Photo courtesy of NEG Micon

Powering *the* Future

Tribes lead the way to renewable energy

By Michelle Tirado

WHAT'S NOT TO LIKE ABOUT renewable energy? It promises energy sustainability. Biomass technology, low-impact hydro, solar panels and wind turbines can deliver low-cost electricity to populations living in remote regions — people off the grid or stuck paying premium rates for traditional power. It's "green," having little to no adverse effects on air, earth, wildlife and people. And in areas rich in these renewable resources, it could be a revenue generator.

Green power has certainly caught Indian Country's eye. Across the nation, including Alaska, tribes are starting to take a serious look at their renewable energy options. And the timing couldn't be better.

In late April, the U.S. Senate passed the long-awaited, long-debated Energy Policy Act — an enormous piece of legislation, authored by U.S. Senator Jeff Bingaman — which strives to set the nation on a course towards energy independence.

Major provisions of the Act were tailored for Indian Country. It establishes a Comprehensive Indian Energy Program at the U.S. Department of Energy (DOE) to help tribes develop their energy resources, such as by reducing the amount of red tape often attached to federal programs.

A number of provisions were specifically created to spark renewable energy development on Indian lands. It provides incentives — grants, loan guarantees and tax credits — to tribes developing renewable energy on reservations. It requires retail electric suppliers to obtain a minimum percentage of their electricity from renewable sources, with double credits to those who purchase power from tribally owned operations.

Karen Atkinson, senior counsel to the majority, Senate Committee on Indian Affairs, sees this as real win-win legislation for Indian Country. She says it will give tribes a role in the nation's charge toward its new energy goal and the opportunity to pursue their own renewable energy objectives, whether it's providing electricity to tribal members or exporting energy to major hubs.

Atkinson says, "Indian reservations are poorly underserved as far as electricity. And this [legislation] provides a way to build sustainability."

Many tribes are sitting on renewable energy gold mines. Atkinson points to a DOE study that found 61 reservations have the potential to develop renewable energy for utility-scale generation. Tribes in the northern Plains and the Four Corners regions have a significant potential for solar and wind development.

Right now, Atkinson says, "There are no renewable energy incentives [for tribes]."

Some tribes couldn't wait for new legislation to tap into their renewable resources. Their own pressing energy or economic needs are enough incentive.

According to DOE statistics, 14.2 percent of all Indian homes on reservations have no access to electricity and the poorest Indian households spend almost 20 percent of their income on electricity.

Many tribes are well into exploratory phases, collecting data and bringing in the experts to evaluate their renewable energy potentials and funding options. Others have erected the infrastructure or have started testing the waters. In a few cases, the technology is in place and already providing electricity to homes and commercial structures in Native communities.

Harnessing the Wind

It may have been the country — pristine and untamed — that lured Martin Wilde to the Blackfeet Reservation in 1992. It may have been the kindhearted people that convinced this Ohio-bred engineer to stay. But it was the wind, and how every night it rocked the small schoolhouse that he had converted into his living quarters, that kept Wilde on the northwest Montana reservation for eight years.

Wilde saw potential in that wind. He saw wind producing energy, jobs and revenue for a tribe struggling with an unemployment rate of around 31 percent and a poverty rate of approximately 45 percent.

"The wind really whips out there," Wilde says. "It seemed like a situation where we could use a very progressive, up-and-coming technology to stimulate some activity there."

The technology is a wind energy system, or turbine, that converts the wind's kinetic energy into electrical energy. Depending on size, wind turbine power ratings run from 250 watts to 1.65 megawatts (with the average U.S. household consuming 10,000 kilowatt-hours each year). Wilde, however, envisioned a utility-scale wind farm, one that would deliver power to cities off the reservation.

Wilde knew at the get-go that developing a commercial wind farm on Indian lands would be tough. He knew the Blackfeet Nation wouldn't be able to do it on its own.

"To own a wind project as a tribe — build it, operate it, sell the power — is a very difficult challenge."

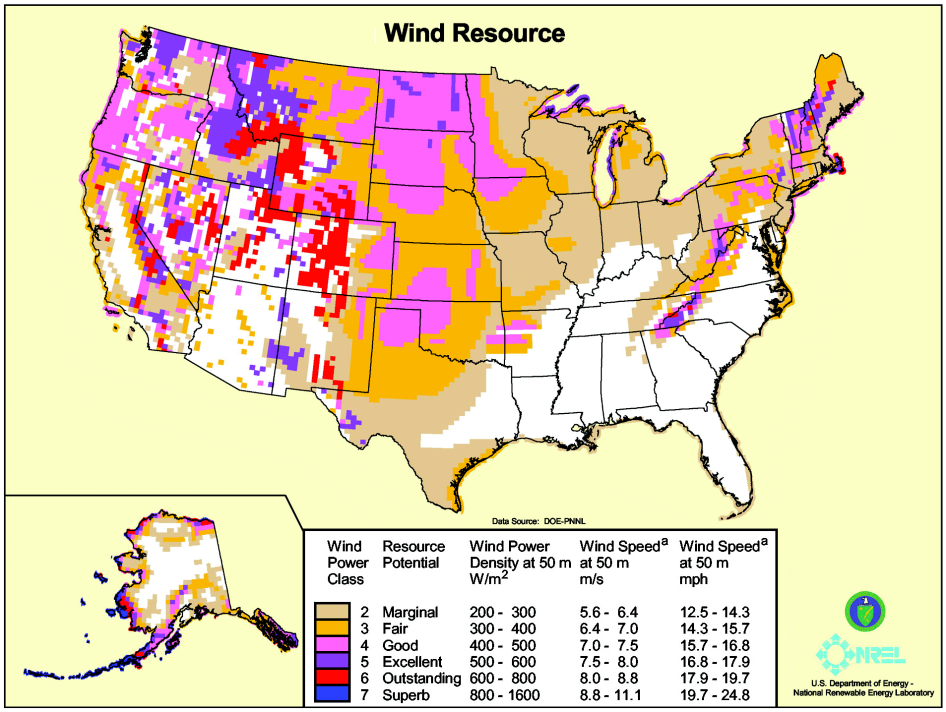
In 1993, Wilde received funding from Montana State University and the DOE to promote wind power development on the Blackfeet Nation's 1.5 million-acre reservation. Few regions in the United States provide superior or excellent conditions for commercial wind power operations. Northwest Montana, designated as having a wind class 5 (on a scale from 1 to 7, the highest being 7), gets pretty close to having excellent conditions, especially in the uplands. On the Blackfeet reservation, elevations range from 3,400 feet to 9,000 feet.

In 1996, Wilde contracted with the tribe to develop the reservation's wind resource. One of the first steps was creating Siyeh Development Corp., a business entity within the tribe to spearhead the effort. As a director of Siyeh, he brought together the state's energy power houses, including Bonneville Power Administration, Montana Power Co. and Western Montana G & T. Wilde also brought in SeaWest, a San Diego, Calif.-based independent wind developer, as a partner to develop a 22-megawatt utility-scale wind farm with the capacity to produce enough electricity to power more than 6,000 homes.

Wilde says the ideal location for a commercial wind project is one with an average wind speed of 21 mph, rarely exceeding 55 mph and rarely blowing under 12 mph. In the highlands of northwest Montana, wind speeds fluctuate between 10.4 mph and 17.9 mph. Other considerations, Wilde says, are distance to transmission power and permitting.

The construction of more than a dozen turbines near the tribe's sewage treatment plant was scheduled to begin in late 2001. As the Blackfeet discovered, having the wind resource and the organizational elements in place doesn't guarantee that this type of venture will fly without any turbulence.

In February of this year, the tribe's project stalled due, reportedly, to the drop in energy prices in the West and the expiration of the federal tax credit for wind energy development. There were even rumors that the project was dead. But, the tribe's partner, SeaWest, confirmed that construction will go on.



Wilde says that, in addition to the right conditions, tribes have to have perseverance — to be prepared to suffer for as long as it takes. They also need a champion.

"You have to have someone who makes the project their personal business … willing to do everything from cleaning toilets to writing grants to negotiating business deals … which is what I did."

Wilde has since parted company with the Blackfeet. He is presently working with other tribes on similar wind projects. Looking back, he says, "We went a lot further than any other tribe has to date. We were five years ahead of every other tribe."

Today, other tribes are pursuing wind power, including the Spirit Lake Sioux, the Turtle Mountain Chippewa, the Kaw and Otoe-Missouria tribes in Oklahoma and the Rosebud Sioux. It's only a matter of time before other tribes join the wind power foray. Many reservations are located in areas favorable for development. The Pacific Northwest, for example, is a prime area.

The Iowa Tribe in Oklahoma has included wind power in its new energy strategy. Although the tribe's 491 members are scattered throughout Oklahoma, and 22 percent live outside of the state, it does have a tribal complex that requires power. Receiving its electricity through a cooperative that imposes high tariffs on big customers, currently the tribe spends between $40,000 to $50,000 each year to power the complex. And with additional buildings on the way, including a daycare center and a public safety facility, the cost can only go up.

"We're looking at wind development to become energy sovereign and to meet our own energy needs at a lower cost," says Michelle Garcia, a tribal member and a consultant to the tribe.

The Iowa Tribe launched its wind project in June 2001. It erected a 66-foot tower on its tribal trusts lands and, using an anemometer borrowed through a National Renewable Energy Laboratory program, it began measuring wind speeds.

Although the tribe wants to get the wind turbine hooked up as quickly as possible, it understands the importance of doing its homework, reviewing wind power technology, cost-modeling and evaluating vendors.

"We're still doing our due-diligence — and that's really important for other tribes to un-

derstand. We would like to jump out there and put one up," says Victor Roubidoux, the tribe's treasurer.

Solar Power in the Land of the Midnight Sun

Alaska seems like one of the most unlikely places to install a solar power unit. But if you travel to Arctic Village — located within the Arctic Circle — and Venetie, you will find two sitting atop the village washaterias.

"Solar power is a viable resource, even in Alaska," says David Blecker, a consultant for Earth Energy Systems, a Madison, Wis.-based firm specializing in developing sustainable natural resource management plans for tribes. Earth Energy Systems helped bring the grid-tied, battery-free photovoltaic units to these villages' bathing and clothes-washing facilities.

In many Native Alaskan communities, electricity comes from diesel-powered generators that run 24 hours a day (on good days). Getting the diesel to these locations has never been easy. It comes in by air or barge. It's the consumer who pays the price for shipping the fuel, and for many villages, those prices are as high as 50 cents per kWh.

The high cost of diesel is a leech on local economies. There are also the environmental hazards associated with transporting, storing, handling and using diesel.

"The tribes up here are really looking towards renewables to decrease their dependence on diesel fuel, as well as to increase their self-determination, create jobs and improve local economies," Blecker says.

Most Alaska tribes that Earth Energy Systems talks to are interested in solar or wind. While there is a major expense in getting the equipment to Alaska's outback, as Blecker points out, the return-on-investment comes through the life cycle of the systems. The shipping costs should also be weighed with the benefits, such as a cleaner environment, more local jobs and an increase in energy security.

Education, Blecker says, is a critical component of developing renewables in Alaska. The community needs to know what energy is, how it's used, how much they pay for it and how it impacts the environment.

"You can't parachute projects in. It really has to come from the community. In order for them to be effective, the capacity has to be developed at the local level — for people to own, operate and maintain these systems," Blecker says.

Before shipping anything, Earth Energy Systems goes into the communities and conducts focus groups to identify needs and assess resources and concerns. This information gets bundled into the comprehensive energy development and management plan.

Prior to installing the units in Arctic Village, the community came forward with concern about the village youth, who make a game of throwing rocks at any stable target. Earth Energy Systems and tribal leadership found a clever solution. They decided to involve the kids in the installation.

Blecker says, "We had three kids working with us the entire time — turning wrenches, cutting wires. And not one rock has been thrown at the systems."

More advanced training is provided to Natives who are engaged in operating and maintaining the equipment. Funding packages typically roll training into the overall cost. Training usually involves sending Natives off to technical classes; sometimes they are sent to the lower 48. In some cases, all training is on-the-job.

There are drawbacks unique to Alaska. Most diesel generators used in isolated villages are old. They were not designed to work in harmony with solar or wind systems. The energy generated by diesel is typically low-grade in terms of voltage and frequency. When quality voltage and frequency exceeds the limits of these systems, the power shuts down. Earth Energy Systems is currently working on creating a system specifically for Alaska Natives.

1.2 kW photovoltaic system atop washeteria in Arctic Village, Alaska.
Photo courtesy of Earth Energy Systems, Ltd.

Blecker explains: "Nobody is prepared to go back to the dark ages. Everybody recognizes that there is trade-off if you want live a life with modern convenience. Electricity is a central part of that. They also clearly understand, probably more so than the average person, that there are ways to do it without sacrificing the environment for future generations."

Looking down the road, Alaska Natives will only be able to develop renewables to take care of their own energy needs. Because of remoteness and lack of power lines, exporting energy — even to villages in the state — is out of the question.

Hydro-Power for a Remote Alaska Village

King Cove is remote. The small Alaska fishing village, with a population of about 1,000 (mainly Aleuts), is too far from the nearest utility grid. For years, its energy needs were met with diesel — expensive to transport and store in this isolated Alaska community.

In 1993, King Cove started exploring its hydro potential. It wasn't interested in constructing a high-head dam to girth a wide, wild river.

The CERT Challenge

IN FEBRUARY 1999, THE DENVER-BASED COUNCIL OF ENERGY Resources Tribes (CERT) laid down its challenge: Energy sovereign by 2010. High-hoping or realistic goal?

CERT's 40+ members are not dwelling on those questions. They're pressing forward, creating and implementing their energy strategies for self-sufficiency and economic development.

Renewable energy resource development is an important element in many of these strategies. In California, a hybrid wind/photovoltaic generator is energizing a Manzanita Band community center. The Navajo have hooked up solar power systems to remote residential housing units. On the Standing Rock Sioux Reservation in South Dakota, a tribal college is being heated using geothermal technologies. And the Jemez Pueblo of New Mexico are taking a serious look at a commercial wind farm.

For more information on CERT, visit: http://www.certredearth.com/

It wasn't interested in dams at all. It had a "run-of-river" project in its sights. Run-of-river is a hydropower technology that depends on the electric output nature gives to a river, one completely at the whim of seasonal flows.

King Cove had the right natural resources for a run-of-river plant. Two streams, one glacier-fed and the other rain-fed, flowed nearby. And it had the precipitation, receiving an average of 52 inches of snow and 34 inches of rain annually.

After conducting a series of hydrological, geotechnical, load inventories and feasibility studies, King Cove, through the Agdaagux Tribal Council, received several grants, including a Title 26 award through the DOE, to research and construct a $7 million run-of-river plant to reduce its reliance on diesel power.

King Cove's 800 kW plant went live in 1995. Over the last six years, the villagers have realized a savings. Using the diesel generators alone, it was paying 20 cents per kWh. If it were still relying on diesel, that rate would have climbed to 30 percent, because of escalating diesel prices. Today, residents still pay 20 cents per kWh.

King Cove's $7 million run-of-river plant.

However, the project has not been ripple-free. Gary Hennigh, King Cove's city manager, says there were problems related to "integrating the hydro plant, which was state-of-the-art, with a diesel powerhouse that was somewhat behind the times." As a result, King Cove residents endured two years of intermittent power outages

And there's Mother Nature, an issue that can't be solved by calling in experts. She is most kind to King Cove from April through the end of October.

"In the winter time, when temperatures get colder, we have less flow," Hennigh says.

King Cove is not the only Alaska village tapping into run-of-river waterpower. There are smaller hydro plants on Kodiak Island, Larsen Bay and Akutan.

Greenhouse at the Tsemeta Regeneration Complex filled with Douglas fir seedlings ready to be planted back into forests.

Photo courtesy of Hoopa Valley Tribe

Biomass — The Circle of Life

The Hoopa Valley Tribe has always been green with its 77,000-acre timber operation. It doesn't use pesticides and it implements a sustained yield forest management plan. So when the tribe learned about a technology that converts hardwood slash into grid-quality AC power, it wanted in.

The technology is biomass — the process of converting plant material, vegetation and agricultural and animal waste into fuel. The concept isn't new. During World War II, for instance, energy shortages forced people to burn wood to fuel their vehicles.

The product, BioMax, a 15 kW modular biopower system developed by Community Power Corporation (CPC), is new. The system, which is, according to CPC, the first of its kind in the United States, gasifies organic waste — corncobs, husks, straw and wood chips — and generates heat and power. Because it gasifies instead of burning matter to produce fuel, it is an environmentally clean energy generator.

The Hoopa Valley Tribe welcomed its BioMax unit late last summer. Within minutes of being hooked-up, it was converting gasified wood chips into electricity. It is currently powering the tribe's vast greenhouse complex, a nursery for more than one million seedlings.

High-energy costs were a real motivator for the Hoopa Valley Tribe. Before the biomass unit arrived, it was paying 13.9 cents per kWh to heat the greenhouse facility, adding up to about $7,000 per month in fuel bills. The tribe laid out about $30,000 for the BioMax, and, it believes, it was well worth the investment.

"The wood residue we utilize is not even a drop in the bucket in terms of the energy potential," says Bob Ulibarri, senior environmental planner for the tribe. "It's the whole circle of life. Nothing is wasted — it's used to grow more trees."

The Hoopa Valley Tribe plans to expand its biomass program. It's wants to connect a similar unit to the cant mill it's building. And it's looking at a woodstove-size unit to electrify and warm single-family homes. Ulibarri says families not on the grid can use this type of unit, which can be produced for approximately $1,500.

The Hoopa Valley Tribe didn't only purchase a BioMax unit, it partnered with the developer. The tribe plans to build an industrial park on an 85-acre "brownfield" site that it owns. Part of that park will serve as a manufacturing, distribution and marketing center for BioMax systems.

Ulibarri is targeting tribes. "A lot of tribes have timber or agriculture. Those two industries produce a lot of biomass that traditionally gets thrown out. Tribes in the Northwest have 72 percent of wood waste residue under their control."

Biomass is, no doubt, the least understood and least used of renewables, particularly in Indian Country. However, a few tribes are looking in that direction. The White Mountain Apache, for one, are looking at lumber mill and logging waste to fuel its timber company's lumber kilns. And last summer, the Lower Brule Sioux Tribe received a $25,000 grant from the U.S. Commerce Department's Economic Development Administration to conduct a feasibility study for the development of an ethanol plant. □