SANDIA REPORT
SAND**2023-09029**
Printed September 2023

Sandia National Laboratories

Consensus-based Planning for Strategic Tribal Renewable Energy Projects

Veronique M. Arguello

Prepared by
Sandia National Laboratories
Albuquerque, New Mexico
87185 and Livermore,
California 94550

Issued by Sandia National Laboratories, operated for the United States Department of Energy by National Technology & Engineering Solutions of Sandia, LLC.

Available to DOE and DOE contractors from
U.S. Department of Energy
Office of Scientific and Technical Information
P.O. Box 62
Oak Ridge, TN 37831

Telephone: (865) 576-8401
Facsimile: (865) 576-5728
E-Mail: reports@osti.gov
Online ordering: http://www.osti.gov/scitech

Available to the public from
U.S. Department of Commerce
National Technical Information Service
5301 Shawnee Rd
Alexandria, VA 22312

Telephone: (800) 553-6847
Facsimile: (703) 605-6900
E-Mail: orders@ntis.gov
Online order: https://classic.ntis.gov/help/order-methods/

ABSTRACT

Tribal planning for Native Country considers Tribal factors and sovereignty for local management, land-use, and plans for tribal (American Indian and Alaskan Native) energy development. Consensus-based strategic planning is an approach to acknowledge and utilize Indigenous traditional ecological knowledge and local historical context in the community. Consensus-based strategic planning pushes for meaningful public participation in the phases of planning. Both planning approaches can support community and local knowledge of historical infrastructure, land management, and environmental patterns. Applying traditional ecological knowledge and Indigenous knowledge in energy planning and development supports Indigenous (people not federally recognized or affiliated with a Tribe) communities in their plans for energy sovereignty. Indigenous peoples can continue to move forward with resilient and traditional lifestyles and plan practical (long- or short-term) solutions with consensus and strategic planning. Indigenous communities, leaders, facilitators, and planner exhibit how consensus-based strategic planning applications can advance Tribal sovereignty in renewable energy planning.

ACKNOWLEDGEMENTS

I would like to acknowledge the devoted support and mentorship from the Indian Energy Program team. Sandia National Laboratories staff - Sandra Begay, Dylan Moriarty, Stan Atcitty, and Gepetta Billie, have been my ongoing supporters for my Tribal planning career. Thank you for the check-ins, laughs, and fulfilling meals together.

CONTENTS

LIST OF FIGURES

ACRONYMS AND TERMS

Acronym/Term	Definition
AGMA	Arizona Groundwater Management Act
APA	American Planning Association
Comprehensive Planning	A way to incorporate southwest stakeholders to plan for long-term spatial planning for water resources and urban density. It is also a tool for implementing policies, and goals for the water supply of urban spaces.
Consensus Planning	A way to incorporate community leaders, right-holders, and knowledge keepers in planning phases to encompass a meaningful community vision for future development and plan implementation.
FEWS	Food, Energy, and Water Security Systems
GIS	Geographic Information Systems
IEP	Indian Energy Program
ITEK	Indigenous and Traditional Ecological Knowledge
MOUs	memorandums of understanding
SEP	Strategic Energy Planning
SNL	Sandia National Laboratories

This page left blank

1. INTRODUCTION

This work describes the critical elements Tribal planners should consider when planning new infrastructure projects on Native lands to strengthen Tribal sovereignty. Indigenous communities and Tribal governments all have their unique characteristics and cultural nuances, which require a consensus-based facilitation and analysis for Tribal planners to better understand and document Tribal energy needs and supply capacity. Careful consideration of the tribal capacities for Food, Energy, and Water Security Systems (FEWS), and Indigenous and Traditional Ecological Knowledge (ITEK) factors, can effectively mitigate increased demand for Tribal resources such as energy, housing, agricultural products, and quality water amid inadequate supplies.

We discuss consensus-based approach to planning strategic infrastructure projects. A consensus-based planning process will facilitate in securing resources and funding so Tribes and Sovereign Nations can continue environmental planning and ethically sustain their traditional and cultural responsibilities to the land. Careful planning helps Tribal nations to understand their energy systems and loads. Accurate representation of the community's demographics, assets, visions, FEWS supply, housing development, Tribal context, political realities, and population growth patterns are key to developing an ethical plan. This report considers both formal and informal physical and social structures in Tribes, which are specified community assets.

Additionally, we discuss the challenges that climate change is causing in many communities resulting in an increased number of Tribal health and environmental impacts due to extreme weather. Weather conditions such as drought can lead to wildfires, a decrease in biodiversity within the environment, and heat-related illnesses and fatalities in citizens. We also discuss how some Tribes are developing plans to adapt to climate change by developing renewable energy sources such as solar energy. Finally, we conclude this work by offering recommendations for improving the planning process for strategic energy projects to optimize success and benefit for the Tribal communities.

This page left blank

2. WHY IS TRIBAL PLANNING IMPORTANT?

2.1. Planning for Community Development and Energy Development

American Indian and Alaskan Native tribes, nations, and communities face many obstacles when it comes to accessing food, energy, and water resources both on and off Tribal lands and federal reservations. Tribal representation and participation are vital in the planning and community development process for establishing community facility needs, as well as human and infrastructure capacities.

Planning for Tribes is a unique approach to this problem because the needs and capacities of Tribal communities can be understood through community engagement and validating traditional-based knowledge. Certain Western planning approaches for Tribes throughout western American history has resulted in loss of heritage foods, Tribal energy security, water quality and Tribal sovereignty. Culture, a language barrier-limited Consensus, and strategic planning all utilize approaches and engagement involving community and local governments in the planning process. Community members across multiple Tribes can benefit from planning processes like the strategic energy planning proposed in this report. Many non-Indigenous people are currently living and developing on ancestral and federal Indigenous lands, so it is possible for them to also benefit from strategic initiatives in Native Country, especially when it comes to accessing an energy grid in rural United States.

Consensus-based strategic planning approaches for Tribal communities can lead to visionary and culturally relevant solutions in lowering the inaccessibility rate to food, energy, and water resources. Planning is a collaborative effort between many groups of people; Tribal Nations, and Indigenous people, all having sovereignly showcased climate resiliency and environmental stewardship before North American Indigenous Nations were colonized. The rate of population growth and urban sprawl should indicate a critical need for Tribes to autonomously analyze and plan their cultural assets and spaces. Advancing Tribal sovereignty and Indigenous Traditional Ecological Knowledge[1] (ITEK)-based development through determining solar, wind, and hydro-renewable energy capacities for Tribes will allow them to lead and apply for opportunities that support their (renewable) energy production. This report considers both formal and informal physical and social structures in Tribes, which are specified community assets.

[1] An assembly of experience, observations, and lessons collected through intergenerational knowledge.

2.2. Food, Energy, and Water Security Systems

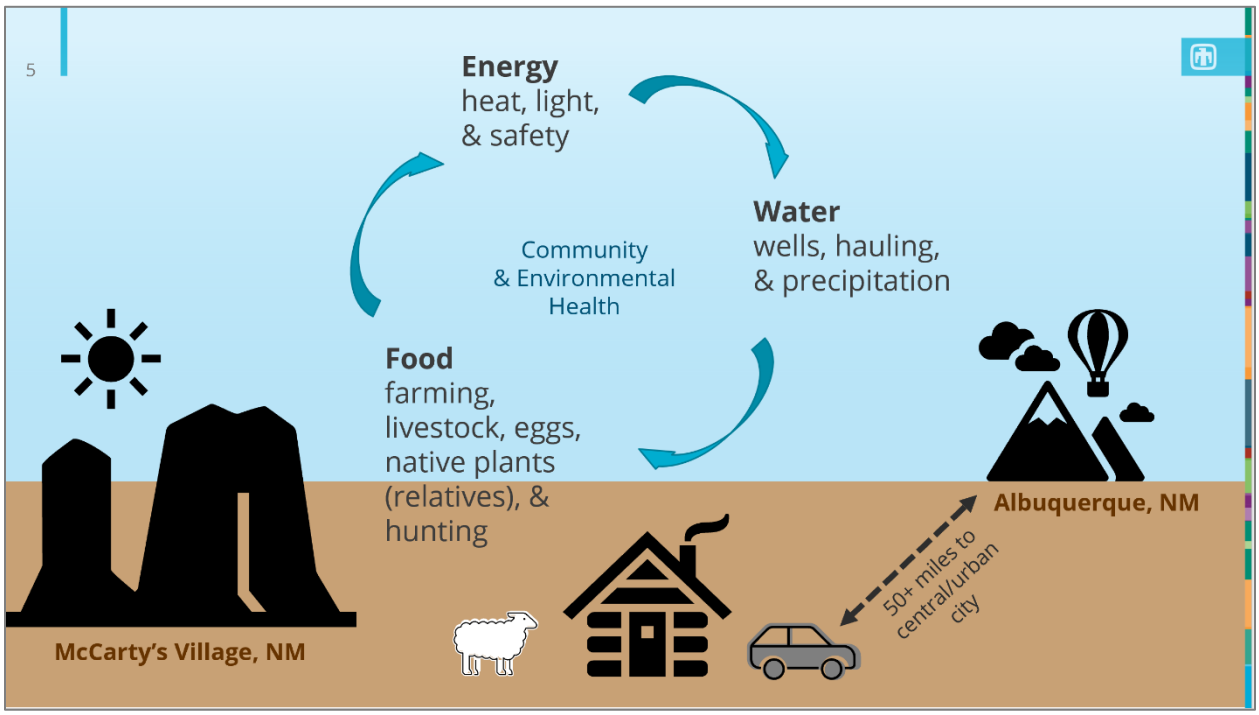

Figure 1. Food, Energy, and Water Security (FEWS) model on the cycle of relations between each system

Figure 1 depicts the relationships between water, energy, and food systems and how they relate to and rely on the other. Note that between two geographic landmarks is a web of food, energy, and water security (FEWS) resources that encompass the general structure of community and environmental health. The dwelling (a house with one vehicle) is part of a relationship between the environment, infrastructure, and FEWS resources. Indigenous Collaborations, Inc. and Sandia National Laboratories (SNL) coordinate together alongside Tribal leadership and participants to develop a Tribal consensus-based strategic energy plan[2] (SEP), which can be used alongside other site and vulnerability assessments to guide Tribes in determining solar, wind, hydro-renewable energy capacities for better preparation in leading and applying opportunities that support their energy production.

[2] Strategically directed energy visions for future energy development and use. The consensus-based strategic energy planning process entails an elaborate workshop with community participants and local Tribal leadership

3. PLANNING

What type of impact does a plan and project development have on American Indian and Alaskan communities? First, there must be an understanding of shifts in landscape, infrastructures. and biodiversity between rural and urban America. One example of how complex the landscapes are in the nation is the fact that the United States can be measured in the following ecoregion areas[3]: Level I, Level II, Level III, and Level IV [14]. This type of framework presents an assessment of the diverse environmental landscapes across the nation, and each region is unique in geographic resources (abiotic and biotic) and wildlife and ecosystems, as shown in the Level III Ecoregion map below. There are different levels/scales to categorizing ecological regions, and biodiversity information varies; however, biodiversity tends to become more complex in Level III and Level IV Ecoregion areas.

Note that these categorized ecoregions and biodiversity patterns are boundless, so even among the different level of jurisdictions in the United States, it is important to consider multiple ecoregions while planning. Other tangible and intangible sources, like natural resources, culture, language, and built environment can be presented in complex, boundless[4] areas across the nation.

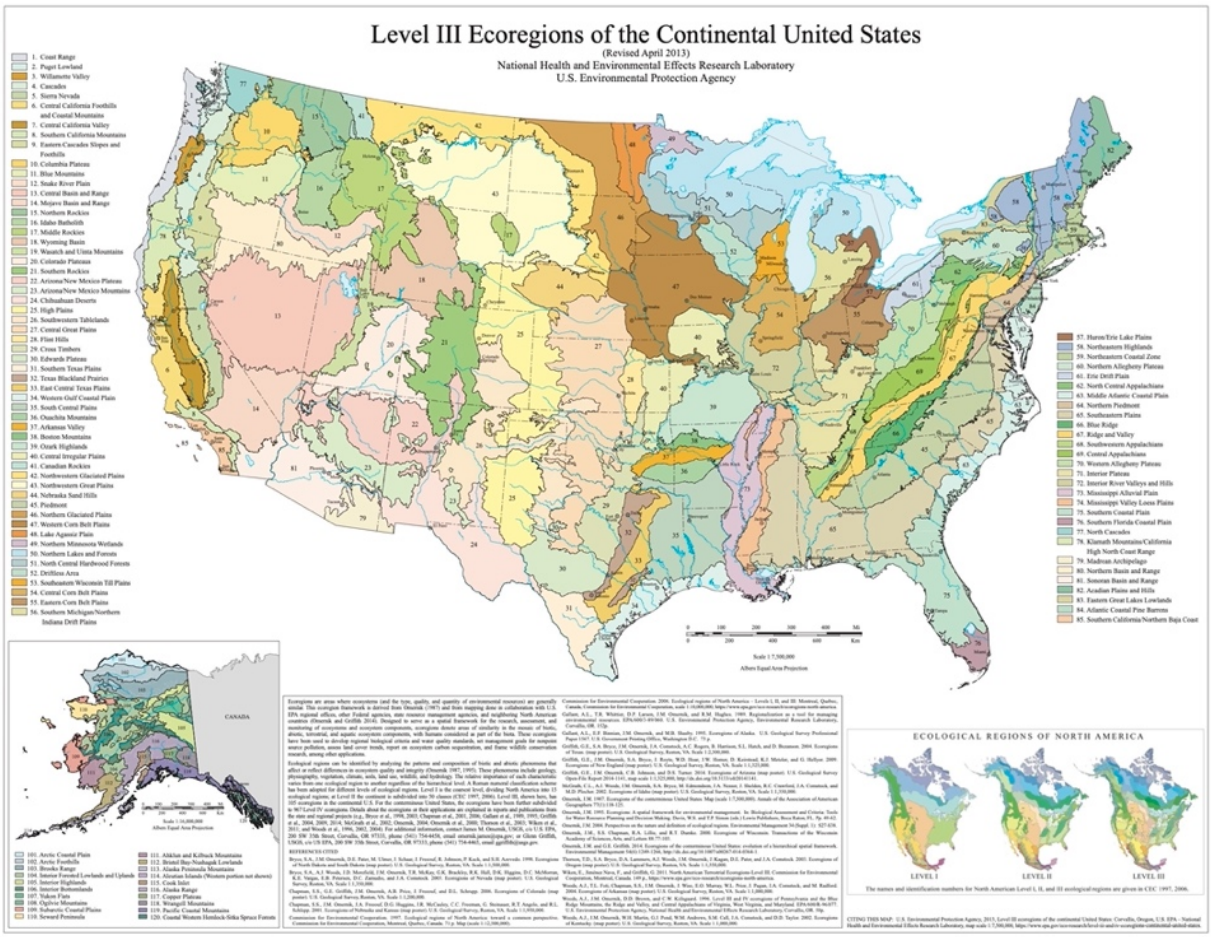

Figure 2. United States Level III Ecoregions Map [14]

[3] different scope levels of continental ecoregions

[4] Does not abide by any political boundaries

Not only are the nation's landforms complex, but climate and weather patterns vary greatly as well, influencing renewable energy capacity for energy sources. For example, renewable sources like hydropower, solar, and wind energy rely on water supply and weather patterns (e.g., cloud and sunlight patterns). Like biodiversity, climate and weather patterns are boundless and therefore do not follow socially constructed political boundaries.

Despite how energy resources are distributed to people on the grid through utilities and authorities, energy primary sources and generation resources vary across the nation's geographical locations and landform. Other patterns like population growth and political boundaries factor into what Tribes and non-Tribal entities (i.e., counties and municipalities) are capable of planning for. For example, population density can vary in rural and urban areas (federal Tribal areas exist in both) because of population growth, economics, and culture. Culture plays a significant role, especially for Tribal planning, as Indigenous culture is rooted with the land, environmental landscapes, and heritage. Non-Indigenous populations live near or on federal reservations and Tribal homelands, however it is not guaranteed that there is local education on Indigenous historical, environmental, or political context. ITEK-related information in those specific contexts provide insight and generational knowledge of the community (environment, human, and wildlife in the same area sharing a culture).

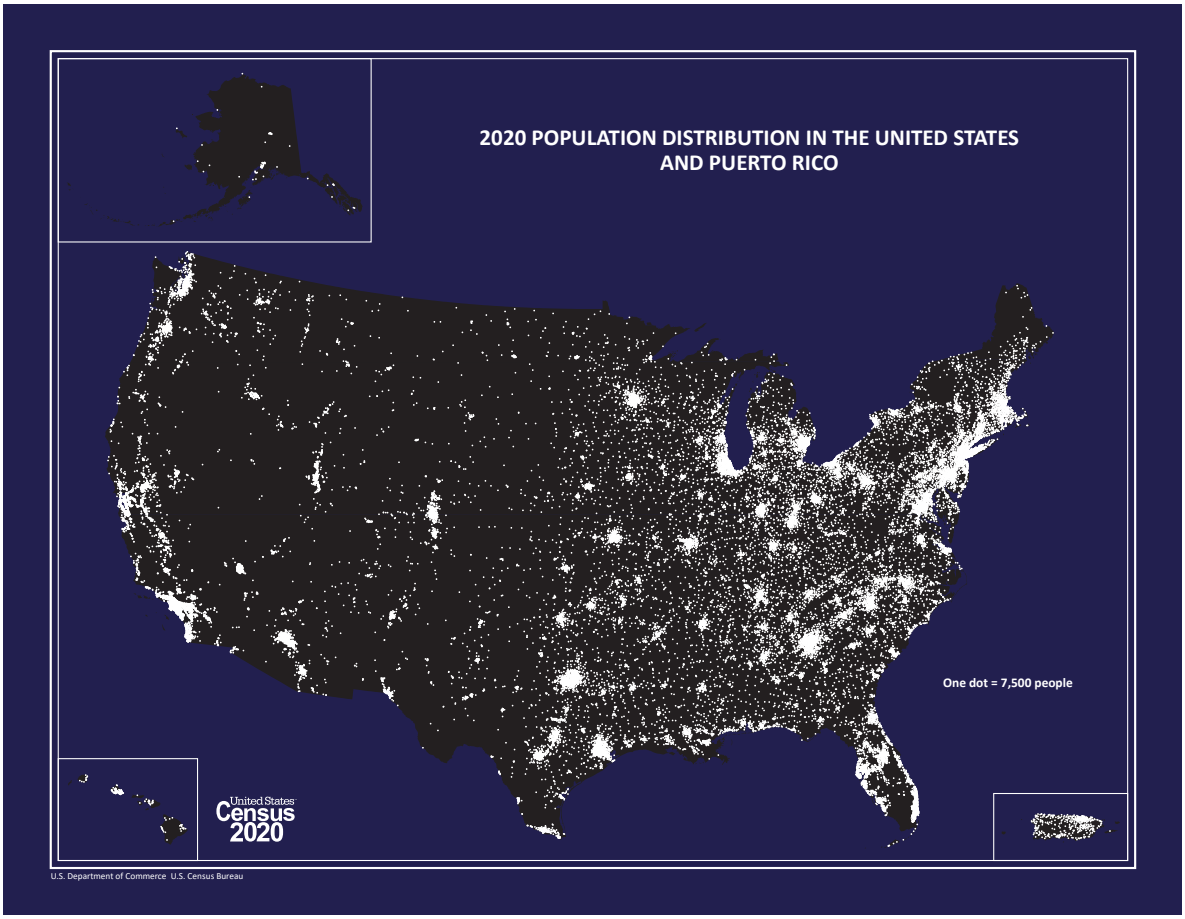

Figure 3. 2020 Population distribution in the United States continent and territories. [15]

Currently, the United States federally recognizes 574 Tribes. Sovereignty exists in many forms among these Tribes and their governments and/or leadership styles. It is important to note that even though the federal Tribal lands have boundaries, Tribal-affiliated communities, resources, and sacred places can be located outside of these politically constructed boundaries. Figure 4 shows federal Indigenous lands across the continental United States. Although the state of Hawaii is not on Figure 4, Native Hawaiian and Pacific Islander communities have a similar culture connection to their homelands and heritage resources as Native American and Alaskan Native communities.

Although Native American and American Indian groups are limited in jurisdiction areas, Tribal governments still have the ability to exercise Tribal sovereignty for policymaking, regulation, and management. Federal Tribal entities can use their sovereignty to strategically develop Tribal-led natural resource management, land-use ordinances, and technical capacities for Tribal operations. An example of maximizing energy development for federal Tribes comes from the U.S. Bureau of Indian Affairs who provide the Tribal Energy Development Capacity Grant Program. This program provides funding support for Tribal goals like developing energy infrastructure, policies, regulations, and utility authorities [5]. Federal Tribes have an annual opportunity to receive federal assistance for developing energy resources while still achieving Tribal goals and sovereignty in the energy planning process.

Figure 4. Indian Lands of Federally Recognized Tribes of the United States [5]

Planning can be a field that formally manages policies, ordinances, and public engagement for existing and future development in different scales of jurisdictions. Patterns and people are subject to shift over time, so planners must consider future factors and project future capacities and conditions (e.g., population, food, energy, water supply, economics, etc.) to conduct a site analysis.

Attaining context from a site analysis is a process in which planners gather sets of information, collect data, and review environmental conditions to analyze an area for development, zoning, and urban/rural design. Sectors of planning can become complex, but usually different planners work alongside each other within a jurisdiction area to complete projects.

However, not all planning sectors have an equal number of planners or resources available. The American Planning Association (APA) is a membership-based networking organization for upcoming (usually those in academia) and professional planners in the United States. A decade ago, an online survey was conducted among APA members on what planning sector their employment position is categorized under. At least 51% of respondents were employed in municipal sectors while 1% of respondents are employed in the Tribal planning sector. The pie chart depicted in Figure 5 shows how Tribal planning representation is significantly lower than other planning sectors.

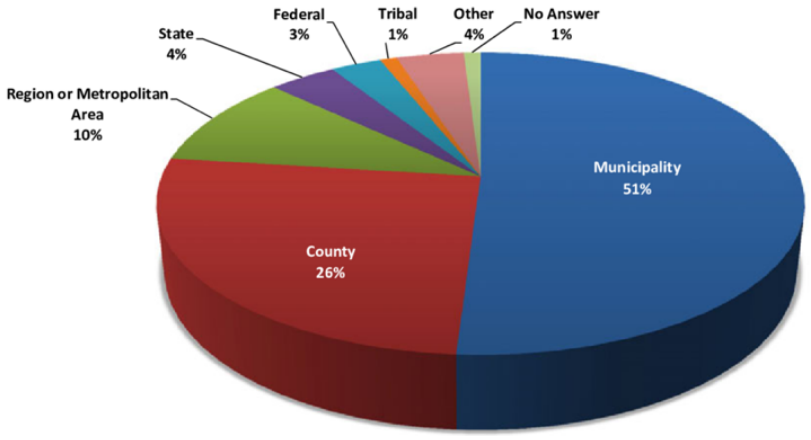

Figure 5. APA online survey response results for employment planning sector categories among members [16]

Based on this data, planning capabilities and resources in each sector are likely to vary by population density and centralization factors.

3.1. Western Planning Impacts

The United States development and population patterns are important factors in planning priorities and needs within a community. In the 1970s, industrial developments and labor attracted populations to centralized urban cities/spaces and urban renewal projects in the United States. After the phenomenon of urban renewal, urban sprawl and decentralization were common for many municipalities in the southwest (i.e., Tucson, Phoenix, Las Cruces, and Albuquerque). The impacts of urban renewal phase are still evident today, as seen in phenomena like displacement, land-use ordinances, and redlining. As a result, rural, urban, and regional Tribal communities needed to adapt to growth and development impacts from each sector.

Physical or urban sprawl[5] is used to describe the expansion of community density across land, whereas growth can describe community density that is expanding or building upwards. For example, in a dense urban region like New York City, NY, the area has limited space to expand city infrastructure that sprawls in space across the city area. The sky is metaphorically limitless, so the most convenient way to expand is by building upwards. In rural areas, community assets and infrastructure are sprawled across the land, and neighbors can even be a couple miles apart.

[5] Planning term

Population density, growth, and demographics are factors that determine community needs in the present and future. Even with advanced analyses, planning for projected populations is a challenge due to so many moving parts in a development project.

Not only is human behavior and pattern subject to change, but even with persistent measures and goals, planning projects and approaches can lead to negative impacts on people and the environment, like the urban renewal era. For urban areas, decentralization was a result of urban renewal, meaning that central nodes of cities were eventually misshapen due to urban sprawl and displacement. The urban renewal project is one example of how the U.S. government, through the Department of Housing and Urban Development grant and loan program, attempted strategic planning for population growth in several cities (Inclusive Historical Handbook, 2019). Unfortunately, because of the urban renewal development process, some cities and towns were stripped of local culture, landmarks, and city monuments that had been historical heritage.

Planning for non-Tribal communities is often guided by western research and planning approaches that may exclude local culture, historical, TEK, and environmental context. In the Southwest United States, housing, and commercial development that occurred on or near Tribal communities and federal lands were not always a priority for utility service access. For example, primary energy sourcing and energy conversion occurs near Tribal communities[6]. Historically, western urban planning, land-use planning, and water management have been disconnected from one another in terms of inter-planning for development and resource security. Over 40 years ago, legal mitigations and actions in creating the 1980 Arizona Groundwater Management Act (AGMA) politically shaped how water issues will be regulated for present and future resources of the state. During AGMA planning former council attorney and state staffer, Kathy Farris, proposed that the AGMA include a water supply security requirement; this proposal was dismissed because there were other water needs argued as more of a priority. However, in recent years, planners, politicians, and especially water managers, recognized that ensuring water supply security is a priority for the Southwest. But even before this planning period, Indigenous peoples were advocating for the ethical and more sustainable regulation of food, energy, and water sources on federal Tribal lands and homelands.

Figure 6. (left image) A photo of New York City, New York skyline and open space. [17] & (right image) A photo of completed Pedestrian Mall for an urban renewal project in Downtown Las Cruces, New Mexico. [18]

3.2. Tribal Planning Impacts

Planning for Tribal Nations can be done through a consulting office to a government relationship, where the Tribal leadership/government exercise Tribal sovereignty to upload Tribal regulations for

[6] Note that environmental impacts are boundless and can affect several communities with one event

lands. Tribal communities can be affected by health and environmental impacts concerning non-Indigenous planning, regulations, and development. For example, many Tribal Nations and communities in the United States upheld Tribal regulations and protocols for the COVID-19 coronavirus pandemic regardless of state or federal regulations. Tribal Nations self-regulate public health protocols with executive power in Tribal jurisdictions. The plotline graph in Figure 7 shows patterns of American Indian, Alaskan Native, and Native Hawaiian populations reaching highest number of COVID-19 deaths and cases. The pandemic put a halt on urban planning systems like public transportation, food systems, funding, and project timelines. Rural Tribal community members often find themselves commuting over 30 minutes to a grocery store with limited groceries, and more than a half an hour to a health center, school or place of employment near central towns and urban cities.

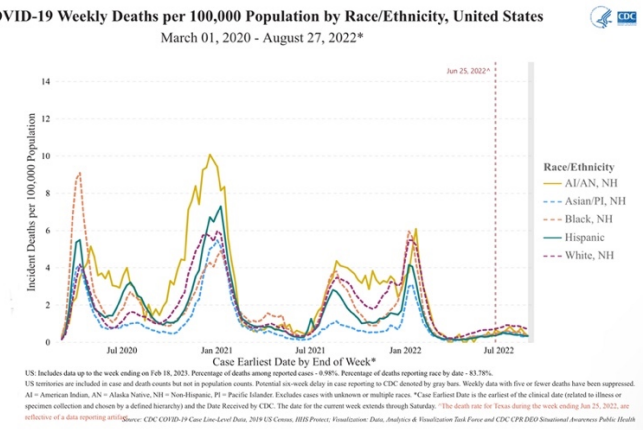

Figure 7. (left image) A photo face mask-requirement signage of San Xavier Mission on Tohono O'odham Nation, Arizona. (Arguello, 2022) & (right image) A plotline of COVID-19 weekly cases and deaths per 1000,00 population by age, race/ethnicity, and sex. [19]

Expansion patterns indicate that urban sprawl development will occur in population dense municipalities and growing urban cities like Albuquerque will have to consider the surrounding communities and federally recognized Tribes' boundaries shown in Figure 8. Landscapes and (in)tangible assets attract development and land management among Tribal lands in the past, present, and future.

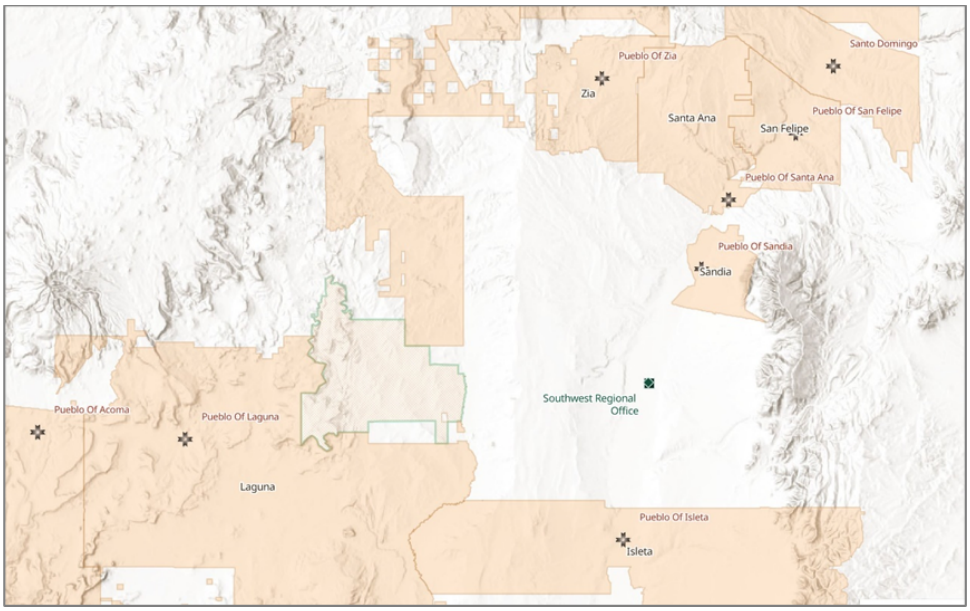

Figure 8. Aerial view of federal Tribal boundaries that surround the largest city in New Mexico, Albuquerque. There are five federal Tribes that physically border the City of Albuquerque and Bernalillo area: the Pueblo of Sandia, Pueblo of Isleta, Pueblo of Laguna, Pueblo of Zia, and Pueblo of Santa Ana.[7]

Meaningful Tribal community outreach and engagement can serve as a sustainable land management practice as it provides planners and consulters the opportunity to discuss and understand challenges and successes for the community's needs, capacity, and supply. It is important to recognize Tribal Nations as key rights holders, so that Tribal lands, resources, and responsibilities are protected through the planning process.

Tribal planning differs from regional and urban planning sectors because ITEK and intergenerational knowledge (Tribal knowledge that has been communicated through oral stories, teachings, and community resources) are incorporated throughout the planning process to reflect Tribal perspectives. Communities, organizations, stewards, and leadership participating in the Tribal planning relate and review the local language, cultural experiences, traditions, and concerns in a planning document. Planning sector sources and workforce representation projected in Figure 5 shows a need to intersect Tribal planning with community and consensus-based interactions and Western planning for beneficial environmental results, pointing out a critical need for Tribal planning involvement in FEWS resources for Tribes and Indigenous people in the Southwest. Commercial/local water, fossil fuel, and food supply and quality are declining, so the need for Tribal strategic planning is critical to secure the future of FEWS resources.

[7] It is important to note that the federally marked Tribal borders may exclude sacred and traditional landscapes and sites for Tribes and cultures.

This page left blank

4. Need For Consensus-Based Strategic Planning Effort

Energy insecurity across Native Country is concerning, given the social, environmental, and political factors for Tribal Nations. The consensus-based SEP process should include community, key stakeholders, and local organization input in energy management. Accessible and meaningful community engagement and public participation for Tribes is vital to acquire an authentic and detailed understanding of what the community needs are for energy sources. This process helps participants recognize unique sociological dynamics of the community experience. Formal planning outreach events like public hearings provide the public with equal timed platforms to voice their concerns which can result in more comments, but less time to process and elaborate the participant's experience. Public hearing settings and agenda may not reflect ITEK significance as it limits qualitative analysis of community capacity.

Community engagement should be accessible in terms of language, location, scheduling, and information materials. Since many traditional public hearings are held during busy hours of the day, there is limited representation of the community available to speak on the Tribal community's behalf. The consensus-based SEP process plans for place and time with limited distractions to be a space for participants to enjoy the process fairly.

4.1. Comparison between Community Outreach and Community Engagement

Figure 9. DOE Summer Internship Presentation Slide information regarding each public participation phase: community outreach and engagement prior, during, and after project planning process. (Arguello, 2022)

Consensus-based planning is a communal engagement between planners and Indigenous right-holders. Community engagement is fundamental for this process because historical context and perspective can be shared on topics like environmental patterns, authority, community values, and needs. Historical context can be information that provide important analysis upon important periods, historical events, origin stories, and cultural history to the local community. ITEK may be a way to identify historical significance for Tribal environments.

Through Sandia's subcontractor, Indigenous Collaboration, P.B.C. (SEP Facilitators), a workshop guided participants through a historical experience - a conversation among participants to reflect on historical events that impacted accessibility to Tribal resources, culture, and utility services. The dynamic of this specific workshop setting was different from a formal community outreach event, like a public forum where the consulting group bring their facilitators and outreach materials to a SEP workshop group and affiliated workshop space.

Tribal planners bringing the outreach and planning engagement to Tribal communities increases participation opportunities for local Tribal members with interest in the SEP platform to share their personal experiences. Bringing planners to Tribal communities can increase public participation by providing a community engagement that takes place in accessible and safe spaces for Tribal community members and leadership to voice their concerns. Consensus-planning values community opinions since ITEK-based observations and opinions on Tribal accessibility, preparedness, historical context, memorandums of understanding (MOUs), and accountability throughout the decades and generations reflect on how Tribal Nations have remained adaptive and standing despite historical displacement and limited planning resources.

Groups like Indigenous Collaboration, P.B.C. have a list of foundational values, including in their facilitation framework for the public:

- Participation: Ensuring that participants are given the chance to participate in the discussion and their intentions and opinions are given a chance to be voiced and noted.
- Teamwork: Working with others of different backgrounds to reach a goal or conclusion, developing, and having trust is part of the process.
- Creativity: What unique perspectives and approaches do folks bring to the table, and how do those skills contribute to critical thinking and problem-solving?
- Consensus: Agreement understanding and collaboration to move forward in union through planning and decision-making.
- Action: Moving conversations and dialogue to inform action on workshop topics and agendas.

Planning for Tribal Nations can easily become complex, especially when identifying historical, environmental, planning, political, and social contexts that influence Tribal planning. Consensus-based planning approaches tools like the facilitated workshops and conversations are framed to embrace participation insight, community knowledge, and ITEK. More Tribal Nations are advancing sovereignty in planning, development, and essential resource management among Tribal lands, so using consensus-based approaches can align with Indigenous culture and TEK.

4.2. Tribal Climate Adaptation

Effects from climate change and extreme weather conditions like drought and extreme heat are creating challenges for Southwest Tribes. These conditions can lead to wildfires, a decrease in biodiversity within the environment, and heat-related illnesses and fatalities in citizens. Looking at

the map data from Figure 10 shows that the United States Southwest region has limited water resources and often experiences drought, especially in the arid-dry region areas. In June 2022, the whole nation experienced critical high temperatures and extreme heat levels. Indigenous people across the nation are facing human and environmental health impacts because of climate change.

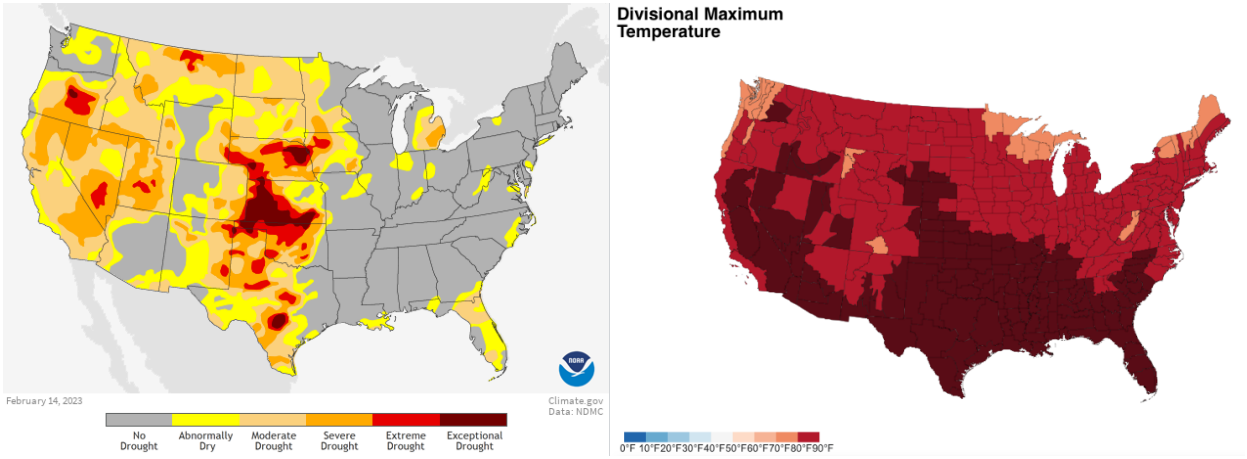

Figure 10. (left image) A U.S. continental map excluding Alaska and Hawaii states with collective Drought monitoring data since 2010. (NOAA, 2023) & (right image) A U.S. continental map excluding Alaska and Hawaii states with Maximum Temperature data in June 2022; note that temperatures exceeding 90 degrees Fahrenheit is considered extreme heat. (NOAA, 2023)

According to the 2014 National Climate Assessment, there is a critical need for long-term solutions and investments in Tribal adaptation to climate change impacts. It is also stated in the assessment, "Indigenous peoples' traditional knowledge systems can play a role in advancing understanding of climate change and in developing more comprehensive climate adaptation strategies." (Fourth National Climate Assessment: Chapter 15). Figure 11 shows a map that details the Southwest sector's mapping climate action planning events, resources, and tools for Tribal nations to utilize for local environment and community development. The Southwest has many Tribes in its region, and several Tribal Nations have developed plans for climate adaptation, climate action planning, climate change, and Tribal adaptation.

Figure 11. Southwest sector it taken from the Bureau of Indian Affairs, *Indigenous Resiliency Program* that indicate where Tribal action planning occurs for climate adaptation.

Developing renewable energy sources for Tribal Nations supports Tribal sovereignty, increases Tribal access to utility services, and invests into Tribal economy and development by creating local renewable energy development. For example, according to weather and climate patterns, the Southwest sector has great potential for solar energy. The Southwest typically has more days of sunlight given its geographical location on the Earth's surface. Figure 12 shows a map of solar irradiance energy data. An example of how Tribal Nations are adapting to climate patterns comes from the people of the Navajo Nation, who assist off-grid homes to gain access to energy and utilize sources like solar energy.

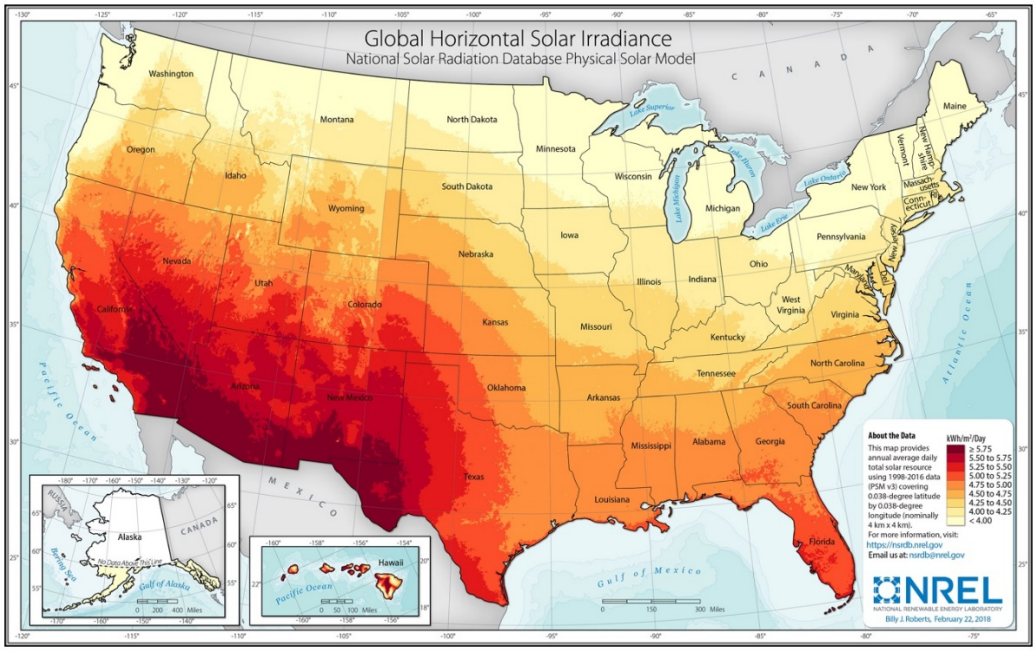

Figure 12. A U.S. continental map with annual GHSI data that measures solar energy potential and capacities [20]

During the summer, SNL's Indian Energy Program (IEP) team traveled on a visit[8] to Native Renewables office founders and employees in Flagstaff, Arizona. The field visit to Native Renewables was an opportunity to discuss with Indigenous women in energy who own operation and renewable energy businesses to provide solar energy to off-grid homes in the surrounding Tribal communities. The team met with former Indian Energy Program interns Deb Tewa and Suzanne Singer, along with four other Native Renewables current staff. Throughout the conversation around Tribal energy, business decisions, challenges, success, and barriers, Deb and Suzanne emphasize that investing into the local community through education, workforce, infrastructure, and representation is vital to adapt trustful relationships especially between energy providers (utility) and consumers. Energy is a fundamental necessity to have a higher quality of living in modern times because current systems utilize electricity, cooling down with air conditioning, phone communication, storing medical equipment, storing medicine, storing foods, class and education, and even virtual doctor appointments.

[8] field visit of project implementation

Energy insecurity across Native Country is concerning, given the social, environmental, and political factors for Tribal Nations. Solar energy can be a resource to decrease barriers in grid access for rural and off-grid Tribal communities and increase quality of life because community members have an energy source. Land rights or not, Indigenous peoples are taking steps adapting to the impacts of climate change and co-solving food, energy, water security challenges. Comprehensive communication between public and planners is during all phases of plan implementation for the utmost productivity in Tribal energy systems.

This page left blank

5. INDIGENOUS COLLABORATION, P.B.C. AND STRATEGIC ENERGY PLANNING

Indigenous Collaboration, P.B.C., a Native American- and woman-owned business, employs facilitators and planners to engage with Indigenous peoples, Tribal government, leadership, and community participants. Indigenous Collaboration, P.B.C. schedules a time to meet with the Indigenous clients to facilitate conversations and workshops on consensus-based strategic energy planning. Workshops can take anywhere from one to three days to discuss topics on Tribal energy, history, heath, and other topics. The workshops are hosted at a location within Tribal lands and communities, ensuring minimal distractions, translation services, on-site meals, refreshments, and a familiar cultural environment. Indigenous Collaboration, P.B.C.'s approach for SEP embraces realities and complexities of Native Country through consensus and facilitation approaches.

5.1. Virtual Interview [10]

An interview of Lesley and Paul Kabotie, Indigenous Collaboration, P.B.C. facilitators, was conducted in August 2022. This interview was a virtual video call with 2022 summer IEP interns and program director, Sandra Begay. In this interview, Lesley and Paul Kabotie provided their strategic planning expertise and perspectives on advancing Tribal sovereignty in clean energy development on Native Country using consensus-based planning. Community realities, social, political, cultural, economic, and the environmental contexts should influence strategic Tribal planning and development. Facilitating dialogue and engagement activities encourage community participants to voice opinions, share experiences and become more understanding needs for that community. The consensus-planning engagement topics, like the history context, provide participants with a space to learn and share generational knowledge and ITEK information, which is often most heartfelt and meaningful for community participants. Dialogue between Indigenous Collaboration, P.B.C. facilitators and participants on topics workshop topics like historical context and vision is a dedicated time to extract values, motives, and goals for the Tribe's future. Values, motives, and goals can align with different topics like energy development, public health, Tribal sovereignty, and environmental and resource management.

Lesley and Paul emphasize that focusing the conversation on Tribal issues among participants is not always informative if details are left out. A good facilitator will lead the conversation to uncover patterns, dynamics, and functions of the community. The facilitation frame worked to use the Indigenous Collaboration, P.B.C foundational values supports consensus-based participation among the group. The consensus-planning process is not just an exercise or plan; it is working together between consultant, planner, and community to address issues and challenges together.

During a one-year implementation phase, Indigenous Collaboration, P.B.C. followed up with the Tribe and their strategic energy plan to implement actions the achieve energy vision. Lesley and Paul note that this consensus-based planning process is situational, given the diversity of Tribal Nations and community contexts. Lesley and Paul Kabotie prepare for the SEP facilitation process by not assuming Tribal dynamics, because context is always *more* complex. Even though the SEP process can be intricate, it provides a less intense and overwhelming Tribal planning process compared to a five- to ten-year comprehensive plan process. The Tribal Nation can use the final SEP to implement strategic energy planning strategics and development even as soon as the SEP deliverable is completed. Consensus and culturally sensitive approach in Indigenous Collaboration, P.B.C facilitation can advance Tribal sovereignty.

5.1.1. Indigenous Collaboration's Consensus-Based Strategic Energy Process (SEP)

In the Indigenous Collaboration, P.B.C consensus-based strategic energy planning process, there is follow-up from Indigenous Collaboration, P.B.C. to the Tribal Nation to discuss goals and indicators for goals withing the SEP. There are quarterly goals and tasks to divide amongst the community that focus on four topics:

- Community
- Education
- Funding
- Infrastructure Development

Once the sections in the SEP are completed and reviewed, Indigenous Collaboration, P.B.C. and SNL will then provide all SEP information to the Tribal Nation, for which Tribal Nations are responsible for distribution. There is an established respect, trust, and understanding between Indigenous Collaboration, P.B.C. facilitators and the participants to ensure the group is comfortable discussing emotional, important, and sensitive topics. Tribal communities can benefit with community engagement, utilizing a planning framework including the following foundational values: participation, teamwork, creativity, consensus, and action for a facilitated conversation or workshop.

5.1.2. Pueblo of Acoma Strategic Energy Plan, 2018

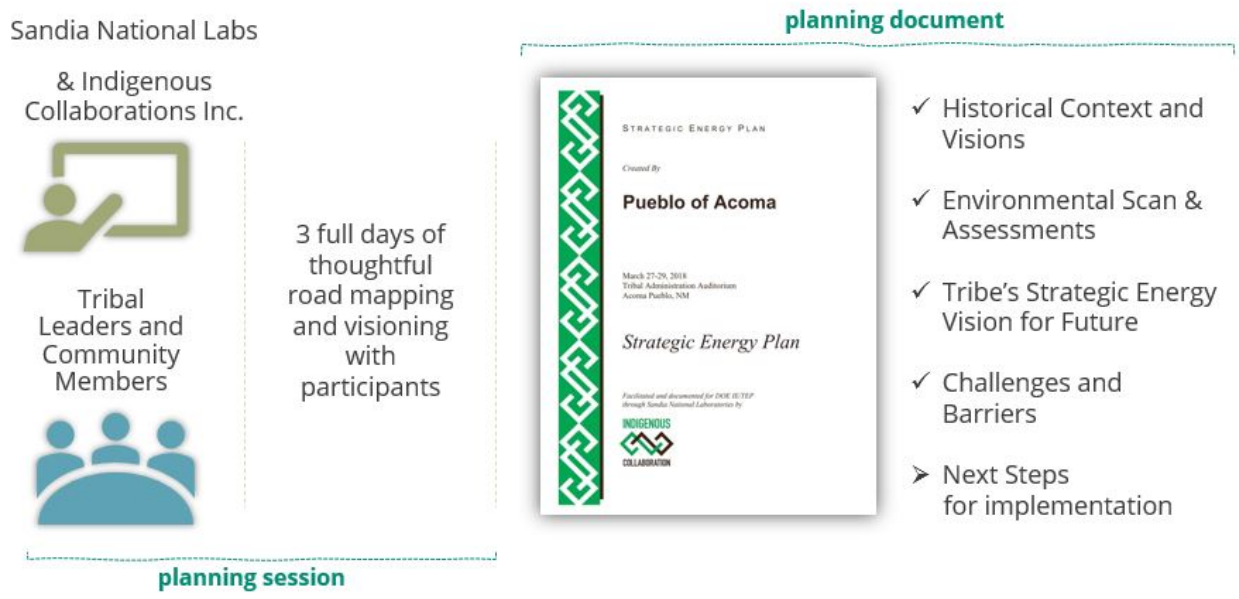

Figure 13. Visual of the Indigenous Collaboration, P.B.C strategic energy planning process and final strategic energy planning document contents.

Indigenous Collaboration, P.B.C. facilitators and Pueblo of Acoma community members discussed the history of energy infrastructure, resources, and development has been for the community. The Pueblo of Acoma has a main village on top of the mesa with traditional adobe dwellings, and three other villages on Tribal lands. Like other Tribal Nations and communities in the Southwest United States, the Pueblo of Acoma has had a history of non-Tribal natural resource management and

extraction on their ancestral lands. Coal mining and uranium mining were used in the primary energy resourcing process for the United States Southwest region, and this energy industry provided labor support for commuting Acoma Tribal members. The Acoma Pueblo Strategic Energy Plan is publicly available at

https://www.puebloofacoma.org/wp-content/uploads/2021/01/2018_Pueblo_of_Acoma_Strategic_Energy_Plan.pdf

Agriculture is a huge part of Pueblo culture and how the Acoma people share generational knowledge for the Tribe. Due to limited water supplies and accessibility to community assets, traditional agriculture practices are being used less. Patterns of factors leading to Tribal energy resource insecurity can be identified for the Tribal Nations in a historical context. A timeline is used to organized participant observations. For example, one participant noted that once the Walmart store was developed in the town nearby, Grants, New Mexico, the practice and knowledge of traditional agriculture in the Acoma community decreased as years went by.

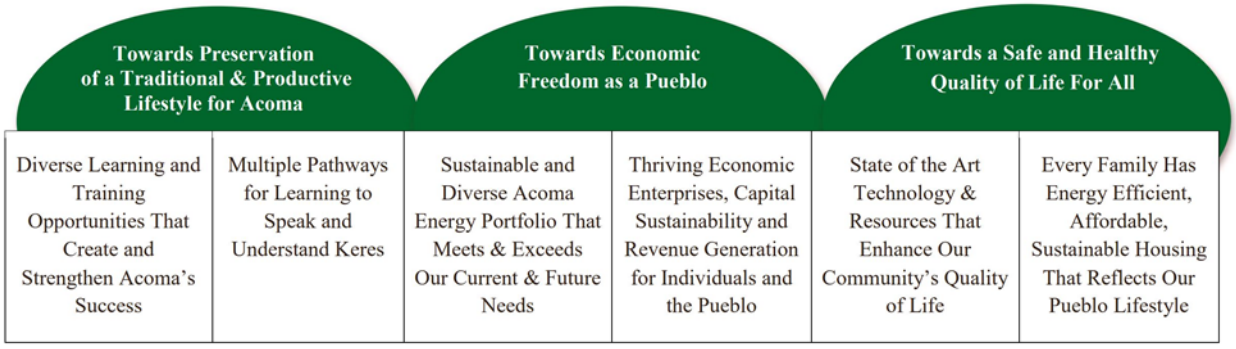

Figure 14. Energy vision table from the 2018 Acoma strategic energy plan.

The Pueblo of Acoma Utility Department and the Water Department at Acoma hosted the first Pueblo of Acoma Water Summit for the public in 2022. In this workshop, the speaker educated members on the upcoming 50-Year Water Plan, Acoma Water Quality Report, and traditional cropping methods for community members. The Tribe hosting the workshop on local Tribal resources is a step forward in Acoma Pueblo planning, implementing strategic methods in preserving future FEWS sources for the Tribe. The goals of the 2018 Acoma Pueblo Strategic Energy Plan have better direction when community members are informed and educated on upcoming strategies and plans for community resources. Community engagement and public participation tools like consensus planning, informal, and formal events provide accessibility and increase FEWS literacy for the Pueblo of Acoma community.

Tribal spatial data such as cultural resource maps, can be digitally mapped for the Tribe using geospatial software tools like Geographic Information Systems (GIS). Utilizing tools like GIS or ArcGIS Story Maps can incorporate ITEK in the imputed data by taking into account the local language, wildlife, and spaces. Tribes can benefit from the GIS tools for FEWS management by entering data that can be protected and limiting user access. Utilizing modern analytical tools can enhance Acoma's quality of life by providing the technology to analyze Acoma's energy capacity, population patterns, tangible, intangible cultural resources, and environmental resources. Figure 15 is a visual of how data in layers are arranged on top or bottom of one another for data analysis.

Figure 15. GIS data set layers for a graduate assignment, Pueblo of Acoma Plumbing Infrastructure and Aquifer Vulnerability for Acoma Village, New Mexico.

6. CONCLUSION

Tribal planners should consider the tribal capacities for food, energy, water systems, and ITEK factors, can strategically mitigate inadequate supply and increased demand for Tribal renewable energy sources, housing, agriculture, and water quality. Indigenous communities and Tribal governments are different from one other and finding the unique context of each Tribal Nation will require a consensus-based facilitation and analysis for Tribal planners to better understand and document Tribal energy needs and supply capacity.

It is critical for the population projects and FEWS analyses used in Tribal planning to ethically represent demographics, community assets, visions, FEWS supply, housing development, Tribal context, political realities, and population growth patterns. The increasing number of Tribal health and environmental impacts from effects of climate change is an indicator for strategic energy planning and ITEK to lead in energy development across Native Country. A consensus-planning process, like strategic energy planning, can factor in critical pieces of information from Tribal Nations and communities Consensus-planning and strategic planning can provide an environment and team that assist in securing resources and funding so Tribes and Sovereign Nations can continue environmental planning and uploading traditional and cultural responsibilities to the land.

Consensual, strategic efforts emphasize the need for Tribal nations to understand their energy systems and loads. In-depth understanding and dialogue can increase the community's value for the operations, labor, equipment, and planning processes of renewable energy sources within Native Country has the capacity to lead in clean energy by accomplishing three things:

1. Acknowledging historical, cultural, political, and economic realities,
2. Establishing respectable relations within Tribal Nation communities
3. Listening to community input and making time to reevaluate planning visions.

REFERENCES

[1] Arguello, V. (2021, December). Pueblo of Acoma Plumbing Infrastructure and Aquifer Vulnerability in Acoma Village, New Mexico.

[2] Arguello, V. (2022). *DOE Summer Presentation Slide* [Screenshot Photograph]. Indian Energy Program.

[3] Arguello, V. (2022). *San Xavier Mission*. photograph, Arizona.

[4] BIA: Tribal Land Boundaries. Indian lands. (n.d.). Retrieved December 14, 2022 fromhttps://biamaps.doi.gov/indianlands/

[5] Bureau of Indian Affairs (BIA). Indian Affairs. (n.d.). Retrieved December 9, 2022, from https://www.bia.gov/bia

[6] BIA. Snapshot of Albuquerque and Tribal Boundaries.

[7] Department of Utility Authority Home. Pueblo of Acoma. (n.d.). Retrieved December 22, 2022, from https://www.puebloofacoma.org/departments/utility-authority/

[8] National Integrated Drought Information System. (n.d.). Retrieved April 5, 2023, from https://www.drought.gov/

[9] Ihh. (2021, September 30). *Urban renewal*. The Inclusive Historian's Handbook. Retrieved April 5, 2023, from https://inclusivehistorian.com/urban-renewal/

[10] Indigenous Collaboration, P.B.C. (n.d.). Services provided (what we do). What We Do - Indigenous Collaboration, Inc. Retrieved December 22, 2022, from https://indcollab.com/about-us/services.html

[11] Native Renewables: Empowering Native Communities. Native Renewables. (2022, November 8). Retrieved December 22, 2022, from https://www.nativerenewables.org/

[12] Palmer, M., & Korson, C. (2020). Decolonizing World Heritage Maps using Indigenous toponyms, stories, and interpretive attributes. Cartographica: The International Journal for Geographic Information and Geovisualization, 55(3), 183–192. https://doi.org/10.3138/cart-2019-0014

[13] U.S. Global Change Research Program. (1970, January 1). Fourth National Climate Assessment: Chapter 15: Tribes and Indigenous peoples. NCA4. Retrieved December 9, 2022, from https://nca2018.globalchange.gov/chapter/15

[14] Environmental Protection Agency. (n.d.). EPA. Retrieved February 12, 2023, from https://www.epa.gov/eco-research/ecoregions

[15] Bureau, U. S. C. (2021, October 19). 2020 population distribution in the United States and Puerto Rico. Census.gov. Retrieved February 12, 2023, from https://www.census.gov/library/visualizations/2021/geo/population-distribution-2020.html

[16] Baldwin, Robert & Scherzinger, Ryan & Lipscomb, Don & Mockrin, Miranda & Stein, Susan. (2014). Planning for Land Use and Conservation: Assessing GIS-Based Conservation Software for Land Use Planning. 10.13140/2.1.3367.0729

[17] APA NY Metro. Facebook. (2022). Retrieved February 19, 2023, from https://www.facebook.com/apanewyorkmetro/photos

[18] Downtown Las Cruces NM history. Las Cruces Downtown. (2014, August 14). Retrieved February 20, 2023, from https://lascrucesdowntown.com/about-downtown-las-cruces/

[19] Centers for Disease Control and Prevention. (2023.). CDC COVID Data tracker. Centers for Disease Control and Prevention. Retrieved February 20, 2023, from https://covid.cdc.gov/covid-data-tracker/#demographicsovertime

[20] Solar Resource Maps and Data. NREL.gov. (n.d.). Retrieved February 23, 2023, from https://www.nrel.gov/gis/solar-resource-maps.html

[21] Jantarasami, L.C., R. Novak, R. Delgado, E. Marino, S. McNeeley, C. Narducci, J. Raymond-Yakoubian, L. Singletary, and K. Powys Whyte, 2018: Tribes and Indigenous Peoples. In Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, pp. 572–603. doi: 10.7930/NCA4.2018.CH15

DISTRIBUTION

Email—Internal

Name	Org.	Sandia Email Address
Sandra Begay	8924	skbegay@sandia.gov
Anthony Martino	8924	martino@sandia.gov
Abraham Ellis	8920	aellis@sandia.gov
Robert Leland	8900	leland@sandia.gov
Technical Library	1911	sanddocs@sandia.gov

Email—External

Name	Company Email Address	Company Name
Veronique Arguello	arguello.veronique@gmail.com	self employed
Lizana Pierce	lizana.pierce@hq.doe.gov	DOE Indian Energy
Wahleah Johns	wahleah.johns@hq.doe.gov	DOE Indian Energy
Thomas Jones	thomas.jones@hq.doe.gov	DOE Indian Energy
NREL Communications (IE)	ie.comms@nrel.gov	NREL

This page left blank

Sandia National Laboratories

Sandia National Laboratories is a multimission laboratory managed and operated by National Technology & Engineering Solutions of Sandia LLC, a wholly owned subsidiary of Honeywell International Inc. for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525.