# RENEWABLE ENERGY IN INDIAN COUNTRY

A CENTER FOR RESOURCE MANAGEMENT SYMPOSIUM

Mesa Verde National Park, Colorado
June 25 - 28, 1995

# DISCLAIMER

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# BACKGROUND

On June 25-27,1995, at Mesa Verde National Park in southwestern Colorado, the Center for Resource Management (CRM), organized and sponsored a conference in conjunction with the Navajo Nation, EPA, and Bechtel Group, Inc., to deal with issues associated with developing renewable energy resources on Indian lands. The goal was to bring a broad range of participants - from representatives of tribes from around the country, federal and state agencies, foundations, environmental groups, and renewable energy companies - together, in order to establish working relationships that would result in bringing renewable energy technologies and benefits to Indian Country on a level not previously seen.

American Indian lands have historically been exploited for their reserves of coal, uranium, oil, and natural gas. The development of these resources has helped meet the nation's growing demand for energy, while often ignoring the energy needs of the Native Americans living on these lands. Due to the remoteness of many reservation homes and the cost of traditional power line extensions, a large percentage of the Indian population is today without electricity or other energy services. In addition, while they continue to develop energy resources for "export," seeing only minimal gain in their own economies, Indian people are also subject to the health and environmental consequences associated with proximity to traditional energy resource development.

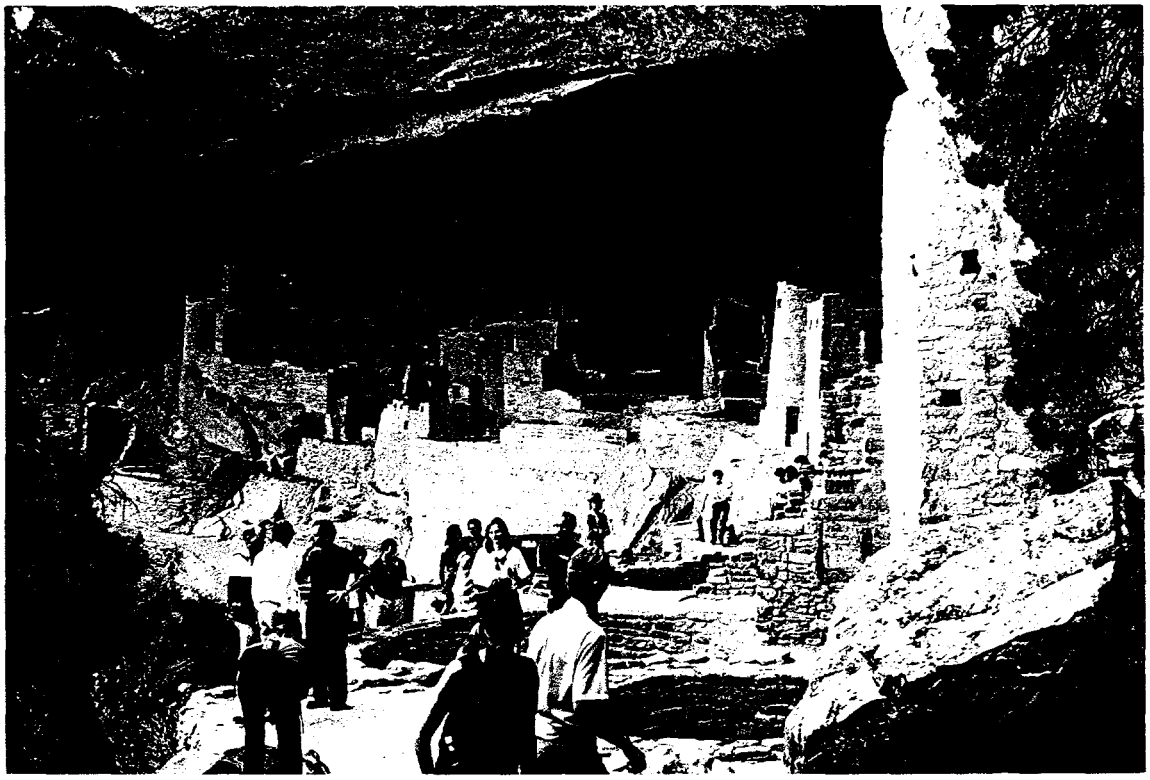
Renewable energy technologies, on the other hand, are often ideally suited to decentralized, low-density demand. These technologies - especially solar and wind power - have no adverse health impacts associated with generation, are relatively low cost, and can be used in applications as small as a single home, meeting power needs right at a site. Their minimal impact on the environment make them particularly compatible with American Indian philosophies and lifestyles. Unfortunately, the match between renewable energy and Indian tribes has been hampered by the lack of a comprehensive, coordinated effort to identify renewable energy resources located on Indian lands, to develop practical links between Indian people's needs and energy producers, and to provide the necessary training for tribal leaders and members to plan, implement, and maintain renewable energy systems.

## CONFERENCE PROCEEDINGS

On the Sunday evening preceding the conference opening, participants toured one of the many exceptional ruins at Mesa Verde - Long House on Wetherill Mesa. Followed by an informal reception, this opening activity gave conference participants a sense of the mystery, power, and beauty of this ancient home of Indian peoples. Considered a sacred site by many different tribes, Mesa Verde proved to be an important element of the meeting to take place over the following three days.

### NAVAJO NATION PRESIDENT, ALBERT HALE COMMENTS

President Hale observed that out of nearly 38,000 occupied Navajo homes on the Navajo Nation, nearly 18,000 (over half), were without electrical power. At the same time, there are four large scale coal mines on the Navajo Nation producing approximately 24 million tons of coal a year. There are six coal fired generating plants on or adjacent to the Nation. Of these, Black Mesa and Kayenta Mines alone supply energy to 3.5 million American consumers in the western United States.



## MONDAY, JUNE 26

Monday's discussions were opened with a brief description from each participant about their affiliation, and their interest in the conference. This was followed by welcoming remarks from Albert Hale, newly elected President of the Navajo Nation.

President Hale emphasized the need for the Navajo not to be depending solely on the exploitation of their non-renewable energy sources (although some 4.75 billion tons of coal reserves still exist on Navajo land). Noting a more complicated competitive environment, including drops in production, increased foreign competition from NAFTA,

deregulation, and minor projected increases in demand, Hale said, "With these facts, the Navajo Nation, as well as other Indian Nations who have similar energy predicaments, must seriously begin exploring use of our abundant renewable energy resources."

Some of this exploration has already begun. Hale noted that throughout the Navajo Nation, there are approximately 1200 homes with nominal photovoltaic lighting systems. There are approximately 937 functioning windmills currently dispersed throughout the Nation supplying water to homes, livestock and small garden plots. The Navajo Water Resources Department had installed 105 PV-powered water pumping units to date, and they intended to move ahead with this program.

Hale urged participants to do more to develop renewable energy resources and noted his intention to make renewable energy a major part of the Navajo Nation Energy Policy, to be presented to the Navajo Nation Council for endorsement. He added, "We cannot play the passive role of lessor and land owner. Developing our renewable energy resources will enable us to maintain and strengthen our sovereign status as Indian Nations because it will enhance energy self-sufficiency and less dependency on government. In addition, by utilizing our renewable energy we will, in the long term, contribute immensely to the conservation of our depleting non-renewable resources such as forests, woodlands, coal, oil and gas."

## Lessons From The Past Hopes For The Future

***Wainwright Velarde, Jicarilla Apache Tribe,*** spoke next about "lessons from the past, hopes for the future." He noted that revenues from oil and gas had been an important source of funding over the years for their tribal activities. Most of the revenue had been the result of leases with oil and gas companies. But the tribe hadn't been involved in negotiating the terms of these leases. It was the United States Geological Survey which held responsibility for regulating the oil and gas companies.

In 1980, the Jicarilla formed its own oil and gas company. Recently, it also developed its own Environmental Protection Office (which works with the United States EPA). And it developed a cultural resources office to protect sacred sites, culture and environment. Any proposal for use of Jicarilla land must involve both of these two agencies.

Wainwright noted that progress had been significant, but not complete. The tribe still lacked control over many of the key aspects of oil and gas development, including drainage, location of wells, zoning requirements, disposal permits, production rates, preparation of wells, injection well regulations and well testing requirements. The tribe also has a difficult relationship with the State of New Mexico in this area. They had just battled over double taxation - the tribes charge 7% on oil & gas, the state charges an additional 7% - making companies responsible for 14% tax on Jicarilla lands. They had managed to get a modification to this process through the legislature.

Their primary obstacle now was the lack of oil production data, and in-house engineering and technical capacity. Although they had been in the oil and gas business since 1947, and had trained many young people through the CERT program, the Jicarilla had yet to introduce a student into this area of expertise.

He concluded that millions had been spent over the years. There had been many booms and busts along the way. The challenge now was to see how to get the best "bang for the buck."

## The Possibilities and Promises of Renewable Energy Development

***Vernon Masayesva, Hopi Tribe*** member, moderated this panel and opened with several observations about the possibilities of renewable energy.

• Over 100 Indian reservations are situated in the regions where the sun's radiation is greatest, the wind is strongest, and the biomass resources are most plentiful. The possibility of energy production just based on raw resources is enormous. The Hopi have one of the richest coal reserves in the nation,

providing one of the largest supplies of coal to the utilities. But still, they are not a major player - because they just lease the resource. It is critical to be 'in the loop,' not outside, looking in. He recalled how the ancients lived - using the sun, earth, rain, etc. "Whatever energy development we do has to be consistent with cultural values." It is safe to say that nearly every tribe sees energy independence as a big step toward self-sustainability, self determination. Renewable energy will soon be a priority for all tribes.

• Tribes need a corporate to corporate relationship with the major utility companies. Indians do not play an integral role in utility planning. This is an oversight. Most of the corridors used to transport energy go through Indian lands.

• DOE must help make it possible for tribes and energy companies to go into business together - help provide technical assistance, etc. In the 1930's, the federal government passed laws to insure rural access to electricity, but this access was being used by ranchers, not Indians. Rural Indians pay highest rate for gas and to have access to basic service. This won't change until power is introduced into these areas. Indians haven't been treated with the kind of respect that US government has shown toward private industry.

Mr. Masayesva noted that Newt Gingrich had said he doesn't want to leave future generations with economic deficit. The tribes were saying, "what about an energy deficit?" It was almost un-American today to talk about sustainable energy. Solar energy today is a dirty word. People make reference to a huge energy surplus in the country. They are looking only at today. The Indian people are saying - we have to look way into the future. While we have a window of opportunity, lets invest in renewable resources. The coal reserves will run out. The possibility for development of renewable energy on Indian lands seems unlimited, but it will require a genuine government to government relationship.

***Debbie Tewa, Hopi Tribe***, was the first member of the panel. She spoke about the Hopi Foundation program to install solar panels in residential areas of the reservation.

She and her partner, ***Owen Taylor***, work with students on reservations - even younger children, to install solar panels in remote residential areas. If they do a poor job in installation or equipment, it costs them, in time and reputation. Their focus is working with individual families. They don't work with a lot of chapters or tribal governments. They pride themselves on being fast and efficient, putting systems in for as little as $10,000. They had just returned from Ecquador, where they had energized three buildings.

They don't have special codes on Hopi reservation. They follow national codes and industry standards to ensure product quality, etc. When remote customers have problems, she and her partner drive out in a day and replace parts or systems. They are able to check people's credit with a 15 minute phone call. They can usually schedule in a client the same day they call If they come in at 8 am, they can have a system going by 4 in the afternoon. They don't spend a lot of money and they don't use purchase orders. They try to keep it simple. The Hopi Foundation has a Board of Trustees and the organizations has quadrupled their amount of business since starting. Most important tool in working at grass roots levels with Indians is consistency. The Hopi Foundation takes pride in delivering on their word. There are lots of historic experiences of federal types who promise something and don't show up. They wear their good will with people. The Hopi people want to be economically self-sustaining, not dependent on grants.

***Jimmy Daniels, Navajo Tribal Utility Authority,*** described a joint solar project underway with the Navajo Tribal Utility Authority (NTUA), Sandia National Lab, and the Department of Energy. They were working in five different districts on the Navajo reservation to put in self-contained mobile solar units. They had electricians stationed in each district to help serve their customers.

72 freestanding units had been installed to date. For a maintenance fee of $40/month, the program serviced the 260 watt solar panel installation, mounted on a two/four inch pole plus structure and

panels, batteries, inventory and charge control. The unit was placed away from residential structures. Installers even brought water with them to mix cement on site. They were pleased with the results of this program.

***Ronald Solimon, Pueblo of Laguna***, described their situation. Located 45 miles west of Albuquerque, they hold 500,000 acres of land, and have over 7,000 tribal members. The Pueblo of Laguna is one of 19 pueblo tribes in the State of New Mexico. The Spanish Crown, the Mexican government and the United States government all recognize their tribe. Between 1950 - 1982, they managed the world's largest open pit uranium mine. They were one of the first suppliers to the Atomic Energy Corporation.

The original concept, based on a job skills inventory, was that the Pueblo of Laguna had the capabilities to function as a repair and overhaul facility or a manufacturing operation.
for the Department of Defense (DOD), which represented a potentially significant market.

Laguna Industries, Inc. (LII), was organized as a tribally chartered corporation with the name Laguna Industrial Development Enterprises (LIDE). They do electrical and mechanical systems manufacturing, field installation and service. They employ 202 people, 87% of which are native Americans. They have been in business for 10 years.

Recently, they have moved into key supplier relationships with companies like GTE, General Dynamics, Rockwell International, Hughes Aircraft, etc. They were always looking to forge new alliances with groups like Sandia National Lab.

They hope to move into the photovoltaics (PV) marketplace. A new partner, Spire Corporation is helping them look at PV manufacturing cost analyses, PV module design, PV manufacturing equipment, and PV module processing.

***Jack Whittier, NEOS Corporation/Enable International,*** summarized work being done by his company on biomass (particularly rootfuels) systems.

He noted that in many developing regions, where populations depended on biomass (specifically wood and coal) for energy, human health was being adversely affected - particularly among women and children. This was true on Indian lands as well. The cost to society of these types of energy was high, and the corrective actions that needed to be taken weren't free. This had inspired them to look for new approaches for those who couldn't afford commercial fuels. This had inspired their "Rootfuel and Indian Health" project.

Their project goals were to:

- Develop an understanding of how household fuel usage impacts human health
- Assess potential for introduction of rootfuels
- Build awareness and local capacity
- Foster entrepreneurial development

They approached this as a regional biomass project, done in conjunction with the Navajo Nation. It is very grass roots oriented, dependent upon active Navajo involvement.
USDOE Western Regional Biomass Program provided funding, and two private firms, NEOS Corp and Enable, played the project management role. The Navajo Office of Water Resources Management, and the Navajo Division of Natural Resources also played key roles in the project.

Some alarming facts were discovered:

- The literature (Morris et al) report that the risk of contracting lower respiratory illness is nearly fivetimes greater if children live in a home with a wood/ coal stove
- Respiratory disease is the fourth leading cause of infant death
- Nearly 6% of Navajos die from respiratory causes (4% is the national average) - A nearly 50% greater rate than the population as a whole. (Smoking is not higher on reservations).

Smoke has two components: particulates, which suppress the immune system, and CO2, which

typically leads to adverse reproductive outcomes. More than 80% of rural households depend upon wood fuels as their most important heating source.

In general, these houses use old, leaky stoves, often with flues that are too short, and where household ventilation is poor. It is not uncommon to see a 55 gallon drum used as a stove.

Rootfuels are an attractive alternative to wood and coal. They come from buffalo gourd, a wild member of the melon family. They are native to southwest in areas with adequate rainfall. They grow rapidly, compared to wood. The roots are non-woody, carbohydrate (starchy), and combustible after drying in sun for a week. They taste horrible - not suitable as a food source. It looks like a pale carrot.

Rootfuel has low irrigation requirements, is nearly smokeless, and is characterized by the absence of lignin. Its combustion properties (7,797 Btu/lb) place it in the same ballpark as other biomass fuels. It offers a significant health improvement, as compared to other biomass fuels.

The project has made a Title 26 application, and work is being done to grow more of this crop. The goal is to distribute it widely to familiarize people with it. Not much scientific investigation has been conducted on this weed. Its chemistry is similar to a steroid. It has pharmaceutical potential, but needs to be better understood.

It could present a unique entrepreneurial opportunity for the Navajo, with potential application all over the world as an energy source. Stable funding will be necessary to keep this project going.

## Developing Business Opportunities and Relationships Indian Country

The moderator of the second panel discussion was ***Henry Townsend, of the Public Service Company of New Mexico***, underscored three important points for this panel:

1. How do you educate business participants about the unique aspects of tribal government? Not all the governments are the same. Each has different culture and protocol.

2. How do you go about making joint ventures, putting economic partnerships together?

3. What opportunities exist on Indian lands that business ventures can capitalize on?

***Jefferson Begay, Assistant to the President (Navajo Nation)***, opened the panel. He noted that as a former general contractor, he had spent many years in Phoenix working with the private sector. He started his company 12 years ago. After working in the southwest region, he decided to bring his company back to the Navajo Nation. That's where it met its demise - because of bureaucracy, fraternalism, etc.

He wondered, how did they plan to replace the funds that would be lost in the Newt Gingrich federal budget cuts? He had, in his own experience, encountered attitudinal problems from the Navajo. Fore example, a distrust of private sector. There was an historical dimension to this - the white man coming on to Indian land to get oil, get coal, etc. So it may be understandable. But it was there nonetheless.

He encouraged tribes to learn to be more prompt when dealing with business. The leases take too long. With dual jurisdiction issues, a lease can take anywhere from a year to two years on a reservation. In a big city, a company could start up within weeks or months.

He is concerned that they lose a lot of their native professional people to the big cities because there isn't any business for them on the reservations - not enough opportunity for them. The way to bring them home is to bring industry to the reservations. With the Local Empowerment Act, they hope to empower local communities so they can use the expertise of young people, and try to generate community owned businesses.

He noted the tremendous amount of "sky." The many days of sun and clear sky annually. But most of the staff had been trained to manage windmills.

They were reluctant to change. He thought they might need to bring in some younger people who understood some of the different alternative technologies.

They have many polluting power plants on their own lands. It's time to take responsibility for ensuring sources of clean energy on their lands. They also have 50-60% unemployment. They need to put those people to work. There is lots of talent on reservation - many well trained carpenters, etc.

Begay posed the question, "What incentives exist?" to work with tribes. The Employee Tax incentive - 30% of Indian employment is reimburseable. Accelerated depreciation for equipment brought onto reservations. They were also talking to the States of Arizona and New Mexico to establish some enterprise zones within the states with tax incentives, etc. There are some laws that businesses need to be aware of, such as the Navajo Employment Preference law. They also have a Labor Relations Department, and a judicial system to see that that laws are enforced.

He felt that things were now at a point where there's been enough talk. The strategy to do this needed to occur through a unified effort of the tribes. The size of the Navajo tribe may put other tribes off, he said. He thinks others think that they'll get all the funding. But they want to work with other tribes - they need their help. They were looking for partners. "What's good for you can also be good for us." That's the best basis for a healthy relationship.

***Stoney Anketell, Fort Peck Tribes***, explained that Fort Peck's reservation encompassed 2.1 million acres in northeastern Montana. The Missouri River was their southern boundary. The two tribes there were the Assinaboyan and the Sioux. He works for the BIA most of the time, but at this conference, he's working for the Fort Peck tribes.

The northern half of the reservation had been classified as "Class 4" wind. This was very hospitable for a wind project. But they had no hard data to prove this to potential investors. They had recently put together a grant for Title 26 DOE money to help.

They were also working with Bechtel, and this had been a good relationship so far.

Presently, they have put up several wind monitoring towers up. Of their 2.1 million acres, 1.1 million belonged to non-Indians (it was opened up under the Homestead Act - every man, woman and child was given 320 acres). Only 15 percent of the reservation was actually owned by tribes. Whereas 35% was owned by individual Indian families. This has created a problem, in terms of putting up the wind towers - they were restricted in where they could put them. They are now trying to determine best locations for wind turbines.

Their number one goal at this time was finding customers for their power. It had great public relations potential. "Everyone in America knows the relationship between Indian people and the earth. I think the Madison Avenue advertisers would have a field day with this if we turned them loose." Millions of Americans would choose this type of energy, given the choice. They could be educated about the benefits - reduced pollutants, etc. He thought this could be a lot bigger than Indian gaming, and more sustainable.

His advice to the private sector was, "If you want to do business on a reservation, find someone on that reservation that knows how to get things done." Sometimes, this requires special processing, special meetings, etc. The tribal attorney may drag his feet. They will want as many Indian people working on these projects as possible.

He urged all the tribes at the conference to pressure the BIA. *"We've got to get the bureau (BIA) more involved in renewable energy. They have to sign off on the agreements - so they must play a much stronger role."*

***Zuretti Goosby, Yurok Tribe***, noted that in northern California instead of 180 days of good sun, the Yuroks got around 180 days of good rain. They were a federally recognized tribe (1876), and in 1993, had adopted a constitution and organized a government under it. The Yurok today have about 3,500 tribal members, but are projecting some 6,000 members eventually.

The Yurok is the largest tribe in California, with the second largest reservation. But it is just 65,000 acres. More than 85% is in fee status (owned by private people), a large percent by Simpson Timber. Roughly 6,000 acres are in trust, half in allotted trust. The tribe controls only about 3,000 acres.

Right now, they were at the beginning of developing of lots of things. They had a good river with lots of salmon. But because of dwindling salmon populations, this has ceased to be a revenue source for the tribe. They were actively looking for some other revenue generating projects.

They had explored the potential of renewable energy. They had entertained a project involving burning wood waste from sawmills, but the project didn't go through at the last minute. But the tribe was awarded a fee of $1.58 million - which they planned to set aside for energy development, plus another $1 million, virtually all of their money. This would go to electrification.

Right now, the upper half of their reservation, which contained about 200 households, is undeveloped (no electricity, phones, etc.) They are just now able to think about acting on a plan to electrify this area.

The tribe had learned a couple of valuable lessons from their power project experience (the one that didn't go through). The first was "don't assume." The typical approach from business was to make a quick decision - to get in and out fast. This didn't necessarily line up with how the tribe made decisions.

Zuretti also recommended that the private sector do its homework. They needed to have a good match between the proposed project and the tribes objectives. It was also imperative to know the tribe. "Tribes are very different. Have a good understanding of the context you're walking into. How does the project fit into the present and future of the tribe? The tribe's plans? Tribes will be looking for greater self-sufficiency if lots of government subsidies go away."

He stressed it was important to make sure you're talking to the right people. Every tribe has a governmental structure. Most tribes have staff. It's important to see how they make decisions, etc. They are sovereign entities - often the sole decision maker. "Your contacts are really your key."

Energy projects especially could be very complicated, involving cumbersome legal relationships, etc. The tribe had clearly designated roles and formal chains of communication. It was possible to lose a lot of time by talking to the wrong person. Good legal assistance is very important in negotiating good energy deals. Sovereignty issues, etc. are a little different. They require sophisticated legal understanding.

***Connie Lausten - Alternative Energy Development,*** described her experiences working with tribes in Alaska to promote a self sufficient energy infrastructure.

In Alaska, electricity costs between 17 cents to a dollar per kwh. Most electricity is subsidize. Her company was developing a computer program, to be used in any village in Alaska. They were looking for the least-cost option - either renewable technologies or energy conservation.

She explained that in most villages, there was both a tribal council and a city council. The tribal council focused more on cultural issues, the city council more on government and public works issues.

Connie stressed the need to respect local cultures and protocols. It was important to follow established decision processes. The village (on Kodiak Island) was leery of outsiders - skeptical about someone doing one more study. Unfortunately, the study she had begun might end because of lack of funding. She was reluctant to jeopardize the trust she had established.

"Projects will disintegrate if you haven't considered what the village wants. It must become a stakeholder. Also, you may need to talk about your project more than once. You may need to educate about renewable energy technologies." Oil spills and over-fishing had destroyed some industries there so there was openness to activities that might

improve the situation.

She challenged the private sector to consider "Who benefits more from the project?" There had been quite a bit of exploitation on reservations. Business people needed to be ethical, to look for an equitable benefit.

She posed the suggestion that it might even be possible to promote the local culture through these projects. Maybe we can look at these projects as a means to return dignity to these tribal cultures."

It was also important to have champion and share information. She concluded, *"We need to see these projects through and stop doing studies."*

Henry Townsend, the panel moderator, summarized that he had heard the following points from panel participants:

- Some of the tribes need to change their attitude toward economic development. Lots of capacity has been developed to do business with private sector.

- There are some problems related to dual jurisdiction. Also, it's important to understand what kinds of issues result from sovereignty - criminal issues, transportation issues, etc.

- There is a need for tribal unity, with respect to renewable energy strategies.

- Sometimes it takes a lot of time to get something processed or approved.

- There are varying degrees of ownership of lands within tribal areas. It's complicated to know which regulations apply where.

- Tribes need some help in promoting the use and production of renewable resources. (So that it can be a mutually beneficial endeavor.)

- Expertise isn't readily available right now within many tribes. They need some outside technical assistance.

### General Discussion

In the discussion period following the panel, Karl Rabago of DOE gave a quick update on the status of Title 26. He noted that it had been "zeroed out in the House." It was to be voted on later on in the week. A procedural maneuver had precluded any meaningful amendments. It looked like the Senate might follow the House lead on the numbers. He was still hoping that the Senate offered some hope to getting back some of their budgets. He concluded, "It ain't a real pretty picture."

In response to a question about the real level of DOE commitment to the Title 26 program, Rabago stressed that it was there. However, the program competed for attention against things like weatherization and conservation activity funding. It had been set up as a grant program, so it really depended upon implementation in the field for success. He added that Title 26, and some other projects, were oriented toward technology development and deployment. They were getting criticism from people who believed that government has no business in these areas - that it should only be involved in basic science and research, not commercialization.

## TUESDAY JUNE, 27
## DEVELOPING RENEWABLE ENERGY IN THE 1990'S

### Trends in Energy Development

***Renz Jennings, Arizona Corporation Commission*** and moderator of the panel, observed that with modern communications technology, we are sending images and messages about "what we've got" all over the world. Others want what we have. But because of limited resources, there's no way they could have it.

He explained that man was a "point of use energy converter" until about 100 years ago. Then he became an energy manufacturer, able to transmit energy. This has led to our predicament today. We have become energy users, not energy converters.

What was once very predictable (i.e. 7% growth in demand, keep adding power plants) is now very uncertain. We are now, *"smack dab in the age of uncertainty."*

California is driving much of this change. Given higher utility costs, they have a high level of interest in escaping the utilities and seeking other, cheaper, more controllable sources. He thought that making progress on the renewable front was a question of attitude and will. Relationships, "getting to yes," is difficult with Indians. It's always a process of renegotiation. Vendors want to go to places where its easier, as opposed to more difficult. However, he suggested, in mystery, there is opportunity.

***Carl Weinberg, Pacific Gas & Electric***, explained that the structure of the utility industry as we know it is falling apart. It's going to unravel. The technology that's coming down the road is moving closer and closer to the point of use, closer to the customer. The kind of capital structure that has to evolve to take advantage of this change will be very different from what we've known in the past.

Utilities have had a social contract - to produce, transport and sell electrons, and to make a reasonable profit. Their strategy to this point has been to grow and build. The winning economic strategy has been technology at facility scale. Every one of these assumptions is now being challenged. The social contract is being renegotiated.

In essence, there used to be one company with a territory, and a transmission and distribution system. This will change. There will be separate generators, open access to the transmission system, and multiple distribution systems. It will be like a "public highway," with retail wheeling and customer choice.

He predicts that we will soon be seeing a wholesale electric market. And a wholesale transport market. In the short term, competition will be driven by price. There will be excess generation, etc. But in the long term, it will be an environmentally driven market. This is what will open the door to renewables.

The typical fossil plant (which uses a boiler) has reached the top of its technology development curve. Efficiencies went up for a period of 100 years or so. Then they topped out. Thermal efficiency and maximum capacity went up as price went down. We have come to the top of the technology development. It's at the point of collapse. Technology can no longer support this structure.

The alternative technology is the gas turbine, the jet engine. Technologies have evolved which are now spilling over into the electrical generation business. Efficiencies keep ratcheting up. Turbines can go from zero to full bore in 4 minutes. In terms of energy efficiency, 75% energy savings is possible using high efficiency end-use technology in appropriately designed packages, at a cost equivalent to energy supply.

*"There is no silver bullet for this energy problem, only silver buckshot."*

Weinberg noted that the cost of renewable technologies has come down significantly. The real success stories are wind and photovoltaics (PV). They represent different markets. Wind has mostly entered the wholesale market. PV is in the retail market. These markets act differently. Wind is down in the 3 cents/kwh now.

Weinberg stressed the private sector's need to deal with a consolidated Indian nation's plan. This would describe a strategy for internal needs/use and export potential. The grid was open now. The door was open now.

Renewables are a strategic energy reserve continually refilled by nature. As with oil and gas, there is a "field." The challenge now is to explore it, to define the resource, and to utilize the field. The main change to be aware of now is that the new emerging technologies represent tools for fundamental changes in the utility business. Things were moving from constructed energy (economies of facility scale) to manufactured energy (economies of product production). Cost would fall as total volume increased.

With the new energy world, investments are smaller

and more often. Business will be done incrementally - in steps that could be taken one at a time. Construction time will be very short (less than 1 to 2 years). Innovation will be continuous. Increased flexibility and options were characteristic of the new systems.

A summary of the trends (technology vectors):

- Decreasing cost of modular generating systems
- Increasing energy efficient products and services
- Advanced power conditioning and smart energy management
- Increasing impact and versatility of information
- Decreasing cost of small modular storage

Weinberg posed the question, *"What opportunities might the Indians have in this new energy world?"* And then answered it. *"Lease land or rooftops, own facilities, broker green power, manufacture equipment, generate green power, provide off grid power, become a distribution company, become an energy services company, become a utility, become a full scale all Indian nations utility providing energy services, telephone and digital TV services."*

He concluded: *"The problem is not a technology problem. Its a capital and business formation and arrangement problem. You will have to join forces in some way to survive in the market that is coming along."*

***Karl Rabago, U.S. Department of Energy***, noted that it was a time when different philosophies about the role of government were being discussed. In many ways, this represented a new opportunity. He worried about the possibility of turning a fiscal deficit into a technology deficit.

Rabago observed that DOE has been through "this dark ages thing" before - in 1980. Then, they had gone back to the labs because the technologies weren't quite ready. But the work in the labs has been quite successful. Renewables were ready now. "Renewables aren't just for liberals any more."

The coming dark ages would have to do with deployment. They would be working to get more units produced, more units into the hands of people. They were looking at solar enterprise zones, partnerships, and more customer orientation.

They had been hearing from the renewables industry that the international markets were growing. Hazel O'Leary's trade missions had been very successful. He posed the question, *"Should we encourage Hazel O'Leary to make a trade mission to the Indian Nations?"*

Rabago noted the different challenges facing the Indian Nations - *"getting renewables in,"* and *"getting renewables out."* These challenges required two different kinds of pipelines.

He anticipated the effects of greater competition in the utility industry, noting that they didn't have competition yet, just a discussion of competition:

- Reduced government
- Consumer satisfaction substitutes for public support
- Increased economic efficiency
- Increased customer choice
- Parallel risk/reward relationship

He summarized the effects of the discussion of competition:

- Inaction and increased burden on state regulators
- Loss of public support
- Federalization and preemption
- Abdication
- Inverted risk/reward relationship

He explained some of the barriers to renewable energy. Renewable energy is capital intensive, even if it's cost effective over the life of the units. Individual units are expensive and have high fixed/low variable cost characteristics. There are no or few applications outside the electricity sector, thus they are without a secondary market. Technology development, demonstration and commercialization involves substantial risks and offer benefits not captured by the original developer. Other barriers:

- Stranded cost recovery
- Site specific
- Regulatory artifacts
- Technological readiness
- Customer readiness

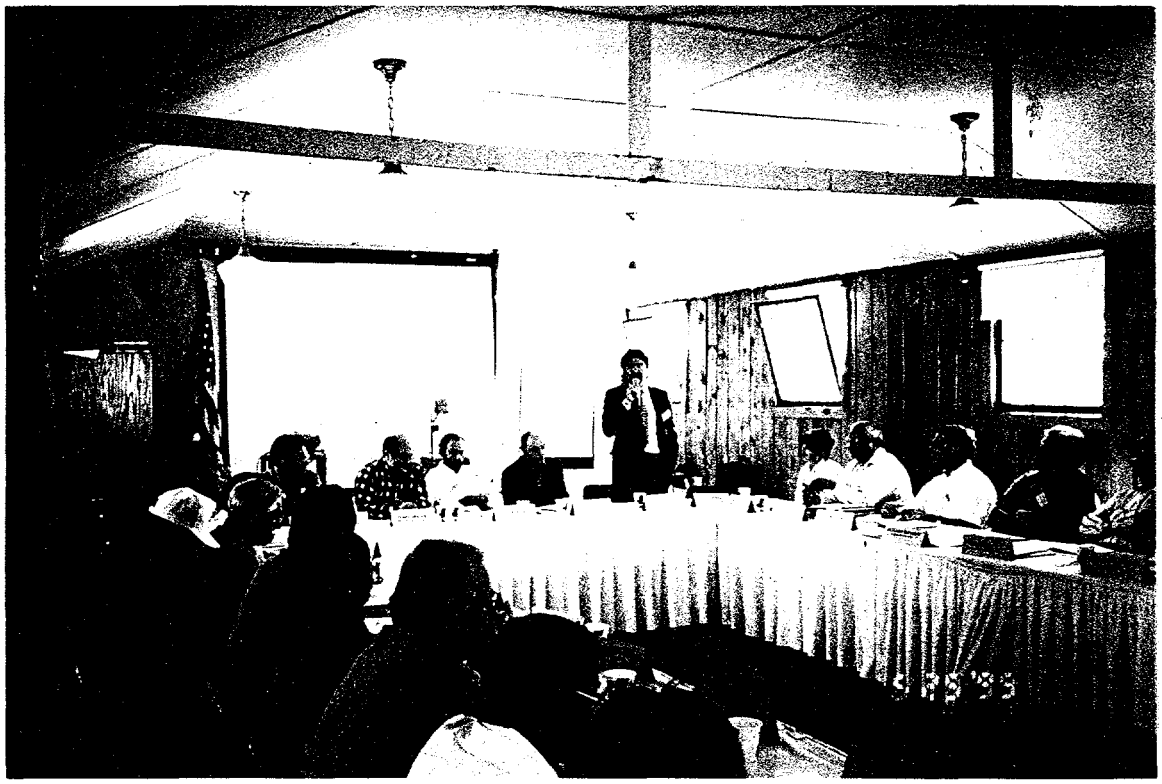
But there are clear opportunities as well, including:

- Fuel price stability
- Modularity
- Transmission support
- Short Lead Times
- Reliability
- Pollution Prevention

And they hadn't even begun to understand the benefit of putting renewables at the end of the transmission chain, instead of at the beginning.

*be about quality development."* He suggested a potential "Summit of Indian Nations" in the near future to discuss energy policy.

***Jan McFarland, EPA***, opened the second panel of the day with a reference to the adverse environmental impacts associated with current energy practices: acid rain, climate change, eutrophication, and impaired visibility/regional haze. Adverse health impacts included ozone, PM10 and hazardous air pollutants.



He suggested a variety of potential public policy tools for this new competitive era: A universal service doctrine (like the telephone break-up), set asides, portfolio standards, wire charges, tax support, subsidy reduction for oil and other fossil fuels, and customer education.

He stressed the need to get out of the pilot program mentality and "just do it." *"Remember our ultimate goal shouldn't be about growth/quantity, but should*

She observed that the government had, in the past, regulated large particulates, but had discovered that the real danger to human health was small particulates. An estimated 70,000 - 450,000 deaths a year were caused by this source. They were looking to regulate these particulates in 1997. They would also be developing a standard to regulate mercury, to help mitigate the problem of bio-accumulation of mercury in food sources, i.e. fish.

She underscored the need to adopt an integrated, power generation approach. The role of clean, non polluting energy technologies was growing, and would become even more important in the future. Someone needed to connect the dots between energy and air quality. They were working harder to make those connections now, to address these issues in an integrated fashion.

McFarland noted that the competition between dirty, inefficient, old, cheap power producers (many of which had been grandfathered in) and higher cost, cleaner renewable technologies was tough. They wanted to help level the playing field to encourage a true market comparison. One example of a "field leveling" technique was the requirement that emission characteristics associated with different power plants be made available to the consumer.

McFarland also talked about efforts with the Grand Canyon Visibility Transport Commission. EPA had recently added 5 tribes to this commission. It was one of the first regional approaches to address visibility impacts on Colorado Plateau caused by mobile and stationary pollution sources. Next spring, formal recommendations would be forward by the commission to EPA Administrator Carol Browner. She concluded that, "Nothing will happen in the western US without the consensus of the tribes. They have a seat at every table. Tribes are in the "catbird seat." They are as powerful a stakeholder and participant as the utilities."

***Steve Sargent, DOE***, described DOE's Title 26 program, the "Indian Energy Resource Development Program." This program was authorized by Title 26 of the Energy Policy Act of 1992, Public Law #102-486.

He pointed out section 2603, which discusses, "promoting energy resource development and energy vertical integration on Indian reservations." It authorizes demonstration programs to assist tribes in pursuing energy self-sufficiency and to promote the development of a vertically-integrated energy industry on Indian reservations.

He summarized that the program had $2 Million in fiscal 1995 to support existing approved projects. In 1996, however, solar technology has been zeroed out as being "corporate welfare," duplicative of what the private sector could/should be doing. He urged the group to contact their congresspeople.

***Richard David, Center for Applied Research***, noted that he was speaking in place of Robby Robinson. The Center for Applied Research is what its name implies. "When you know what you have, and you know what you want, call the CAR." 75% of their work was related to tribal energy and economic development.

He stressed that relationships were the critical element to doing business with Indian tribes. It was important to have a contact in the tribe who knew what was going on. He described a project CAP had done with the Hopi. Vernon Masayesva had become interested in the parallels between Hebrew culture and Hopi culture. The Hebrews' great love of the land helped them recover their farming traditions. They had used this analogy to help restore farming tradition to the Hopi tribe.

The Hopis had gone to Israel and saw 500,000 acres under cultivation all irrigated by deep brackish water. The real goal wasn't "technology transfer." They were really sharing their cultures - two cultures that live on the desert. They were very successful in drafting an agreement, not couched in legal terms, but in meeting mutual cultural objectives. The Center entered the picture to try to identify funding for the project. They had pursued funding through the Department of Agriculture.

They took an idea born in culture and made it into something that would pass the scientific and technical reviews of the Department of Agriculture. The project was approved, but it had been swept into Gingrich's Recisions Bill. "It was our most successful unsuccessful project," David said.

A second example of their work was a request from the All Indian Pueblo Council to have them help quantify the value of the tribes on the economy of the State of New Mexico. In August, they would hold an Indian Economic Summit in New Mexico. (He thought this might be a good template for an Indian Energy Summit.)

***Jim Williams - Native American Renewable Energy Education Project (NAREEP)***, explained that they were part of the energy and resources group at UC Berkeley. They were working in conjunction with the Lawrence Berkeley Laboratory.

Their project dealt with education, developing human resources and providing access to information for tribes who want to pursue renewable energy. Their current funding would take them through end of 1996. He hoped it would be a short term project that has long term perspective and impact.

The program consisted of three programs:

1. Community Energy Development Project
   - Step by Step workbook (guide to access funding, do projects with private sector, etc.)
   - Develop data base (information on what's already been done in Indian country)
   - Hold some Workshops with tribes interested in planning projects

2. Curriculum Project (Long term human resources and technical capacities of tribes)
   - Create or modify existing curriculum on renew able technologies (in tribal colleges and schools)
   - Teacher Training

3. Native American Renewable Energy Center Project
   - Pursue sources of funding
   - Conceptualize what this should be
   - Help establish this center
   - Functions:
     - Technical Assistance
     - Teacher Training
     - Information Clearinghouse
     - Inter-tribal Computer Network (focused on energy matters)
     - Research Arm for Interdisciplinary Research (larger context of energy issues on Native American lands)

Williams noted that the key element of this project was partnership. The project would involve the Native American community in several ways. They would be in touch to identify needs and wants, and to convene people who have a stake in what this type of center could be, how it could be useful. They were also interested in developing ways to engage young Native Americans. Their goal was service, not to establish an on-going bureaucracy.

***George Sterzinger - Nevada Department of Business and Industry***, explained that he was there on behalf of the Corporation for Solar Technology and Renewable Resources. CSTRR is just beginning, just staffing up. But they will come anywhere and any time to negotiate, etc.

They would very much like to cooperate and work with Indian tribes in the development of a regional power market, sharing benefits. He thinks that the integration of Indian and CSTRR efforts will make for a stronger, more effective whole.

Their organization began with the Defense Reauthorization Act of 1992. Nevada looked at assessing solar energy potential at the 1,400 square mile Nevada nuclear test site facility. They calculated that there was solar generation potential equal to 10 Hoover Dams possible at this site. How can this potential be translated into reality?
The real test now was market price, being able to compete in the marketplace.

He noted there would be a premium for anyone who could offer a long term contract - a 15 or 20 or 30 year contract. The rest of the market was retreating from long term commitments. This might be an opportunity for Indian producers.

He concluded that gas projects in US are effectively subsidized. The ability of renewable energy projects to compete internationally with conventional projects is really good, however. Sometimes this marketplace is overlooked.

***Lori Jablonski - Coalition for Energy Efficiency and Renewable Technologies (CEERT)***, explained that renewable energy needed an advocacy arm. CEERT could be an effective advocacy arm for renewable energy. They try to bridge differences between environmentalists and developers, even

though over arching goals might be the same.

CEERT wants the market to reflect the social and environmental costs of energy production. They make their decisions through consensus, based upon common ground.
One of their activities is to get involved in regulatory proceedings. They have helped build the evidentiary record in California for the economic efficiency of renewables.
They are also deeply involved in utility restructuring.

Jablonski warned that the utility restructuring would have some ominous implications for cost shifting - for instance, impacts on low-income populations.

## Developing Renewable Energy Projects

***Hap Boyd - Zond Systems, Inc.,*** explained that his company deals in bulk electrical power production, using wind as the power source. They were founded 1980, and now have 180 employees.

He addressed several of the issues associated with wind generation: visual aesthetics, noise levels, avian impacts, and dispatchability. He also discussed benefits: the lack of air pollution, compatibility with existing land uses, energy security, the fact that it's a renewable resource, and its usefulness as a hedge against fossil fuel price fluctuations.

Boyd noted that wind is a fairly predictable resource. He said that the kinds of things a potential generator would need to know about an area would include: speed, distribution turbulence, peak gusts, direction, and pressure. It would be important to get data from both long and short term stations.

In terms of the site, important characteristics included:

- Topography (slope, soils and vegetation) Weather (rain, winter storms, snow, iceand heat)
- Infrastructure (electrical transmission, roads, water)
- Regulatory issues (property rights, access, conflicting rights, land use regulation)

He noted that this was a capital intensive system, where a 500 KW turbine would cost 63% of the entire system. Operations and maintenance represented 20% of the total system cost. Operations and maintenance functions include turbine technicians, turbine technician support (employee benefits, training, safety), equipment and vehicles (service trucks, crane, stinger, maintenance), indirect support (engineering electronics, vehicle shop, etc.), and management.

He summarized that wind systems, when operated in good locations with a steady and predictable wind source, and with operating costs such a relatively small percentage of overall costs, were a very good financial risk.

***Wayne Gould - Southern California Edison Company***, explained that, even with all the talk of restructuring, the cost of on-grid energy systems were decreasing at about 9% a year. However, some 90 utilities across the country were actively pursuing PV development, to add to their energy portfolios. They would probably make this type of system available to remote customers (off the grid) in exchange for a monthly fee.

Southern California Edison has a design for a PV system for remote housing markets that was designed by a third party. This 1KW system (1,000 watts) costs $20,000 delivered, up and going. They thought this was still somewhat expensive, but that there was a market for it.

Edison would finance the PV system, and manage its installation and maintenance. Procurement, construction and maintenance would be actually performed by the PV industry. Each project is competitively bid. Edison offers financing using traditional utility/customer financing terms and customers can purchase the PV system at any time.

In this type of arrangement, the utility acts as a facilitator or integrator providing start up capital. The customer pays a flat fee on a monthly basis. Over a 15 year period, the customer can buy them out on a depreciated basis. After 15 years, the system belongs to him. Or he can renegotiate his contract and extend the monthly fee.

Gould summarized that he thought market development, financing and system standardization were the 3 biggest challenges for PV today. The private sector would have a big role to play in helping overcome these challenges.

***Bob Wichert - Sacramento Municipal Utility District (SMUD)***, stated that they were the only utility to date that actually own wind turbines, etc. There is 5 megawatts of wind power on their system today. They plan to expand this by about 45 additional megawatts by 1997.

They also own the largest utility PV system at 2,000 KW's. They have also been the largest renewables (non-hydro) purchaser (850 KW's/year) for utility use. They have plans to expand their use of fuel cells to allow for biomass applications, etc. About 50% of their total energy comes now from renewable resources, but most of that is hydro electric power (650 megawatts).

After listening to the conference discussion so far, Wichert said he had one lingering question. He wasn't sure if the tribal nations wanted to be buyers or sellers of renewable energy - or both.

He thought that, from a utility perspective, PV's were cost effective now. PV calculators pay for themselves many times over. Even in larger applications, they are cost effective today. As an example, street lights come on at night and can go for 30 days without bright sunlight. In addition, the price of PV's was definitely going down. It was now at about $6/watt, and going down. Installed, he thought the 16-17 cents per KW hour made PV an attractive energy source, especially when compared to other, dirtier energy sources.

Customers also appeared to be willing to pay extra for PV energy. There was a big market for renewable energy. They were trying to tap into that with a Green Power program. This program included converting waste to energy biomass, i.e. landfill gas, waste treatment gas, sewage treatment plant gas, etc. They had the ability to run these resources through a fuel cell and get energy from them.

In their development of renewable energy projects, they have asked for turnkey projects. Wind suppliers will do the work necessary to assess your wind, how much it will cost to put the turbines up, etc. and buy you the equipment, and guarantee you wind at a price. (5 1/2 cents per KW hour.) PV suppliers will also guarantee a price if they know the conditions on your site.

He summarized with some advice for the Indian representatives:

- As tribal nations, they might ask developers to come in and assess tribal resources and let them tell you how you could sell it, etc.

- Satellite uplink capabilities were available today from a suitcase. PVcommunications could handle that job right now (enhancing telecommunications capabilities on reservations).

- The current market is such that developers will go to great lengths to please their customers. Don't be afraid to bid out turnkey operations and see how cheap the market can provide it. "You'll be surprised to see how cheap you can get it. Today's market is amazing. Let the market tell you what it will do for you."

- Ask for turnkey operations. Get operations and maintenance costs broken out on a line by line basis. Get bids all the way to the switch if you can. Look at them as total installations, all hooked up, etc.

- Get guarantees (i.e. price). *"Ask for them, you will get them."*

***Jesse Smith - Kemper Securities, Inc.***, explained that they were a municipal brokerage firm that provided various forms of tax exempt and taxable financing mechanisms to the market.

He explained that a bond is essentially a loan. A tribe, as a borrower, is going to borrow the money, pay the principal back and pay the interest back. Their investors' money will produce interest. An investor might be looking for the highest return possible, or might be looking for an exemption on interest income on their tax return.

There is a lower rate of financing available to the borrower if he doesn't have to pay taxes on his earnings. The rate will be around 75% of what the taxable rate would be. Municipalities have financed things this way forever, with general obligation bonds, etc.

Tribes got the authority to issue these types of bond in 2 ways: from the Indian Tax Status Act of 1982, and subsequent amendments to the Internal Revenue Code. (They are considered as municipalities in their ability to borrow.) The money must be spent for "essential government functions" like electrification - public projects which serve an important public need. Other examples would include streets, sewer, water, schools, and hospitals. They could provide power to a local community, or provide power to a public utility (i.e., another tribe, a municipality, etc. it doesn't have to be an Indian tribe).

Another area of potential financing was industrial development or industrial revenue bonds. With this mechanism, a conduit can be provided to a private business. Tribes have a similar ability. For a tribe to do this type of bond, the project can only involve manufacturing, and the land has to be in trust for 5 years. If a tribe has a manufacturing facility, they could borrow 20 times the annual payroll to the tribe. This test has to be proven every year. (If payroll $1 million - could borrow $20 million.) However, this is a self-policing industry. There are no "bond cops."

The concept of 'security' is key to borrowing money. There must be a willingness to pay, funds to actually repay, and a pledge providing access to those funds if you get into a non-payment situation. Tribes are an interesting borrower because they are sovereign nations. They must expressly waive their sovereign immunity to borrow in the general marketplace. (Sovereignty can't take precedence over their obligation.) This can either be a general waiver, or a limited waiver.

It was noted that Jesse is one of the few people around with actual experience getting tax exempt financing for tribes.

***Todd Bartolf - Winrock Foundation***, introduced himself as a small business entrepreneur who had worked in both the corporate realm, and the foundation world. He had also squeezed in work with the utilities, in between. He had started out marketing solar thermal energy.

Winrock had 250 people working on projects around the world. Their primary objective was introducing technologies and paths to rural developments. There were two fundamental aspects to their work - strengthening local capacity (they hire local people to do project implementation), and market aggregation - collective buying power. They try to create this at the local level. They also work to establish an institutional memory. People learn by doing. They try to put technology into the hands of the end user.

He thought there was a lot to learn that could be fed back in this direction, so we understand what the end uses are, what the ideal applications are. Sometimes the application is totally inappropriate to the technology. *"We develop these technologies in semi-isolation."*

Winrock provided a linking mechanism between those needing the technology, and those holding the technology. The also provided a very unique mechanism for channeling funds from a wide variety of interests into a specific local project.

Bartolf concluded with a suggested proposal: Hearing about all the fragments, the pieces, it sounded as if there were a need to create an entity that could have a collective voice. The group might consider setting up a Native America Renewable Energy Foundation - something that generated its own income eventually, but which would need some seed money now. It could be locally staffed, with representation from various tribes, to move this agenda forward through the years. If this is successful, he would go back to Winrock and see if they would consider funding it. He though the other stakeholders at this conference would do the same.

## General Discussion - Recommendations, Ideas and Proposals

A general discussion followed the last panel. ***Paul Parker, Center for Resource Management*** was the session moderator. Observations included the following:

1. There seemed to be some emerging consensus around the following

- Some type of Indian Nation Energy Summit which Secretary O'Leary might attend
- Hosting a financial workshop for tribes
- Some type of inter-tribal organization - foundation or non-profit, clearinghouse, etc.

2. There were two sensibilities represented in the conference. One was the retail side, the tribal electrification side. The objective here was to provide energy services to remote locations. Once these locations were electrified, the job would be done. The second side was the wholesale side. The "I want to set up a business and sell power," side. The power could be sold to provide rural electrification. The wholesale side might be done in some sort of collective fashion - putting the tribes together. These two sensibilities were related, but different. It was important to be clear about which objective the group wished to pursue, in which context.

3. The private sector would require a "situation analysis" to help address this problem. It was too broad now. There was a need for better information, better data, about what energy resources were available on Indian lands. A contractor might be able to collect this information.

4. There is sensitivity about providing this information to the private sector. Tribes want to be self-determined, controlling their own information, their own destiny. The tribes don't necessarily want to be bulk producers of power. You can't do an assessment if nobody wants to have one done.

5. Tribes are interested in the concept of individual Indian businesspeople who want to do something. It doesn't have to be big. If a person can run a business and make a good living on it, that's a good solution. The question for the private sector was probably more, how small are you able to go? Not how big.

6. There was a need to get away from the language of a consortium of "tribes, tribes, tribes." There was stronger will to do things independently. It was still hard for Indians to find neutral ground where they might look at sharing. They want holding interests and the ability to reap the profits from any investment.

7. It would be useful if the Indian nations made some sort of statement of their objectives with regard to renewable energy. Did they want to create jobs? Have a stake in technology development?

8. From a large corporate objective, some of the small tribes don't even "show up in the corporate headlights." It might take aggregation to make this happen.

9. Indians don't necessarily work well together. They are not that interested in what happens on other reservations, with other tribes. Often, they are competing with each other for scarce funding, for the same piece of the pie. They have gotten accustomed to thinking that they have to fend for themselves, without cooperation.

10. Indian communities need education about these types of systems, the utility industry, etc. if they are going to do it themselves. People aren't familiar with all of the technical and market dimensions to this debate. This gets in the way of them being able to do it themselves, on a small scale.

11. Needs assessment data might be available now from regional agencies like the BIA or IHS. It might be disaggregated, but probably could be collected. However, Indians would expect this information to be collected outside and brought to them. They wouldn't necessarily want to collect it and bring it to the private sector.

# TUESDAY, JUNE 28
# CONCLUSIONS AND NEXT STEPS

***Terry Minger, Center for Resource Management,*** made some summary comments. He referred to this "new world of energy restructuring" and asked, "what's really happening in this world?" He concluded that there had been lots of history about why things don't work. Maybe it was time to put that aside, a time for new contracts, new relationships. It was a world of less reliance on government. Deregulation. It was a time of short term competition, and long term focus on quality of the environment. It was a time when energy production was getting closer to the end user. It was a time of new financial relationships, of global opportunities and global competition. It was a time for renegotiation of the social contract and political restructuring. It was a time when conventional power production had reached its peak efficiency, but when renewables were still moving up the efficiency curve, with opportunity for optimization still ahead.

Minger also contrasted what he called the "intersecting circles" of wants - what the Indians wanted, what the private sector wanted. He began with the statement that the Indian community had tremendous power - legal, sovereign and moral power. They also had tremendous public support, public good will. The Indians wanted: self-sufficiency, control, partners, less reliance on government, capital, financing, technology (continuous improvement technology), business planning and business training, access to a larger playing field - national and international, access to markets, jobs and education, and renewable green power.

Industry wanted certainty, predictability, stability, shared risk and reward, data, information and resource assessment, the ability to form partnerships without burdensome bureaucracies, acceptable return on investment, stable long-term business relationships, experience that could be transferred to international markets as well, the ability to aggregate to get the price mechanisms working in their favor, renewable green power.

He concluded that both were looking for win/win solutions. There was a way to marry Indian strengths with business strengths.

The conference concluded with statements from each participant.

**NEXT STEPS**
**(ACTION STEPS)**

1. Creation of a task force/steering committee
2. Clearinghouse that would match interests and potential projects, needs and objectives
3. Finance workshop
4. Indian Energy Summit (with Hazel O'Leary attending) - with good agenda
5. Lobbying for Title 26 (last ditch effort)
6. Identification of a replacement mechanism for Title 26
7. Overseas Investment Partnership (OIP) - Analogous organization for capital formation and risk reduction
8. Share what we've done here with various congressional delegations