



Photo credit: Nathaniel Corum

The Port Gamble S'Klallam Tribal Housing Authority designed and built Teekalet Village adjacent to key historic salmon fishing grounds on the Puget Sound

Building Green and Respecting Native American Identity: *Housing, Culture, and Sustainability in Native American Communities*

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Native American tribes have long faced challenges in providing safe, decent, and affordable housing for tribal members.¹ A study conducted by the U.S. Department of Housing and Urban Development (HUD) in 1996 found that 40 percent of Native Americans lived in physically deficient or overcrowded housing as compared with 6 percent of the U.S. population. HUD has partnered with Native American communities since the Department's creation in 1965 and Federal monies still fund the majority of housing

built or rehabilitated in Indian Country today. This is due in part to the special relationship of tribes and the Federal Government, but is also related to the extreme housing need, poverty, and continued under representation of private financial capital in tribal communities. HUD's Office of Policy Development and Research (PD&R) is currently conducting an assessment of housing needs in tribal communities that will gauge the progress being made in alleviating deficient or overcrowded housing conditions, and will help identify locations that are in greatest need of

targeted assistance. In addition, HUD is actively engaged in a number of initiatives aimed at improving conditions on the ground in Native American communities throughout the U.S.

One such effort is Sustainable Construction in Indian Country (SCinIC), a joint effort of PD&R and HUD's Office of Native American Programs (ONAP). The initiative seeks to promote and support sustainable construction in Native communities through demonstration, training, and dissemination of best practices and program results. HUD launched SCinIC in response to a fiscal year 2010 Congressional appropriation and the program builds on previous work by HUD and other intermediaries that focused on sustainable construction in Indian Country, specifically techniques and technologies that make homes more energy efficient and healthy while respecting Native American cultural heritage. Issues of sustainability are particularly relevant in Indian Country as tribes may already face high fuel costs because of their remote locations, a challenge which is exacerbated by volatile fuel prices.

Background

Changes in the way that the Federal government funds tribes under the Native American Housing and Self Determination Act of 1996 have opened the door for tribes to explore development of affordable housing that is both more culturally adapted and more sustainable (defined in terms of durability, environmental impact, and energy efficiency). Many tribes are adapting sustainable design and construction practices to meet the housing needs of 21st century tribal life; however, there are barriers which slow the scale of adoption. At the beginning of the initiative, to help guide training and technical assistance (TA), SCinIC hosted focus group discussions examining impediments to the acceptance of sustainable construction practices by tribes or tribal housing entities. Focus group representatives identified four key impediments, discussed below.

Building codes

Communities and states develop building codes to protect health and safety and to show commitment to particular issues, including green building. As sovereign nations, tribes also possess the power to adopt existing green building codes and standards or to create their own, but many tribes currently do not have such codes in place and are just beginning to develop them. For instance, the Navajo Housing Authority, a SCinIC participant, is working to create culturally relevant green building standards, but has faced delays due to pressing housing need and internal issues.

Costs/Funding

The perceived cost of sustainable construction can be an impediment, as higher costs are often realized upfront, with potential savings from improved health, energy conservation, and more durable housing realized later in the life of the building. However, some sustainable construction technologies do not impose additional upfront costs. Education can change perspectives and life cycle assessments, and benefit analyses can provide tools to determine the technologies that provide the greatest return on investment. SCinIC is providing such assessments as technical assistance (TA) to the Akwesasne Housing Authority of the St. Regis Mohawk Tribe and Cocopah Indian Housing and Development.

Capacity Building

Tribal housing authorities may have difficulty building and/or maintaining capacity for a variety of reasons. For example, changes in key personnel because of tribal council elections or decreases in Federal funds may have enormous impacts on capacity. Smaller tribes may lack the staffing to develop sufficient housing to keep pace with community need. Repeated training, onsite TA, and partnerships with other organizations are ways to build lasting organizational capacity; SCinIC implemented all of these methods to strengthen tribal communities.

Planning

There are times when Federal funds suddenly become available, creating opportunities for tribes to plan projects. However, such unpredictability can lead to a mismatch in community need and available resources, such as land, staff time, housing, or funds. Long-term master planning can help rebalance that mismatch, ease the flow of development, avoid costly delays, and support a tribe's overall goals. For example, the Pokagon Band of Potawatomi Indian's master plan addresses the tribe's long-term housing and self-sufficiency goals. It also emphasizes their commitment to protect the watershed through environmentally friendly water conservation and management. The Ohkay Owingeh Pueblo has a master plan that both revitalizes and protects community within the historic Pueblo core.

SCinIC has funded projects with university, nonprofit, and for-profit entities whose activities focus on different ways of supporting sustainable construction in Indian Country and breaking down some of these barriers. These activities include offering opportunities for Native and non-native young people to participate in sustainable housing development in Native American communities, providing partnership development and TA to tribes developing housing, and creating case studies to highlight best practices.

Service Learning Partnership

Over the past few years, students and faculty from the University of Colorado Boulder (CU) Program in Environmental Design have traveled to South Dakota to collaborate with students and faculty from the Oglala Lakota College and the South Dakota School of Mines and Technology to research and design four energy-efficient homes. Each prototype house will be built using different materials and construction methods and will lay the foundation for training the next generation of sustainable construction professionals.

“Designing for People and Place: Sustainable & Affordable Housing for the Pine Ridge Indian Reservation” is a service-learning program through CU’s Native American Sustainable Housing Initiative, funded through SCinIC. By providing a unique experiential learning opportunity for students to work on a community-based sustainable housing research project, Designing for People and Place is an example of CU’s commitment to community engagement and aligns with CU’s Flagship 2030 Initiative, reflecting “a strong commitment to serving the needs of Colorado while simultaneously becoming a global presence in education and discovery for the benefit of the larger world.”

Cultural Understanding Integrated

This interdisciplinary team of students and faculty, working with the Pine Ridge community, integrated the Lakota culture’s deep respect for the natural environment and sustainability into the design process through a series of community-based focus groups and design workshops held both on Pine Ridge and at the CU campus. This approach to collaborative planning is seen throughout various SCinIC-funded efforts. One example of culturally sensitive design is the use of frost-protected shallow slab foundations to connect the housing to the land—a new technology for the community that is both affordable, energy efficient, and closer to the natural grade. The units are 100 percent compliant with the Americans with Disabilities Act (ADA), which addresses the Lakota emphasis on resilience and kinship of extended family by supporting access for elders. Unlike many non-Native construction projects, each day of construction included Lakota ceremonies and prayers intended to allow team members to become more present with themselves and their team.

Net-Zero Energy Strategy

The team designed the four homes with an emphasis on energy efficiency to demonstrate sustainable alternatives to the current conventional wood-frame houses found across Pine Ridge. The homes are designed to be net-zero energy – producing more energy over the course



Photo credit: Design Group Collaboration

The Kikunol multifamily housing project honors shapes and symbols important to the Passamaquoddy tribe in Pleasant Point, Maine.

of a year than they use – and include cost-effective passive strategies like natural ventilation and passive solar orientation in addition to a combination of active renewable energy systems like photovoltaic panels (PV), solar thermal hot water and wind turbines. All four homes were designed using the Leadership in Energy and Environmental Design (LEED) for Homes rating system criteria. The homes produce 20 percent more energy than they use.

Short and Long-Term Goals of the Service Learning Partnership

The first alternative home being built this year will use straw-bale construction. The three additional homes will be built using structural insulated panels, which are wall or roof panels composed of an insulating core sandwiched by two structural boards; an optimized wood-frame that increases stud placement and eliminates extraneous wood not needed for load bearing; and compressed earth block. The project will collect life-cycle costs and compare the durability of the materials over time. In addition, in-house energy-monitoring sensors will collect real-time climate data and energy usage from the residents. Existing conventional wood-frame houses and mobile homes common on Pine Ridge will provide the baseline for comparison research of the four prototypes.

A key objective of the project will be to develop a comprehensive case study to help inform the future housing choices for community organizations such as the Thunder Valley Community Development Corporation and the Oglala Sioux (Lakota) Housing Authority. The project will also establish an applied research laboratory to educate students of the three partnering educational institutions in the design and construction of sustainable, affordable, culturally adapted, and regionally appropriate housing for Pine Ridge. The research findings will be published in an academic paper, presented at future academic conferences, and shared with the community through an open access website.

Future research opportunities identified include data monitoring; analysis of patterns of energy use by occupants and links between energy-use patterns and occupant behavior; as well as improved energy-modeling capabilities, web-based tools, and innovative systems for construction to accommodate the unique conditions and challenges specific to Pine Ridge.

Technical Assistance Under SCinIC

HUD selected supportive TA as one vehicle for nurturing the use of sustainable technologies under SCinIC. HUD specifically structured the TA to supplement the selected projects. This stipulation ensured ownership of the project by the community, supported capacity building within the tribe's project team, and allowed the project team to continue work once SCinIC TA ended.

The nine demonstration projects represented diverse climate regions and locations, housing types, and sustainable technologies. They were located in Alaska, Oklahoma, Michigan, New York, Arizona, Idaho, and Mississippi. Projects could either be planned or already completed. To support program success, HUD also considered the status of construction funding and tribal leadership's support for the project.

The remote Native Village of Kwinhagak on Alaska's western coast sought TA to combat the effects of wet and windy weather on its housing and high fuel costs. One-third of the community's 160 housing units need to be replaced. When bad weather causes fuel to run out faster than anticipated, the cost of barging in additional fuel pushes prices well above the normal level of \$7 to \$8 a gallon. SCinIC team members in the Cold Climate Housing Research Center worked with Kwinhagak to adapt two designs. One design is an octagon shape that resembles traditional rounded sod houses, which decreases the buildup of snow around houses. The housing wall design includes a continuous layer of soy-foam insulation to decrease air leakage. The prototype of the octagon house has been measured as 80 percent more energy efficient than the current housing stock.

Technical Assistance Provided

The SCinIC team worked with the demonstration site project staff to determine TA requirements. The tribes or tribally designated housing entities with completed projects primarily requested post construction-related TA. This included energy assessments that test current energy usage and project future usage, as well as blower door testing to reveal air leakage results.

The planned construction or rehabilitation projects primarily requested assistance in making their housing or site plans more energy efficient. This included design review (changes to site plans and housing orientation) and recommendations of regionally appropriate sustainable materials, products, and technologies, which often included computer-based energy modeling that simulates energy usage. For the Nez Perce Tribal Housing Authority in Idaho, energy modeling comparing cost and usage of heating and energy technology options helped the housing authority decide to pursue a straw-bale design, but not to include solar technologies at this time. In Arizona, Cocopah Indian Housing and Development, which was budgeting to begin making efficiency upgrades, received TA to link up with its utility provider to access incentive programs. These programs provided 60 faucet aerators, 38 low-flow showerheads, and 360 CFLs at no cost.

Effect of Technical Assistance

The energy modeling and post-construction testing provided communities with baseline assessments of energy usage against which to measure and compare data as the housing ages. The TA included potential or estimated payback and other cost-effectiveness information on products or materials that communities can compare against the real-world costs or longevity of their own installed technologies. Similarly, communities planning future projects can use the recommendations to determine how to invest the upfront dollars for a cost-effective return.

All demonstration projects consisting of planned projects received TA, but not all reached their anticipated construction goals during the two-year contract period. Reasons for delays included the need for additional TA, scaling back because of lack of anticipated funding, or the need to pursue additional funding for added sustainable elements or additional specialists because of lack of local capacity. Additionally, some demonstration projects faced other challenges such as having to learn to work with new techniques or equipment, weather or archeological delays, or internal politics.

Current Best Practices

It is important to acknowledge the innovative and impactful work being accomplished by American Indian communities around the country. In this vein, the Sus-

tainable Native Communities Collaborative, an initiative of Enterprise Community Partners, completed its Case Studies 2013 project, with funding provided in part through SCinIC. The Case Studies documented exemplary tribal housing projects all over the country that took a comprehensive approach to design and construction which could be replicated in other communities. The 17 projects featured represent an emerging trend of sustainable building practices that promise to transform tribal housing projects while preserving their communities' cultural heritage. Best practices from this work show a focus on good design and site planning, successful collaborations and partnerships, community engagement, and innovative financing and construction techniques.

Community-Specific Housing

Many project teams opened a dialogue with the community to discuss specific family, cultural, and heritage needs in order to ensure that the homes were built to meet the goals of their community and geography. For example, the Place of Hidden Waters project is an updated version of the traditional Coastal Salish longhouse characteristic of the Pacific Northwest, and the Guadalupe and Nageezi demonstration homes adopt the adobe-style construction and massing typical of traditional desert homes in the Southwest. Thoughtful site planning, as practiced in the Place of Hidden Waters, Teekalet Village, and Penobscot LEED Homes, can help protect and celebrate the natural habitats central to Native American tribes' heritage and ways of life. Access to healthy food is an important aspect of site planning, and the Place of Hidden Waters is reaping the rewards of onsite community gardens.

Creative Approaches

Building sustainable and healthy communities requires innovative thinking, and many of the project teams demonstrated creative approaches to developing partnerships, technologies, research, and financing. The Apsalooke (Crow) Tribe partnered with the University of Colorado at Boulder to develop an earth block house built by a tribal workforce. The Pinoleville Pomo Nation collaborated with many partners to develop a prototype home and tribally based building codes. Straw-bale homes at Northern Cheyenne in Montana are part of a larger Red Feather Development Group initiative to build super-insulated housing using all-volunteer crews. The Ysleta del Sur Pueblo was the first tribal housing project in Texas to take advantage of low-income housing tax credits, which required considerable partnership building and tenacity.

Comprehensive Approaches

All of the projects take comprehensive approaches to green building, including connections to long-term planning initiatives. In most cases, cultural and economic sustainability were as important as environmental sustainability. Tribal enterprise and employment are crucial to economic sustainability, and many projects incorporated locally-produced or traditional materials such as Navajo FlexCrete (a solid fiber reinforced aerated fly-ash concrete material), earth, straw bales, and SIPs. The project team for Kumuhau Subdivision modified the AirScape whole house fan, which provides an air circulation system in place of air conditioning, to produce a quieter ventilation system called the Kohilo fan. The Navajo Housing Authority's Sustainable Community Planning Manuals were designed to improve the development of more than 34,000 new homes, and more than half the homes in the sacred and cultural core of Ohkay Owingeh have been rehabilitated by tribal members who relearned the traditional method of building with adobe and mud plaster.

Several projects have been catalysts for other community revitalization projects, and many are considered national and regional models. The Place of Hidden Waters and Owe'neh Bupingeh are recipients of the international Social Economic Environmental Design award as well as other national awards for design, planning, and green building. Devine Legacy on Central was the first mixed-income, transit-oriented development built along the light rail line in Phoenix, Arizona.

Conclusion

HUD's SCinIC initiative has used multiple approaches to demonstrate high-quality sustainable housing in tribal communities and assist tribes in overcoming some of the continuing obstacles to implementing sustainable construction practices and technologies. Approaches that emphasized collaborative planning emerged as a particularly promising strategy for developing internal capacity, community ownership, acceptance of sustainable technologies, and a unique expression of cultural vision in housing. The collaboration continued from community workshops through master planning processes and the development of full-fledged integrated designs. Through the dissemination of these best practices and research results, more tribal communities will be able to create their own culturally appropriate and environmentally responsible housing – providing hope and strength in sometimes desperate conditions. **CI**