

**CBA · NAU** **Recommendations for Reducing  
Energy Consumption and  
Improving Air Quality through  
Energy Efficiency in Indian Country**

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## **Recommendations for Reducing Energy Consumption and Improving Air Quality through Energy Efficiency in Indian Country**

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### **INTRODUCTION**

Energy efficiency is maximizing the effective utilization of energy while minimizing the costs of that energy. Implementation of energy efficiency (EE) programs by a tribe can have many positive impacts. These include the reduction of energy costs and the associated freeing of significant financial resources for other important uses, improving electrical service, increased energy independence, improved air quality, reduction in environmental impacts, and others. Foremost amongst these benefits may be the potential for reduced energy costs. By employing EE measures, it is easily possible to save 10 percent on energy costs and the potential exists to save in excess of 50 percent. Thus, if a tribe spends \$100,000 annually on energy, it can expect a minimum energy cost savings of \$10,000 annually, and perhaps significantly more. In 1997, U.S. Indian households spent \$757 million on energy supplies. Thus if only 10 percent of that cost were eliminated via EE, then \$76 million would be available for other purposes on Indian lands instead of energy. The magnitude of these savings will increase significantly if other energy end-uses such as commercial and government entities are included. Furthermore, EE can go hand-in-hand with new electrification, providing a cost-effective means to decrease operating costs while improving the performance of newly electrified homes and other buildings.

Energy-efficiency programs have a large potential to reduce costs to tribal governments and reservation residents. Some 10 percent of Indian households spend at least 20% of their income on electricity, so cost savings can be very important to these households. Additionally, many tribal buildings are rather old and were not built according to energy-efficient building codes or with any focus on energy usage. Because of this, energy efficiency programs for administrative and school buildings may lead to substantial savings.

### **THE WESTERN REGIONAL AIR PARTNERSHIP – MOTIVATION FOR THIS PROJECT**

The Clean Air Act establishes a national goal of restoring visibility in National Parks and Wilderness Areas to “natural” conditions by reducing levels of man-made air pollution that affect visibility over the next six decades. One of the strategies identified to reduce these pollutants is through pollution prevention. The Western Regional Air Partnership, through its Pollution Prevention Forum, has commissioned a series of studies to assess how pollution from fossil-fueled powered power plants may be reduced through alternative electricity generation strategies (e.g., renewable energy resources such as wind energy, solar energy, etc.) and through increased energy efficiency. One of these studies resulted in the report “Recommendations of the Western Regional Air Partnership’s Air Pollution Prevention Forum to Increase the Generation of Electricity from Renewable Resources on Native American Lands.” This report was released earlier and is a companion to this paper. The present paper focuses on how tribes can employ energy efficiency to reduce the pollution generated during electricity generation.<sup>1</sup>

#### **Air Pollution Prevention Forum**

The charge of the AP2 Forum is, in part, “to examine barriers to use of renewable energy and energy efficient technologies, identify actions to overcome such barriers, and recommend potential renewable energy and energy efficiency programs and policies that could result in a reduction of air emissions from energy reduction and energy end-use sectors in the Grand Canyon Visibility Transport Region.” Membership in the forum is representative of the membership in WRAP, plus representatives from a wide range of interests. See the forum Web site at [www.wrapair.org](http://www.wrapair.org).

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<sup>1</sup> For more details on the WRAP and the RHR see either of the AP2 reports listed in the reference list.

The initial focus of the forum was to explore the potential for increased utilization of renewable energy sources, followed by an examination of potential areas for improvement in energy efficiency. In both contexts, renewable energy and energy efficiency, the primary focus is electricity supply and demand. More specifically the AP2 Forum has been asked by the WRAP “to identify and recommend legislative actions, economic incentives and regulatory policies that states and tribes can adopt to increase use of renewable energy and energy efficiency and reduce haze causing emissions in the region.”

### **Tribal Governments**

With the development of the Western Regional Air Partnership in 1997, tribal governments were recognized as full partners in the development of strategies to address the problem of regional haze in the West. This role was not achieved quickly or easily. A brief examination of key steps to full partnership follows:

The major federal air pollution statutes of 1963, 1967, 1970, and 1977 were largely silent on the roles and responsibilities of tribal governments in the federal scheme of implementing these laws. However, much attention was given to federal and state relationships. Air-quality management on tribal lands was assumed by state governments, the federal EPA, or more commonly, not at all! This oversight of failing to include tribes became increasingly apparent and problematic as various air-quality concerns were recognized as being common over large regions of the nation, including tribal lands. With the Clean Air Act Amendments of 1990 Congress added three new provisions: (1) The EPA Administrator was authorized to treat tribes as states for the purpose of implementing the Act, (2) The eligibility criteria for tribes to obtain such treatment were defined, and (3) The EPA administrator was directed to promulgate regulations laying out those provisions of the Act for which it is appropriate to treat tribes as states.

More than 7 years later, in February of 1998, the EPA administrator promulgated regulations to establish the basic framework authorizing eligible tribal governments to implement Clean Air Act programs. These regulations have become known as the “tribal authority rule” (TAR) and are codified at 40 CFR Part 49. The following key provisions of this rule are particularly relevant to the WRAP and to potential energy efficiency opportunities.

- (1) Eligible tribes may implement Clean Air Act programs to protect air resources “within the exterior boundaries of the reservation or other areas within the tribe’s jurisdiction.” Such tribes thus have authority to regulate all sources of air pollution within the exterior boundaries of the reservation, including those on non-Indian owned fee land within the reservation.
- (2) Tribes have a great deal of flexibility when developing their air-quality management programs. The Act does not require any action on the part of tribes, unlike state governments, to implement any provision of that law. To encourage tribes to develop air-quality management programs, however, the TAR authorizes a modular approach to tribal programs; that is, tribes can build their technical and management capacity at the same time they begin to address concerns specific to their priorities. This modular approach provides several opportunities:
  - Tribes can pick and choose among Clean Air Act provisions to craft a program that addresses the tribe’s specific air-quality concerns.
  - The EPA can approve these modular programs provided that they do not depend on any other program element for enforceability.
  - To encourage tribes to develop air quality management programs, grants are available from the EPA pursuant to Sections 103 and 105 of the Clean Air Act.

### **REGIONAL HAZE RULE**

In 1999 the EPA administrator promulgated the regional haze rule (RHR), codified at 40 CFR Part 51.300–309. The RHR has provisions that apply to all states and tribes in the United States. One specific provision of the RHR embraces the recommendations of the Grand Canyon Visibility Transport Commission (GCVTC) and offers western states and tribes options for complying with RHR requirements. States must develop regional haze implementation plans (SIPs), but can choose between the general federal requirements (Section 308) or the specific elements of the GCVTC (Section 309). The RHR sets forth specific timelines for these State Implementation Plans.

The requirements of the RHR are among the air-quality program elements that can be implemented by tribal governments. Under the Clean Air Act, tribes eligible to implement Section 309 (GCVTC) plans are those located in the states of Arizona, California, Colorado, Idaho, Nevada, New Mexico, Oregon, Utah, and Wyoming.

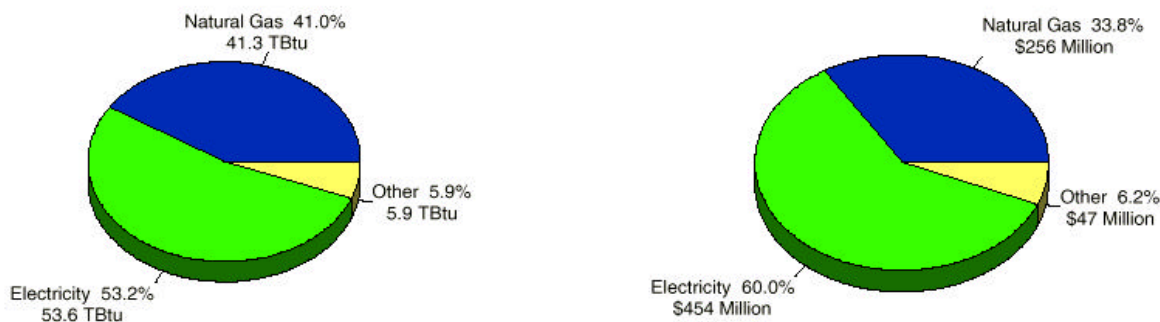
These tribes may seek approval from the EPA to implement the RHR through Tribal Implementation Plans (TIPs). The deadlines imposed on states do not apply to tribes, but tribes may choose, and are encouraged, to implement programs. Thus tribes may elect to develop regional haze programs pursuant to either Section 308 or 309 of the RHR. For any tribal lands where the tribal government elects not to take on this responsibility, the EPA must assure air-quality protection. Regional haze program requirements on some tribal lands may therefore be implemented via Federal Implementation Plans (FIPs).

Energy-efficiency measures are specifically recognized in Section 309 of the RHR. Economic costs and benefits—both direct and indirect—are to be identified and described. This report fulfills, in part, that requirement with respect to tribal lands, governments and programs in the region.

### POTENTIAL COST SAVINGS IMPACT OF ENERGY EFFICIENCY

#### Tribal Household Electricity Use

Energy efficiency has the potential to significantly impact electricity consumption and related electricity costs. Considering that \$454 million was spent on electricity (not all energy sources) in all Indian households in the United States in 1997 (see Figure 1), 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. If consumption of other energy resources besides electricity are considered for EE improvements, such as natural gas, the potential for savings could double (see Figure 1; electricity accounts for about half of the money spent on energy resources).



Source: Energy Information Administration, 1997 Residential Energy Consumption Survey.

**Figure 1** – 1997 data on energy consumption and expenditures for major energy sources in Indian households in the United States. The chart on the left indicates energy consumed by source (electricity, natural gas, and other) and the chart on the right indicates the percentage and amount of money spent in consuming each of these energy sources (Energy Information Administration 2000).

A report by Elliott (1998), “Lowering Energy Bills in American Indian Households: A Case Study of the Rosebud Sioux Tribe,” supports these findings. Elliott showed that Native American households generally carry a substantial burden in household energy bills. For the case of the Rosebud Sioux, EE measures were shown to offer the potential for savings on the order of 25 percent (e.g., retrofitting exterior lights with compact fluorescent bulbs, installing low-flow showerheads, using a water-heater insulation blanket, switching to a higher efficiency refrigerator, etc.), and some measures offered potential savings on the order of 65 percent (e.g., comprehensive weatherization using advanced techniques, and fuel switching space- and water- heating systems from electric to propane).

## **BENEFITS OF ENERGY EFFICIENCY**

### **Benefits of a Tribal Energy Authority**

Perhaps the most important recommendation in this report is that of designing a tribal energy plan that is coordinated by an energy manager within a Tribal Energy Authority. When the electricity provider is someone other than a tribal entity, the energy authority will be an advocate for tribal electricity customers. This liaison capacity may be used, for example, to create rebate programs to decommission older appliances. Or the energy manager can negotiate with off-reservation power producers to improve reliability; in some cases, reservation power lines are at the end of the electrical grid, which can result in unreliable delivery. If the tribal energy authority has the ability to negotiate for all customers as a block, then a better resolution may be arranged. The energy authority can make decisions and implement plans that lead to a future based on the tribe's vision. And it follows that a tribal energy authority will also create jobs. Some tribes may be too small to fund a fully operational energy authority; in these cases it may be beneficial to form a consortium of tribes to create a single such entity. Each tribe would design an individual action plan, but they would share personnel and capital resources.

### **Economic Benefits of Energy Efficiency**

The primary benefit of improvements in energy efficiency is, of course, the cost savings. Often a moderate expenditure today will result in substantial future savings. Indeed, after an energy management program is initiated, energy cost savings up to 15 percent can be easily realized with little capital investment. Eventually, savings on the order of 30 percent are routinely obtained, and sometimes savings of as high as 50 to 70 percent can be achieved (Capehart et al. 1997). These savings free financial resources for better use elsewhere, often regardless of the sector that implements the efficiency improvement. A few examples may help to illustrate this general concept: A family may choose to insulate their home to permanently reduce the heating or cooling cost; money is spent the first year, but money is saved every year afterward. The money saved can be applied to whatever that family perceives as its next greatest need. A business may, for example, install new light fixtures that provide the same illumination benefits at a lower cost. There is an initial outlay of cash, but then these reduced costs last for the lifetime of the new fixtures, raising the incomes of the business and perhaps its employees. A governmental entity may have similar opportunities to implement efficiency measures. Such measures will free budgetary resources, allowing that entity to better accomplish its mission.

In addition to decreasing the energy-related costs in a household, business, or government office, efficiency improvements 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. Jobs are created 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.

Money saved through efficiency improvements will eventually be spent on other goods and services, some of which are available on the reservation. A family with lower utility bills may now spend more on *locally* produced services such as dining, entertainment, daycare, or preventive medical care. As activity in these sectors increases, employment and incomes will increase as well. As this additional income is spent, it circulates throughout the economy, further increasing employment and incomes through a phenomenon known as the *multiplier effect*. Not all money saved through EE returns to the local economy, but will continue to flow off the reservation through the purchase of *non-local* goods and services, such as when purchasing new appliances. There are also indirect economic benefits of EE programs. However, these are more difficult to calculate, in part because spending of the cost savings is reallocated among sectors.

Energy-efficiency programs have a large potential to reduce costs to tribal governments and reservation residents. According to a report by the Energy Information Administration some 10 percent of Indian households spend at least 20% of their income on electricity, so cost savings can be very important to these households (Energy Information Administration, 2000). Half of the Indian reservations paying the highest electricity prices are in the WRAP region. (Energy Information Administration, 2000, pg. 10) Additionally, many tribal buildings are rather old and were not built according to energy-efficient building codes or with any focus on energy usage. Instead, federal funds were used to provide least-cost structures. Because of this, weatherization (energy efficiency) programs for administrative and school buildings may lead to substantial savings.

### **Secondary Benefits of Energy Efficiency**

Several secondary benefits may accompany EE improvements. First and possibly foremost, energy conservation can contribute to energy independence and improved tribal sovereignty. The money saved may also allow a tribe to address other pressing needs, such as improved health care on the reservation. EE measures also frequently improve the performance and longevity of existing energy systems, which can improve the comfort of working and living spaces and may increase productivity of workers. Benefits such as these may be difficult to quantify but are certainly worth considering.

### **Electrical System Reliability and Avoiding Power Outages**

Improved EE can also help curtail brownouts 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 WRAP region to meet peak demand is at risk. The ability to meet the demand for electricity in this region will likely depend largely on weather (i.e., its effect on electricity demand through heating and cooling) and hydroelectric conditions (i.e., the availability of hydroelectricity as related to reservoir levels and the higher priority functions of the reservoirs such as irrigation and flood control). Thus possibly the most effective means of avoiding brownouts and service interruptions may be to manage the demand side of the market place. This could include initiating demand-side management programs that encourage energy efficiency, or possibly even altering the electricity rate schedule so that consumers pay real-time prices for electricity (higher cost during the mid-day and afternoon when the demand for electricity is highest, and lower cost in the evenings and through the night).

### **Benefits of EE in New Electrification**

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. Furthermore, eight of the twelve tribes with the greatest need (by percentage of households) for electrification are located in the WRAP region (Energy Information Administration 2000, pgs. xi, xiv). It is estimated that 18,000 homes on the Navajo Reservation do not have electricity available (Bain et al. 2002). 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 constructed. This combination of existing need and expected growth makes the need for energy-efficient designs ever more important. Efficiency can be improved at many points along the electricity production-consumption pathway. Some ideas include improved technology in the development of new electricity production sites, improved electrical transmission and distribution systems, the siting of buildings in clusters to reduce transmission distances, and the adoption of energy-efficient building codes.

### **Economic Development Benefits**

Many tribes face two major needs: employment and economic development. Perhaps tribal economic development could avoid the conventional model where pure profits are the main consideration. Although profits must still be a consideration, culture and traditions could also play an operative role in blending successful commerce with traditional lifeways. Economic security can help lead to cultural self-preservation. Energy efficiency is an ideal way to help achieve such security because it does not depend solely on scarce resources in danger of being depleted. Instead it can help protect them for future generations. Becoming more energy efficient can lead not only to direct opportunities for people in education and employment through its economic benefits, but also to a myriad of secondary reservation-based opportunities. This can all be done in a way that does not detract from the culture, but rather helps to preserve it. Economic development occurs when diverse activities and businesses are given the opportunity to prosper and flourish within a stable political background. Such development is a process that weaves through the social system; it can assist sustaining tribal character.

Jacobs (2000, pg. 19) has noted that "Development ... operates as a web of interdependent co-developments." EE programs can enhance such co-developments, which incorporate multiple members of the community and bring vital improvements to its economic structure. According to a study done on the Navajo Reservation (Yazzie 1989), approximately 87 cents of each dollar earned was spent off the reservation in border towns, where goods and services were purchased. As the economic development process continues and a more diverse selection of goods and services is offered on the reservation, people will spend more money on the reservation rather than in border towns. The term for this is *import replacement*, and it is a vital part of the economic development process. Although major efforts have been made to increase retail opportunities on reservations in the last decade, additional expansion can be stimulated by providing affordable renewable energy and by encouraging

the creative and entrepreneurial spirit of community members. By introducing energy efficiency programs to the reservation, the tribe will be refueling itself.

In order to replace imports with domestically produced goods and services, the whole reservation economy must participate in development, which spreads work opportunities throughout the community. The goal is to seek diversification rather than mere expansion of existing goods and services. When energy efficiency is realized, the cost of doing business is lowered, and the economic landscape will become correspondingly more fertile, producing business opportunities such as sales of more efficient appliances, light fixtures, bulbs, and accessories. Combining the energy efficiency programs with a program for increased electrification creates a potential for both retail and manufacturing expansion. There will be a new found need for items like refrigerators, fans, extension cords, and computers, which could be sold on the reservation. Leakage of money off the reservation will decrease, and the tribe will profit from increases in both reservation business activity and employment opportunities.

As the technicians working for the energy businesses begin to develop their skills installing and implementing the new, efficient systems, spontaneous entrepreneurial ideas could arise. Perhaps small components of the systems could be produced locally. Alternatively, new and better designs for components may result from the creativity of the tribe's entrepreneurs. Native American tribes could move ahead of the rest of the world by inventing specialized tools desired by the rest of the planet. This is Jacobs's (2000) "web of co-developments." There is no way of foretelling the future, but the strong entrepreneurial nature of the indigenous cultures almost assures development of new opportunities, products, and services.

Some of the benefits of implementing efficient energy programs on reservations will be social. The lack of jobs and insufficient income, two of the most pressing issues on reservations (Smith, 2000, pg. 95), tend to create a downward spiral in quality of life because people see no opportunity for improvement. The result is often substance abuse, domestic unrest, and attrition of people to places where jobs can be found. Those who seek highly specialized jobs tend to leave the reservation in search of such work; a brain drain takes away the most talented members of the population. However, appropriate economic development will likely ameliorate such social ills. The brain drain effect will decrease because there will be more opportunities for people to use their talents on the reservation. The experience of earning a steady income will give hope for improvement, as well as providing successful role models for others. This increase in activity will also likely reduce substance abuse. Individuals will begin to see opportunities to enrich their lives rather than feeling hopeless.

The energy business itself will bring immediate employment opportunities that will likely continue to exist into the future. 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. There is much to be gained by becoming experts in the art of energy efficiency, as the United States and other nations struggle to make more efficient use of fossil fuels. Tribes could be ahead of the game with their more comprehensive understanding of the systems and their uses. This is a perfect opportunity to turn the tide, to begin to export skills and services, and subsequently to import dollars.

### **Air Quality Benefits**

The basic idea advanced by the Grand Canyon Visibility Transport Commission (GCVTC) was that by reducing electricity consumption through EE, the amount of electricity required from central station power plants would be reduced. If the power plants that supply a tribe's electricity burn coal, then energy efficiency would result in less sulfur dioxide pollution emitted and a consequent reduction in haze (coal contains sulfur, and when the coal is burned some of the sulfur will combine with oxygen to produce sulfur dioxide, which is known to cause haze and reduce visibility). Lacking specific power plant information for tribal supplies, an estimate of the savings in sulfur dioxide emissions can be estimated from the average sulfur dioxide emissions for the state(s) within which the tribe is located (Table 1). Note this table presents the amount of sulfur dioxide produced per megawatt-hour (MWh) of energy produced. As an example, a typical power plant might have an electrical generating capacity of 1000 MW. If running at full capacity for one hour, the plant would produce 1000 MWh of electrical energy. Using Table 1, if the plant were located in Arizona, on average it would have emitted 344 lbs of sulfur dioxide into the atmosphere during that hour ( $1000 \text{ MWh} \times 0.344 \text{ lbs/MWh} = 344 \text{ lbs}$ ).

Other air pollutants are also emitted from power plants that burn hydrocarbons (such as coal and natural gas), and energy efficiency is a tool that can be used to reduce all types of air emissions. In particular, large amounts of carbon dioxide are created during combustion, and it is the primary greenhouse gas in global warming. Low levels of nitrogen oxides are also released during combustion, and these can lead to regional haze, photochemical smog and acid rain. Efficiency actions could be included in Tribal Implementation Plans as a way to reduce the emissions inventory baseline and as control measures for criteria pollutants (criteria pollutants are those which

impact air quality and should be addressed in an implementation plan). A longer-term potential justification for energy efficiency is its capability to reduce greenhouse gases (those pollutants that lead to global warming, such as carbon dioxide). Should greenhouse gas emission reductions be mandated, energy efficiency would likely be the most significant tool for achieving such reductions.

**Table 1** – Average sulfur dioxide emissions from power plants located in the 13-state WRAP region, reported in pounds of sulfur dioxide emitted per megawatt-hour of electricity produced (source: Energy Information Administration 2001).

<b><i>Sulfur Dioxide (lbs/MWh)</i></b>	
Alaska	0.344
Arizona	1.524
California	0.000
Colorado	4.352
Idaho	0.000
Montana	1.080
New Mexico	3.438
North Dakota	9.866
Oregon	0.494
South Dakota	4.358
Utah	1.522
Washington	1.246
Wyoming	3.896
<b>Mean</b>	<b>2.471</b>
<b>Standard Deviation</b>	<b>2.748</b>

**RECOMMENDATIONS OF THE WESTERN REGIONAL AIR PARTNERSHIP’S AIR POLLUTION PREVENTION FORUM**

Western tribes have the potential to implement and, in some cases, to lead innovative programs that improve energy efficiency. This research recognizes the great diversity of tribal lands in the region and the inherent need for tribal governments to selectively pursue energy-efficiency opportunities. For example, some tribes place a high priority on the need to provide basic reliable electric service to their residents and businesses; there are innovative opportunities for energy conservation measures in the design and development of these services. Other tribes fully served with reliable electricity may want to concentrate on improving the efficiency of electricity applications. Virtually every tribe may be interested in the economic benefits offered by energy-efficiency programs as well as the related social and cultural benefits. With potential cost savings on electricity expenditures (as well as other energy sources) on the order of 10 percent to 50 percent, energy-efficiency programs and policies could have a significant positive impact that extends beyond economics to tribal sovereignty, energy independence, and increased health care opportunities.

The following recommendations offer a broad selection of options from which tribes in the WRAP region and their many collaborators can choose according to their specific circumstances. The energy-efficiency recommendations are presented in three broad categories:

- Opportunities that can be implemented by individual tribes with little or no involvement by other external entities.
- Strategies for on-reservation programs that are best pursued in collaboration with others, including tribes, states, federal agencies, and energy providers.
- Initiatives for which tribes can support and lead programs to improve energy efficiency regionally and nationally.



## TRIBAL SPONSORED PROGRAMS

### **Development of an Energy Plan**

For tribes that do not have one, it is strongly 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. Establishing an energy plan is the first necessary step in gaining control over the energy use and costs incurred by a tribe. The plan can enhance tribal sovereignty and energy independence. 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 efficiency measures and programs it is generally best to begin by setting some goals, and then implement low-cost, highest-return projects first. The initial phase of developing an energy plan is to collect baseline data on current energy uses. The baseline data collection may require some additional metering to determine specific uses.

### **Tribal Energy Manager**

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. An energy manager within an energy authority can direct and manage energy programs including those related to energy efficiency. As such, the energy manager is a logical choice for assuming the responsibility of selecting, evaluating, and implementing appropriate EE programs for the tribe. The energy manager can also recommend policies for consideration by the tribal council. For tribes without an energy authority, an energy manager position can be created elsewhere within the tribal government.

### **Tribal Energy Authority**

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 in energy, and help retain some of the money expended on energy on 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.

### **Tribal Implementation Plan**

A Tribal Implementation Plan under the provisions of the Regional Haze Rule and the Tribal Authority Rule would commit the tribe to developing an energy plan and to employing energy efficiency as a method to reduce electricity consumption. Such a plan would be a good step toward tribal energy conservation.

### **Adopt Energy Efficient Building Codes**

As Native American tribes grow in population and develop economically, there will be an ever-growing need for electricity. As new buildings are constructed and older buildings are renovated, there is a great opportunity for energy savings by employing energy-efficiency methods. Tribes can adopt energy-efficient building codes such as the International Energy Conservation Code (IECC), and establish a plan to periodically “commission” buildings and ensure that the energy systems within a building are operating as they should be. It is also recommended that EE be integrated into housing plans, and that life cycle cost methods be used when evaluating the energy systems within buildings.

### **Electrification Expansions**

With new electrification comes the opportunity to implement EE. New customers in rural areas may spend a large fraction of their monthly income on energy, in some cases as much as 20 percent (Energy Information Administration 2000). In these cases it is critical that cost-effective, energy-efficient appliances and building materials be employed. Thus it is recommended that tribes consider integrating EE with plans for new electrification.

## **Education Programs**

Education can make the difference between an effective, successful, comprehensive energy management program and a fragmented program with little support. Educating tribal members, leaders, facility managers, staff members, contractors, and children in school about understanding energy usage and the benefits of conserving energy will build support for an energy program and will lead to significant savings in energy costs. Tribes, therefore, might consider initiating education programs about energy efficiency and energy conservation for all tribal users.

## **COLLABORATIVE OPPORTUNITIES FOR TRIBAL ENERGY CONSERVATION**

### **Intertribal Collaborations**

Many tribes may lack the size or resources to establish their own energy authority or even to hire their own energy manager. In these cases it may be beneficial to initiate partnerships with other tribes for that purpose. This could allow tribes to combine their electrical loads, and potentially allow for the possibility of a lower electricity rate to be negotiated with the energy service provider. Beyond this, tribes could work collaboratively to encourage the federal government, through its trust responsibility, to fund energy-efficiency programs (including education programs and rebate programs) and to provide funding to tribes for energy management. Each tribe within the consortium would develop an individual energy plan based on tribal specifics such as uses, culture and resources. Then, the common pool of resources employed by the consortium would be used on a cost sharing basis.

### **Federal Facilities**

There are numerous federal facilities on tribal lands, and these facilities consume an appreciable amount of electrical energy. Tribes could adopt energy conservation codes or policies that require federal facilities on tribal lands to meet modern energy-efficiency codes such as the IECC.

### **Federally Sponsored Programs**

There are numerous federally sponsored programs in which tribes may participate to implement energy efficiency. These programs include the Weatherization Assistance Programs (WAP) and the DOE Rebuild America Program. The forum recommends that tribes, as part of their overall energy plan, participate in existing federally sponsored programs related to energy efficiency such as the Rebuild America Program and the Weatherization Assistance Program. Tribes may also consider requesting funding for efficiency programs from the federal government via several existing statutes, most notably the Energy Policy Act of 1992 and its amendments. Tribal leaders and collaborators could formally request adequate appropriations from the U.S. Congress and appropriate agencies to implement the energy conservation and renewable energy development provisions of these laws. This should include funding of training programs for tribal energy professionals related to renewable energy and energy efficiency.

## **TRIBAL LEADERSHIP BEYOND TRIBAL LANDS**

### **Demand- Side Management Initiatives**

Demand-side management (DSM) programs run by electric utilities have been disappearing over the past several years with the advent of deregulation. However, effective DSM can yield direct financial benefits to a tribe in the form of energy cost savings. The forum recommends that tribes support DSM programs that encourage and reward efficient electricity users. Tribes can also show leadership in this area by supporting system benefit charges that will be used to fund such programs.

### **National Energy Efficiency Policies and Standards**

National energy efficiency policies and standards can potentially significantly impact regional air quality in addition to energy supply reliability, cost, availability, and security. The mitigation of haze throughout the West will depend upon all users of electricity and other energy forms that impact haze. Tribes can provide leadership through support of national policies promoting energy efficiency.

## CONCLUSIONS

The strongest recommendation stemming from the Air Pollution Prevention forum of the WRAP was for tribes to develop and implement energy plans. This paper has provided a discussion of the benefits of any such plan and itemized a variety of components of any said plan. In two companion papers, Acker et al. (2004 a and b), the authors have explored three specific energy efficiency programs on three reservations and detailed more specific implementation processes for energy plans. In the first case it was shown that efficiency projects are relatively easy to identify and in all cases proved to be cost efficient. In a forthcoming report the research team will be developing an energy plan ‘template’ for tribes to customize for their individual use.

## REFERENCES

- Acker, Thomas L., Auberle, William M., Eastwood, John D., LaRoche, David R., Ormond Amanda, Slack, Robert P. And Smith, Dean Howard, 2004a, "Economic Analysis of Energy Efficiency Measures: Tribal Case Studies with The Confederated Salish and Kootenai Tribes of the Flathead Reservation, The Pascua Yaqui Tribe, and The Yurok Tribe," College of Business Administration Working Paper Series, Northern Arizona University. ref. 04-02.
- Acker, Thomas L., Auberle, William M., Eastwood, John D., LaRoche, David R., Ormond Amanda, Slack, Robert P. And Smith, Dean Howard, 2004b, "Identification and Implementation of Potential Energy Efficiency Programs in Indian Country," College of Business Administration Working Paper Series, Northern Arizona University. ref. 04-03.
- Air Pollution Prevention Forum, "Recommendations Of The Air Pollution Prevention Forum To Increase The Generation Of Electricity From Renewable Resources On Native American Lands", 2002. [www.wrapair.org](http://www.wrapair.org)
- Air Pollution Prevention Forum, "Reducing Energy Consumption and Improving Air Quality through Energy Efficiency in Indian Country: Recommendations to Tribal Leaders from the Western Regional Air Partnership." 2003, [www.wrapair.com](http://www.wrapair.com)
- Bain, Craig, Ballentine, Crystal, DeSouza, Anil, Majure, Lisa, Smith, Dean Howard and Turek, Jill "Economic and Social Development Stemming from the Electrification of the Housing Stock on the Navajo Nation" College of Business Administration Working Paper Series, Northern Arizona University, 2002. ref. 02-34. [http://www.cba.nau.edu/faculty/workingpapers/pdf/Smith\\_electrif.pdf](http://www.cba.nau.edu/faculty/workingpapers/pdf/Smith_electrif.pdf)
- Capehart, B.L., Turner, W.C., and Kennedy, W.J. 1997. Guide to Energy Management, 2<sup>nd</sup> ed. Fairmont Press Inc., Lilburn, Georgia.
- Energy Information Administration. 2000. Energy Consumption and Renewable Energy Development Potential on Indian Lands. Office of Coal, Nuclear, Electric and Alternate Fuels, U.S. Department of Energy. April 2000 ([www.eia.doe.gov/cneaf/solar.renewables/page/pubs.html](http://www.eia.doe.gov/cneaf/solar.renewables/page/pubs.html)).
- Jacobs, J. 2000. The Nature of Economies. Modern Library, New York.
- Smith, D. H. 2000. Modern Tribal Development: Paths to Self-Sufficiency and Cultural Integrity in Indian Country. Altamira Press, Walnut Creek, California.
- Yazzie 1989. "Convenience Stores: The Third Wave of Navajo Retail Outlets", *Navajo Nation Economic Development Forum*, #1, November December.