A FINAL REPORT ON FINDINGS AND RECOMMENDATIONS FOR PROPOSED ENERGY EFFICIENCY PROJECTS

OHKAY OWINGEH

NEW MEXICO

ENERGY EFFICIENCY AUDIT
OF
TRIBAL FACILITIES AND RESIDENCES

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Part I General Information

BACKGROUND AND GENERAL COMMENTS

The Council of Energy Resource Tribes (CERT), a Membership Organization created by 57 Tribes in the United States and Canada, was created to support member Tribes as they develop their management capabilities and use their energy resources as the foundation for building stable, diversified self-governing economies (according to each Tribe's own values and priorities). Since its inception in 1975 CERT's Board of Directors, comprised of the duly elected or appointed Tribal leaders from each member Tribes, have dramatically restructured the Indian relationship with the federal government regarding mineral development on Indian lands. From the beginning, CERT member Tribes maintained control of their natural resources, participating in all aspects of management: negotiating agreements, protecting the environment, asserting the value of the Tribal natural and energy resource and other ecosystem resources, and verifying revenue payments. CERT has enjoyed significant success over the last thirty years in Tribal energy development. CERT assists Tribes to develop comprehensive Tribal energy visions, including plans for strategy and implementation reflective of unique Tribal values and resources. CERT assists Tribes with essential services in strategic planning including resource assessment, feasibility study, and business planning. In today's environment of volatile energy costs such work is a critical issue not only for Indian Nations but in fact for countries and people worldwide. In December, 2005, for example, the Jemez Electrical Coop, serving Ohkay Owingeh, announced a 41% increase in the cost of electricity per kilowatt hour.

It is in this context that CERT has undertaken a strong and varied program to determine the level of energy efficiency in a variety of different types of facilities in the many different Tribal lands. CERT asked Current-C Energy Systems, Inc. (Current-C) to work with CERT personnel and interns to assess the energy usage in several types of facilities at Ohkay Owingeh in New Mexico.

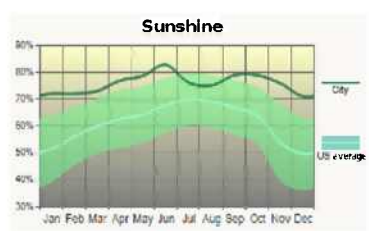
CERT has developed this report in a way that can also serve as the basis for future energy audits at other Tribes. The team appreciates the willingness of the many people at Ohkay Owingeh to help in constructing this report, and for their interest and help in its preparation. It is important to note that this audit, in common with all done by CERT, is conducted in the context of the community or organization for which the study in done.

Ohkay Owingeh was until recently known as San Juan Pueblo, a name dating to the early days of Spanish occupation when it was called "San Juan de los Caballeros". Under the leadership of the 2005-2006 Council a decision was made to officially designate the community as Ohkay Owingeh, "place of the strong people", a name used locally since at least the 13th Century. The Tribal Governor cited self-determination and a way of life that has persisted for centuries in his announcement of the change. This pride and sense of both place and people characterizes the community in ways both overt and subtle.

Ohkay Owingeh was the home of Popay, leader of the first successful resistance to a foreign occupying power in North America, and it remains a leading member of the Eight Northern Pueblos community. The headquarters for the Northern Pueblos is still located in Ohkay Owingeh today. History and the traditions of the community remain a driving force in decision making, and in recent years the Pueblo has undertaken a number of initiatives that can be characterized as they were by one Tribal official, as representing "modern living with a traditional touch". That phrase is important in the way it sums up many of the goals of the community.

Any set of recommendations should take into account a number of variables including tradition, the environment in which the community is located, and the goals of the community itself. Ohkay Owingeh has set itself on the path to creation of a community at once forward looking and respectful of its own past. In 2000 the Pueblo adopted a community planning process and in 2001 produced the first version of its Community Master Plan. This plan, the first Smart Growth model for North American Tribes, has a number of elements that might impact decisions on recommendations in this report.

The Master Plan calls for a "Main Street" approach to develop a walkable community along with design guidelines that preserve the architectural heritage of the Pueblo and foster a distinctive sense of place. Such guidelines, and importantly the intent that underlies them, will inevitably have an impact on implementing recommendations for enhancing energy efficiency. They are also "resource smart" because of the inherent advantages of adobe style construction in insulation, thermal mass, and adaptation to the local climate. Observations made in this report regarding the two residences evaluated confirm that notion, with the adobe home being far better insulated and impacted less by infiltration of outside air than the more modern HUD home. One recommendation might be to consider future construction using a traditional style of building as a matter of preference for historical, aesthetic, and energy usage reasons.



A second variable that must be taken into account in any set of recommendations is the physical environment of the area. Ohkay Owingeh is located in Northern New Mexico between the cities of Santa Fe and Taos. This is an arid region with both hot summers and cold winters and a very high percentage of days with abundant sunshine[1]. The style of architecture that evolved over time takes that climate into account, and future development can usefully be modeled on lessons learned over the centuries.

As renewable energy use is considered the environment will also play a role in decision making. The use of solar energy, both in passive design and active solar applications, is one obvious choice. Indeed the Pueblo has long recognized this fact. With assistance from the Advanced Energy Technology Center at Sandia National Laboratories the Pueblo is experimenting with the use of solar powered food drying facilities and a large solar powered oven. Use of a solar dehydration facility is intended to take advantage of

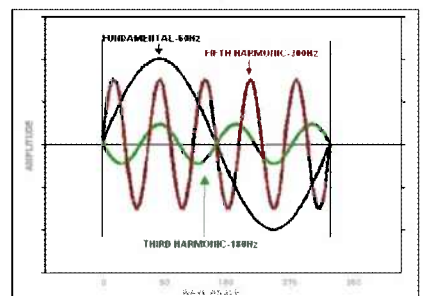
[1] See Appendix C of this report for Weather Charts applicable to Ohkay Owingeh

the market attraction of dried foods on a commercial scale and is one example among many of the use of new energy technologies as a tool of community and economic development. The natural environment at Ohkay Owingeh will also be a factor as recommendations in such areas roof and insulation materials, technologies used in HVAC systems, and other areas are considered.

The adobe-blocks (measuring 12" x 4" x 4- 10") weigh 25 pounds and are dry-stacked without mortar.

Building type is also a consideration, especially given the widespread use of adobe construction. Adobe buildings are by their nature well insulated, possess considerable solar mass and are typically quite "tight", aiding in the prevention of infiltration of outside air. Over time dry stacked brick with joint mortaring develops a natural seal as shown in the cutaway illustration at left. When the structure is properly protected from moisture it can last almost indefinitely.

Other factors in reviewing the audit are the special features of several of the facilities examined. The largest facility examined by the team was the Ohkay Casino Resort operated by the Pueblo's commercial ventures arm, the Tsay Corporation (a separate report covers the Casino). Casinos are by their very nature consumers of power and other resources at considerable levels, and the Ohkay Casino is no exception to that rule. The annual utility bill for the Casino alone is $375,000 at present rates, and while exact future cost projections are difficult it is clear that the cost of both electricity and natural gas is trending upwards. Moreover casinos are locations where large numbers of computerized machines are in use for extended periods and almost universally such facilities are subject to power quality issues arising from harmonics imbalances and variable loads.



Harmonics Interference

Some otherwise routine recommendations are, however, inappropriate in the case of casinos. The entertainment and hospitality industries are impacted very heavily by perceptions among their clientele. Lighting levels, signage, and the kinds of equipment used all play a part in creating those perceptions and must be considered from both an energy efficiency standpoint and from that of the customer. The casino parking lot, for example, is lit by forty 1000 watt metal halide lamps on 50ft poles. These lights consume considerable electricity, but eliminating them altogether is not a recommendation that makes sense in light of the demands for security and a sense of security among patrons of the casino.

The report that follows this introductory section reports on findings and recommendations of the team in some detail. This report also contains appendixes with