**Case Studies of Green Building and Sustainable Design in Indian Country**
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“Indian country" generally refers to land within an Indian reservation or land in federal trust (land technically owned by the federal government but held in trust for a tribe or tribal member). Several examples of commercial and residential facilities that have incorporated green building and sustainable design can be found in Indian Country and this area has much potential for growth. There are approximately 400 existing hotels, motels, and resorts, as well as 200 casinos and bingo halls located on tribal lands in the U.S. (U.S. EPA, 2000).

Nationwide, more than 200 Tribes are reaping revenue of more than $10 billion and are reinvesting huge sums in building their communities. A recent survey reported that 54 California Tribes have building projects valued at more than $250,000 planned or underway. Of these, 46 were commercial buildings, 43 were tribal buildings, and 34 were residential and prefabricated buildings (Center for Indian Community Development, et al., 2004). This paper presents case studies of existing commercial and residential projects on tribal lands that have incorporated elements of green building and sustainable design.

The Potawot Health Village in Arcata, California incorporates many aspects of green design and construction. This United Indian Health Services (UIHS) facility is modeled after a traditional north coast village and is carefully sited to enhance the natural environment (Center for Indian Community Development, et al., 2004). The health center consists of one structure made to look like 12 small buildings wrapped around a central courtyard. This configuration improves internal pedestrian traffic flow and is seismically stronger. The building design makes maximum use of natural light and ventilation with energy-efficient windows. The UIHS wanted a structure that would incorporate Native American architectural traditions, but did not want to use redwood, a

traditional building material. In a novel approach to accommodating cultural preferences, they used pre-cast concrete, that when properly stained, proved to be an acceptable substitute for the endangered redwood. In addition, the gathering room of the health village is lined with old-growth redwood boards, most of which was recycled from an 1890s lumber mill. (Architecture Week, 2006). The photo below shows the exterior of the Potawot Health Village structure.

Potawot Health Village

The Mohegan Sun Casino and Hotel (shown below) in New London County, Connecticut is one of the largest casino resorts in the world. Approximately 40,000 to 50,000 people visit the facility on a daily basis. The director of the Tribe's Environmental Protection Department, Dr. Norman Richards, implemented a master plan for sustainability at this facility that focused on recycling, and transportation. Many of the ideas that Richards and his team implemented were from organizations such as the Natural Step, a Swedish organization that focuses on sustainability, and the
U.S. Green Building Council. The recycling program focuses on green purchasing and a source-separation system. Daily food waste is sent to a pig farm where it's fed to pigs. The pig waste is composted and used to grow plants. Within the vehicle maintenance shop, all vehicle fluids such as antifreeze, oils, and brake fluids are recycled (Koch, 2005).

Mohegan Sun Casino and Hotel

To address air quality issues and fuel consumption associated with security vehicles at the facility, several strategies have been implemented. Security patrol vehicles have been replaced with bicycles, which use no fuel and have no air emissions. The bicycles are far less expensive than vehicles, are maneuverable, and work well for quiet surveillance. They have also promoted security patrol moral and retention. In addition, an incentive program was implemented for carpooling and a bus driver's lounge was opened to prevent bus idling in the casino parking lots (Richards, 2006).

To reduce the hotel HVAC demand, the Tribe has implemented temperature control using an infrared occupancy detection system, which adjusts room temperatures if guests are not present. In addition, heat/electric cogeneration and photovoltaics have been incorporated into the hotel and casino (Richards, 2006).

One example of residential facilities that have incorporated green building and sustainable design is the Rumsey Rancheria in Yolo County, California. The Rumsey Band of Wintun Indians approached Sacramento-based home builder John Deterding about designing and building 18 homes and eight townhouses on their Rancheria, located 50 miles northwest of Sacramento. The Tribe wanted the homes to be multigenerational, with minimal impact on the environment. For these homes, John Deterding used Rastra, a sustainable, energy efficient, environmentally friendly construction system material developed in Europe (John Deterding Company, 2006).

Approximately 85 percent of Rastra's volume is made of recycled post-consumer polystyrene wastes that very likely would have been left in landfills for an eternity. Rastra offers the structural strength of concrete paired with high thermal insulation, sound attenuation and fire-resistance. It can be used for every type of wall and other components of a building while being resistant against frost, heat radiation, mold and nesting insects. Rastra can be easily cut, rasped, routed or even carved into sculpture-like forms. Plaster easily adheres to its surface, and tiles can be glued right without any preparation (RASTRA Corporation, 2006). The photo below shows one of the homes on the Rumsey Rancheria that was constructed with Rastra.

Rastra Home on Rumsey Rancheria

In August 2004, Cache Creek Casino Resort, owned by the Rumsey Band of Wintun Indians, activated a photovoltaic (PV), solar electric, power generation station. Visible from Highway 16 and containing more than 1,000 ASE 300 series modules, the installation is the largest of its type owned by a casino resort. The solar field will produce electricity equivalent to the requirements of about 73 homes a year for at least the next 25 years. The installation serves not only as a clean energy power station but also as a symbol of the Tribe's commitment and contribution to helping California meet its energy needs.

Solar power is also being utilized for residential projects on tribal lands across the Nation. On the Pine Ridge Reservation in South Dakota, for example, families can spend over 50% of their disposable income on heating in the cold winters. Solar power for heating as shown in the photo below can be a cost-efficient alternative for providing heat.

Solar Air Heater for House on Pine Ridge Reservation

On the Hopi Reservation, many tribal family live independent of the utility grid, or don't want utility lines in their communities for cultural reasons. Solar electricity is an ideal solution for their energy needs. The photo below shows a solar corn dryer being used on the Hopi Reservation. The Hopi Foundation, now called NativeSUN, has installed photovoltaic systems on more than 300 homes in Hopi villages (LaDuke, 2001).

Solar Corn Dryer

These are just a few examples of commercial and residential projects on tribal lands that have incorporated elements of green building and sustainable design. As we move into the future, it is likely that we will see even more examples of green buildings and sustainable technologies as Tribes across the Nation invest in their communities and exchange stories about their successes.

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