can be developed with ease, at low-cost and with short payoff periods.[4]

Renewable energy development can have both a cost saving and revenue potential. Instead of purchasing electricity from off-reservation sources, tribes might be able to begin producing their own; whereby, electricity payments stay within the local economy. By piecing together various renewable energy programs, a tribe might be able to reduce the overall electricity bill. Alternatively, lower electricity rates may be available to tribal members. Combining efficiency savings, the multiplier effect and reduced rates, tribes might realize substantial cost savings from the domestic production of electricity.

Indian lands hold huge potentials for the development of renewable energy sources. As opposed to many past non-renewable energy production deals, tribes can develop their economies around clean and safe energy production and become major providers to off-reservation populations, reaping substantial revenues from increased production. Jobs, incomes and profits developed can create a stimulus for substantial secondary economic development.

Thus an energy plan can motivate a tribe towards an improved and expanded economy, all the while developing clean and safe energy that does not violate cultural norms and values like mineral and fossil fuel extraction and use. Developing an energy plan allows tribes to negotiate from positions of strength for the effective exercise of sovereignty.

The issues leading to the creation of the WRAP were concerns about regional haze at the Grand Canyon and other magnificent vistas in the West. The following is a brief overview of the rationale behind energy use reduction through efficiency measures and the development of renewable energy sources.

Problems with Coal

Although coal has been successful in powering America's energy needs, it has two inherent flaws.[5] For one, it is relatively inefficient. Only about one-third of the energy released

[2] See Grand Canyon Visibility Transport Commission (1996) for details.
[3] See the Energy Information Administration (2000) report for the details.
[4] See Acker, Auberle, Eastwood et al. (2003) and Acker and Smith (2005) for complete details on energy efficiency programs.
[5] See Ratliff and Smith (2005) for further details concerning the negative effects of coal. The data presented in the paragraph below are taken from this paper.

in the burning reaction goes towards electricity generation. Second, burning coal emits a tremendous amount of environmentally detrimental byproducts. In particular, coal-burning electric power plants account for roughly 57 percent of the total industrial air pollution in the United States. About two-thirds of sulfur dioxide (SO_2), one-third of carbon dioxide (CO_2), and one-quarter of the nitrogen oxide (NO_x) emissions in the United States are produced by coal burning. Emissions from coal burning puts fine particle matter into the atmosphere that may become lodged in lung tissue, raising lung cancer rates. Global warming is being caused by carbon dioxide emissions when fossil fuels such as coal are burnt. In America in 1999, coal-fired power plants alone released 490.5 million metric tons of CO_2 into the atmosphere (32 percent of the total CO_2emissions for 1999). Mercury, a harmful element, exists in coal. Finally, coal mining causes severe erosion, resulting in the leaching of toxic chemicals into nearby streams and aquifers, which pollutes drinking water and destroys habitats. Thomas Casten, (1998, p 77) author of *Turning Off the Heat*, writes, "In short, the excessively rapid consumption of fossil fuel in old power plants with out-of-date pollution control is causing local and global environmental problems." Moving toward energy efficiency and renewable energy programs can reduce the problems.

Overview of the Planning Process[6]

For tribes that do not have one, it is recommended that tribes consider developing an energy plan or policy. To be effective, this plan needs support from the highest levels within the tribe, and among other things should set down goals for energy efficiency, renewable energy development and electrification. Establishing an energy plan is the first necessary step in gaining control over energy use and costs incurred by a tribe. An energy plan can be a way towards enhancing tribal sovereignty, economic development and energy independence.

The first step of energy planning is to create an energy vision. Through public hearings, conversations with tribal members, program directors and relevant others, the council should create a broad vision regarding energy. The vision should set the policy direction for tribal action. A tribal champion should emerge, empowered and supported to lead the strategic energy planning process forward. The vision should be specific enough to set clear direction, but should not be prescriptive in the methods used to achieve the vision. Where do you want to end up, and how can you get there? The first step in understanding your energy journey is to envision your destination. What does that place look like? Take stock of where you are now to better understand the resources you will need to get to your destination. The difference between these two points, where you are, and where you want to be, defines the work that needs to be done. A thorough understanding of the energy planning template can help guide the visioning process, since this template discusses numerous energy issues. However, the template in no way implies what any single tribe's vision should be. The vision is a sovereign decision of each specific tribe.

It is recommended that tribes without an energy manager (or similar position) consider establishing such a position. The task of an energy manager is to develop, implement and maintain a program focused on tribal energy use and energy development. An energy manager within an energy authority can direct and manage energy programs. As such, the energy manager is a logical choice for assuming the responsibility of selecting, evaluating, and implementing appropriate energy efficiency programs and renewable energy development for the tribe. The energy manager can also recommend policies for consideration by the tribal council.

[6] More complete details are available in the full blown Energy Planning Template available at the SES website. See Acker and Smith (2005).

For tribes without an energy authority, an energy manager position can be created elsewhere within the tribal government.

Hiring a person or assigning to a person the duties of an energy manager is a key step in implementing energy efficiency and renewable energy programs. It is important that a single person or office within an organization assumes the responsibility for energy issues and energy efficiency and renewable energy, and that this person or office has support and commitment from the highest levels of the tribe. This plan should include, but not be limited to the following: identify and track energy uses, recommend energy-efficiency programs and equipment, and conduct education and/or rebate programs. When implementing energy measures and programs it is generally best to begin by setting some goals, and then implement lowest-cost, highest-return projects first.

For tribes in need of an electrification program, the manager will also design and implement such a program.

Tribes without an energy (utility) authority might consider establishing such an entity (either individually or in collaboration with other tribes). Perhaps the most important recommendation in this report is that of designing a tribal energy plan that is managed by an energy manager within a tribal energy authority. The energy authority will be an advocate for tribal electricity (and energy) customers, possibly negotiating lower rates from outside sources and improving the reliability of the service. An energy authority will also create jobs, build tribal expertise about energy, and help retain some of the money expended on energy for the reservation. A tribal energy authority also holds promise to advance tribal self-determination. The energy authority will make decisions and implement plans that lead to a more successful future based on the tribal vision.

In order to begin an energy authority and create a position for an energy manager, it may be necessary for a tribe to pass a tribal resolution, including budgetary considerations. Alternatively, especially for smaller tribes, the natural resource manager – or similar position – might be given the tasks of an energy manager.

As discussed extensively within the literature on tribal governance, the energy authority should report to the tribal council on a frequent manner, but the manager should maintain a level of autonomy for the day-to-day management of the authority.[7]

A Tribal Implementation Plan (TIP) would commit the tribe to developing an energy plan. The TIP would address the issues of energy efficiency measures, renewable energy development and electrification programs. As such the detailed TIP will include four distinct components: energy efficiency, renewable energy development, an electrification program and an overview of how the previous three overlap.

To implement the TIP, a tribal energy manager needs to have the ability to create and manage efficiency and conservation plans through development of a TIP, especially if given the full support of the tribal leadership. If no such position exists, it is recommended that one is created. As mentioned, the TIP needs to incorporate the needs of the tribe and its members. The energy manager can ensure that these needs are integrated into the TIP.

[7] This model is after that developed by Cameron (1988) for a Development Corporation for the Crow Tribe and Caliguire and Grant (1993) regarding an Enterprise Board structure for the Hualapai Nation. See also Cornell and Kalt (1990, 1991, 1992a and 1992b) and Smith (1994a, 1994b, and 2000, chapter 11) for discussions of the importance of separating day-to-day management issues from strategic ones. The former should be the purview of the manager; while, the latter *are* the purview of the tribal council.

Creating a comprehensive and effective TIP is a significant undertaking that requires involvement of tribal officials, staff, and members. It is therefore important that all tribal members are educated. Therefore, education programs for all residents, including children and training programs may be needed to ensure that all properly understand the need and role of an energy plan.

Energy Efficiency

Energy efficiency (EE) is broadly interpreted as being synonymous with energy management. The intent of energy management is to implement strategies that maximize the effective utilization of energy while minimizing the costs of that energy. When considering reduction of electricity consumption, a good place to start is with the identification of the main uses of electricity. From the perspective of a tribal administrator, the biggest uses of electricity may best be divided into the following categories or sectors: residential, commercial (which includes tribal and federal government facilities as well as gaming and recreation facilities), industrial, and agricultural. For most tribes, residential and commercial building loads consume a significant portion of the electricity budget; however, the amount consumed within other sectors varies significantly for each tribe.

The next level of consideration of electricity use is from the perspective of a person (energy manager) responsible for tracking and understanding electricity consumption. This person will be interested in knowing the actual uses of electricity so as to determine the opportunities for EE and the associated cost savings. From this perspective, electricity use is typically divided within each sector into categories such as lighting, space heating, space cooling, refrigeration, hot water, office equipment, pumps, fans, motors, and possibly others. A good source of information for identifying how much energy and electricity is used within these categories in each of the various sectors is the U.S. Energy Information Administration (EIA).

An important consideration when evaluating any potential EE measure is the required functionality of the system being considered. It is crucial that the EE measure not compromise functionality. In order to fully understand energy use, it may be cost effective to invest in additional usage meters.

Energy efficiency has the potential to significantly impact electricity consumption and related electricity costs. Considering that $454 million was spent on electricity in all Indian households in the United States in 1997, a decrease of only 10 percent in consumption of electricity due to EE programs could produce savings on the order of $45 million. Given the fact that Indian populations are rapidly increasing and that tribes are actively engaged in economic development, the amount of resources spent on energy will only increase.

A primary benefit of improvement in energy efficiency is cost savings. Expenditures towards energy efficiency today will result in substantial future savings. After an energy management program is initiated, 15 percent of energy costs can be saved with little capital investment. Thirty percent savings are routinely obtained through energy management programs, but sometimes savings of as high as 50 to 70 percent can be achieved. When money is saved, a tribe's spending goes further, and can be used for other needs or for creating new programs. Thus current savings can be achieved and future usage growth, and expenditure, can be avoided by achieving increased levels of energy efficiency.

Decreasing the energy-related costs through efficiency improvements in a household, business, or government office, may also further the economic development of a region, or may change its pattern of economic activity by freeing resources for other, more productive tasks.

Many tribes face two major needs: employment and economic development. Energy efficiency proposals will lead to the creation of jobs for local workers to repair or weatherize buildings, and if some of the materials used are locally produced or processed, work is generated in those sectors as well. Tribal colleges are perfect locations at which to hold classes to teach people about how the energy-efficient applications work. With this highly specialized niche of the local economy filled by tribal members, business is developed and skills are refined that provide opportunities to export products and services off the reservation.

Improved EE can also help curtail brownout and service interruptions. At least for the next few years and until significant new electricity generation comes on line, the general ability of the electric power system in the western region to meet peak demand is at risk. Possibly the most effective means of avoiding brownouts and service interruptions may be to manage the demand side of the market place which will be encouraged through energy efficiency measures.

Energy efficiency opportunities exist with all new electrification projects that tribes undertake. More than 14 percent of Indian households in the United States lack electricity, as opposed to 1.4 percent of all U.S. households. Eight of 12 tribes with the greatest need for electrification (by percentage of households), are located in the WRAP region.[8] It is estimated that 18,000 homes on the Navajo Reservation do not have electricity available.[9] The Native American population throughout the country is rapidly increasing and will require additional housing in the future. As reservation economies develop, new commercial and industrial buildings will also be developed. This combination of existing need and expected growth makes the need for EE designs ever more important.

Successfully evaluating the economic merit of an EE measure or several EE measures will assist in determining whether or not to implement a given measure, or in deciding which of several measures is best. When evaluating an EE measure, it is important to employ a consistent, reliable method for evaluating the economic merits. Several steps will help evaluate the economic merit of Energy efficiency:

Step 1: Identify the opportunities for EE.
Step 2: Develop feasible alternatives for EE improvements.
Step 3: Select the decision criteria.
Step 4: Analyze and compare the feasible alternatives.
Step 5: Select the preferred alternatives
Step 6: Assign responsibility for implementation and evaluation
Step 7: Revisit your decision

Renewable Energy

Generally speaking, the term "renewable technology" refers to any technology that utilizes a renewable resource system as a type of fuel to generate either electricity or heat.[10] A renewable resource system is defined as a system in which the energy source replenishes itself, often naturally. The most popular sources for renewable technology are solar, wind, hydro, geothermal, and biomass.

[8] See the Energy Information Administration (2000) report.
[9] See Bain et al. (2004) for complete details.
[10] This report focuses on electricity consumption and production. It does not include details on other types of energy, such as heating and transportation; however, similar planning is possible within those energy areas.

Regardless of a tribe's size, location, or other demographic variables, a formal energy policy statement that incorporates specific provisions for renewable electric energy is an important beginning to a larger set of strategies. A program to stimulate renewable energy generation will be most effective as part of a more comprehensive energy policy developed by and adapted to each tribe.

Virtually every tribe in the WRAP region enjoys an abundance of harvestable renewable energy resources. Some tribes with an established tribal electric utility are already well positioned to expand the role of that utility to develop viable sources of renewable energy. There are several potential advantages to creating or expanding the tribal government's direct role in renewable energy development and marketing: increased opportunities for new electrification services to members and others on tribal lands, improved reliability of existing electric supplies, acquisition of low-cost electricity that is competitive with traditional energy sources, acquisition of electric supplies that reflects the tribal energy policy and supports other tribal objectives, and increased employment for tribal members in a skilled work force.

The development process of renewable energy as an energy source is based on criteria that examine the viable production possibilities of renewable energy as it relates to the needs, wants, and available resources of the individual community(s) considering renewable energy as an energy source.

The type of system refers to the physical size of the system and its' energy production capacity. There are three types of systems available for the respective accessible resources and energy demands. The different systems can be generalized as small or site specific, medium or village sized, and large or utility scale. Small/site specific energy systems are designed to accommodate the energy needs of a small number of houses or buildings, generally those that are not already connected to the grid. Communities larger than a few houses will however be in the market for an energy supplier larger than residential sized systems. Large systems are generally the most cost efficient because after the implementation of the system the production rate and capacity of these systems is vastly larger than small or village sized systems. Enough energy is generally produced to both satisfy the energy demands of even the larger communities as well as excess energy to be sold on the market, which of course requires the community to be grid connected.

Communities already connected to the grid should also consider renewable energy as an alternative to their current imported energy supply. Many remote communities connected to the grid due to their subsequent locations in relation to their power source, experience blackout periods from any interruption or malfunction at any point in the power grid. Regardless of the electricity service quality and expenses, there are numerous economic development benefits to having an independently produced electricity supply which a medium or large sized system would supply.

After obtaining an understanding of the different types of renewable energy sources and systems that are available, it is necessary to assess what resources are available for the implementation of such an energy system that would efficiently process the resource into electrical energy. Renewable resources are generally used at their location, with the exception of biomass which can be shipped from its source to a use site, so they must be locally available and able to maintain the input level satisfying the energy needs of the community and the production level of the system implemented to do so.

To indicate the resources that are locally present, resource maps such as those provided by the DOE, are available for different states. The energy assessment of these maps is done at a

large scale so they can only give an estimate of the resources available in a general area, however they do indicate which resources are most prevalent in a certain area which is the first step to determining the best and most viable resource for any given area.

Given the variant nature of renewable energy and renewable energy systems, there is no general method for selecting a site location. There are many different conditions and variables ranging from geographical to social and cultural issues that may or may not factor into a tribe's decision depending on the relevance of these conditions and variables to the specific profile of each tribe. It is a case by case evaluation, but there are some factors that all tribes will need to consider. The site chosen for energy production must be proximal to the location of consumption or connection costs could devastate the budget of the project making renewable energy no longer feasible.

In the future, it is likely that tribes may add electrical generation capacity, especially as they move toward energy independence and as they consider sale of electricity on the deregulated electrical power market. There are two basic scenarios for tribes interested in, or actively involved in, electricity generation:

1) Electricity generation for tribal use.
2) Electricity generation for sale on the competitive electric market.

Tribes seeking to add electricity generation for tribal use or to achieve energy independence (with or without existing generating capacity) will likely want to assess their electrical energy consumption. For tribes seeking to sell electricity on the open market, internal consumption data is not as important as information about the electricity market and how to participate n the generation and sale of electricity. This will require economic and resource planning, and possibly interaction with agencies such as the Federal Energy Regulatory Committee (FERC), the U.S. Department of Energy (DOE), the Council of Energy Resource Tribes (CERT), and State Corporation (or Utility) Commissions. Regardless of the motivation for adding electrical generation capacity, information about the projected generating capacity and production by the tribe will be needed in the Tribal Energy Plan.

Electrification

Tribes need to determine whether they might have a possible electrification problem – tribal leaders are likely to know this without any research. If so, the Tribal Energy Plan needs to include electrification in the plan. Once it is determined that a tribe has electrification problems, an initial estimate is determined, and then it is necessary to determine the locations of the target households. This will be a much more difficult task depending on the dispersal patterns of the population. Modern Geographic Information Systems (GIS) may facilitate the location process. Once the target households begin to emerge from the mapping process, the transmission lines should be overlaid onto the maps. Estimates should be made as to when it might be reasonable to connect households to the existing grid. Those households located in proximity to the existing lines[11] should be pooled in a "grid connected potential" category. The remaining households should be analyzed with respect to the type of electrification possibility. Advances in the various technologies of electricity provision are moving quickly. Two types of systems are becoming more and more available at lower costs. These are clustered or "village-based" systems and stand alone systems. For households that are neither clustered nor within the swaths of connectivity,

[11] Analysis of the existing lines should be conducted to ensure they are capable of carrying the added load. If the lines are not, then additional analysis will be necessary to address the financial requirements for upgrading the lines.

stand alone systems are the only likely manner of electrification. Based on the initial resource assessment, various types of systems should be investigated. Small solar, wind and biomass systems are becoming increasingly available for these types of situation.

The electrification program will necessitate an extensive education program. Households slotted for the program will have many questions and concerns. Repeated workshops, possibly bilingual, will have to occur.

Depending on the number of households in question, an electrification program is likely to be very expensive. A single stand alone system was estimated to cost between $7,200 and $12,400 for the equipment alone – without installation costs or profits to the installation business. Given the financial conditions of most tribal governments and most targeted households, it is unlikely that the requisite funds are readily available. Thus additional funding sources probably need to be identified.

Implementation

Once an energy plan has been decided upon, the final step is the actual implementation of the project. Before any project can be finalized the funding source needs to be identified along with a time-line and schedule for the project.

The key to any project is to identify an available and reliable funding source. Although most energy-efficient measures will result in cost savings over time, it can be difficult to come up with the initial finances for the project. Several methods can be used to identify or establish a funding source. These methods include finance and technical support, a revolving fund, utility and state rebate programs, and grant programs.

Once a funding source has been identified, a projected time frame needs to be created. Research on similar previous energy projects can help determine how long the actual project will take to complete. The builders, contractors, and employees who will be hired to implement the program will also help in determining how long the project will take to complete. Once an estimated length is established, a time line with a specific beginning date and projected ending date needs to be specified. With a time line, a schedule of production can be created. A schedule detailing when each portion of the project is to start and be completed can help in the efficiency of the execution of an energy project. A schedule and time line cannot work towards efficiency without management. Management of the schedule will ensure that each portion is completed when scheduled, and if any delays are imminent, then each of the following portions are also delayed accordingly so there is no wasted efforts. For a wind turbine to be built, the base and trunk needs to be in place before the blades can be secured on top. But, if there is no management of the schedule, if the base is delayed for some reason, and workers come when scheduled to install the blades, then extra time and resources are wasted. Schedule management will ensure that the project is implemented in the most cost and time efficient manor.

The final step in creating an energy plan is implementation. The actual hire of an energy manager and purchase of goods and services is the final stride in actualizing the projected project. Once these are in place, the projected project will become a working energy plan.

Once the energy project has been implemented, reassessment and evaluation of the project needs to be an ongoing project. Every quarter, year, or specific time period the energy project needs to be reexamined. The aspects in which the project has been a success for the tribe needs to be examined along with any improvements that can be made to make the project more efficient. The reassessment and evaluation needs to be ongoing and mirror the project during every time period. In essence, the evaluation will change every time period to reflect the project over the last time period. Hopefully, the reassessment and evaluation will show more successes

and fewer improvements over time. Never will a project be perfect, so the reassessment and evaluation stage needs to continue to ensure the most cost and time efficient energy plan.

The Hualapai Workshop: A Narrative

Once the energy planning template was developed (Acker and Smith, 2005) it became obvious that tribes would need support in developing their energy plans. Thus it was decided to create an energy planning workshop curriculum. SES research assistants culled through the template described above and created an "all day" workshop. A more condensed version of the curriculum has also been developed for a 90 minute formal presentation followed by 30 minutes of discussion.

The longer workshop allows for good interaction between the SES staff and the participants from the tribe. An example of this occurred at the initial workshop in April 2005. Councilman Waylon Honga and Planning Director Jack Ehrhardt of the Hualapai Tribe invited the team to provide a workshop for the Hualapai Tribe in Peach Springs, Arizona.[12]

The drive from Flagstaff to Peach Springs includes a severe elevation decrease down from 7,000 feet (2,300 meters), which normally allows for some wonderful vistas of the high desert. However, this day was particularly hazy, which leant to a good discussion of the importance of the work being completed by the team.

Upon arrival in Peach Springs, the workshop began with a discussion of electricity production and air quality. The poor air quality that day made for a very good example of how electricity production influences air quality. Peach Springs is very rural and distant from any sizable population base, but is roughly 100 miles from the Ft. Mohave Generating Station, which is a coal fired production site. The normally wonderful vistas of the high desert and the mesas surround Peach Springs were particularly hazy this day. Since the northern border of the Hualapai Reservation is the Grand Canyon, the source of the haze was probably those sources identifies by the Transport Commission.

Research Assistant Megan Trout was presenting the material on the case studies included in the template.[13] The first case study concerns upgrading the Yurok Tribe's Headstart building with efficient florescent light bulbs. One of the Hualapai participants asked what the difference was. It just so happened that the florescent lights in the council chamber, where the meeting was taking place, were unshielded and it was obvious that some new efficient replacement bulbs has been used burned out bulbs, because there were different bulbs literally side by side. This led to an interesting discussion about the possible savings and the quality of light emitted from each type of the bulb. (The efficient bulbs also appeared to provide better lighting.) Thus the first energy efficiency project was identified: replace the older bulbs with cost saving bulbs by the end of the month.

Ms. Trout then presented the case study of the Pasqua Yaqui Tribe's new Headstart building, which concerns installing motion sensors on the light switches in the classrooms. After a break, Jim Arwood (Solar/Rebuild America Coordinator, Energy Office, Arizona Department of Commerce) introduced the idea of placing motion sensors in the restrooms in the tribal administration building. Some quick calculations were done and it was determined that this second energy efficiency project was worth investigating.

[12] At this point in the process the Arizona Department of Commerce began supporting the project.

[13] See Acker, Auberle, Eastwood et al. (2004a) and Acker, Auberle, Eastwood et al. (2005) for a formal presentation of the case studies.

Following lunch, research assistant Will Lankford presented the background on renewable energy development. This led to a discussion of the ongoing plans for solar development and wind resource testing, which led to a further discussion of transmission agreements and the like.

Most importantly, the workshop is designed to begin a conversation among the council members and between them and various community members and program managers.

Conclusions

This article has described the tribal Energy Planning Template as designed by the Sustainable Energy Solutions team. It has also shown how the template workshop can be used to begin the conversation within communities. The WRAP reports strongly recommended that each of the 237 tribes within the region complete an energy plan. The template and workshop curriculum have been designed to aid tribes in this development.

Although the driving force behind the WRAP recommendations was improved air quality, at Peach Springs and elsewhere, tribes should begin the process of energy planning due to the following issues:

- Economic Development
    - Cost savings
    - Revenue generation
    - Job creation
    - Profit creation
- Increasing Tribal Sovereignty
    - Energy Independence
- Cultural Integrity.

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