U.S. DEPARTMENT OF ENERGY

Tribal Electricity Access and Reliability

Report to Congress
August 2023

United States Department of Energy
Washington, DC 20585

Message from the Secretary

In December 2020, Congress included in its Fiscal Year 2021 Consolidated Appropriations Act for the U.S. Department of Energy (DOE) to assess and report on the current status of access to electricity and electricity reliability for households in Tribal communities. DOE's Office of Indian Energy Policy and Programs prepared this report by engaging Indian Tribes and evaluating (1) prior investments by DOE, and (2) the needed investments in electricity access and reliability.

This report is being provided to the following Members of Congress:

- **The Honorable Joe Manchin III**
  Chairman, Senate Committee on Energy and Natural Resources

- **The Honorable John Barrasso**
  Ranking Member, Senate Committee on Energy and Natural Resources

- **The Honorable Cathy McMorris Rodgers**
  Chair, House Committee on Energy and Commerce

- **The Honorable Frank Pallone, Jr.**
  Ranking Member, House Committee on Energy and Commerce

- **The Honorable Dianne Feinstein**
  Chair, Senate Subcommittee on Energy and Water Development
  Committee on Appropriations

- **The Honorable John Kennedy**
  Ranking Member, Senate Subcommittee on Energy and Water Development
  Committee on Appropriations

- **The Honorable Chuck Fleischmann**
  Chair, House Subcommittee on Energy and Water Development
  Committee on Appropriations

- **The Honorable Marcy Kaptur**
  Ranking Member, House Subcommittee on Energy and Water Development
  Committee on Appropriations

If you have any questions or need additional information, please contact Ms. Becca Ward, Deputy Assistant Secretary for Senate Affairs or Ms. Janie Thompson, Deputy Assistant for House Affairs, Office of Congressional and Intergovernmental Affairs, at (202) 586-5450, or Ms. Katie Donley, Director, Office of Budget, Office of the Chief Financial Officer, at (202) 586-0176.

Sincerely,

Jennifer Granholm

Executive Summary

The Fiscal Year 2021 Consolidated Appropriations Act required the U.S. Department of Energy (DOE) to assess and report on the status of access to electricity and electricity reliability for households in Tribal communities.

A multifaceted consultation and outreach strategy was used for this report. Two listening sessions, contracted support, and Federal staff research yielded results that provide a snapshot of Tribal energy access and reliability. The results in this report relied heavily on self-reported data derived from stakeholders working directly with Tribes or for Tribal communities. As such, this report provides an in-depth perspective.

Evaluating the Office of Indian Energy Policy and Programs' (Office of Indian Energy) investments and the current state of Tribal energy access and reliability, the following key insights emerge:

- DOE and the Office of Indian Energy's investments to these historically underserved Tribal communities, albeit limited, are having tangible impacts in Indian Country;
- Indian Country contains vast untapped energy resources;
- Significant need, interest, and potential exist for Indian Tribes to:
  - Implement energy efficiency and renewable energy technologies in Indian Country
  - Develop their energy resources
  - Stabilize energy costs
  - Spur local economic development
  - Provide jobs for Tribal members;
- Federal Indian law and jurisdictional uncertainties and complexities limit private investment and impede energy development on Tribal lands;
- Significant financial, infrastructure, and human capacity barriers exist that hinder Tribal energy development;
- Lack of Tribal-specific data has historically prevented quantifying the current energy state in Indian Country and hampers justifying additional resources;
- Increasing vulnerabilities from climate change has resulted in a rising demand for clean energy; and
- Complicated Federal application processes and funding gaps limit access by American Indian and Alaska Native communities.

Many Tribal communities

- Are served primarily by multiple rural electrical cooperatives
- Generally pay a higher-than-average rate for electricity;
- Use a higher-than-average proportion of their income toward energy costs;
- Have higher-than-average proportion of unelectrified homes (i.e., homes that are not connected to any type of central electrical grid infrastructure, also known as off-grid); and,
- Suffer from higher-than-average electricity reliability issues, compounded by higher-than-average poverty levels and higher-than-average inadequate housing.

Notably, considerable renewable and conventional energy resources exist on Tribal lands. Small-and large-scale renewable energy adoption is increasing throughout Indian Country. Growing demands for Tribal-run utilities are resulting in greater stabilization of energy costs, potentially spurring local economic development, and providing jobs for Tribal members. More investments made in energy transition communities, electrical infrastructure, and resource asset development are critical needs throughout Indian Country.

Tribal Electricity Access and Reliability

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ACEEE: American Council for an Energy Efficient Economy

ACS: American Community Survey

AI/AN: American Indian and Alaska Native

ANCSA: Alaska Native Claims Settlement Act

ANVSA: Alaska Native Village Statistical Areas

APS: Arizona Public Service

ARE: Alaska Resource Education

Bbl: Barrel of Crude Oil

BIA: Bureau of Indian Affairs

BIPOC: Black, Indigenous, and People of Color

BLM: Bureau of Land Management

BTFA: Bureau of Trust Funds Management

C.F.R.: Code of Federal Regulations

COVID-19: Coronavirus

DEMD: Division of Energy and Minerals Development

DOE: U.S. Department of Energy

DOI: U.S. Department of Interior

EERE: DOE Office of Energy Efficiency Renewable Energy

EIA: DOE Energy Information Administration

EPA: U.S. Environmental Protection Agency

EPAct 2005: Energy Policy Act of 2005, Pub.L. 109-58 (2005)

FERC: Federal Energy Regulatory Commission

FPL: Federal poverty level

FY: Fiscal Year

GAO: Government Accounting Office

GEIC: Growing Economies in Indian Country

GW: Gigawatts

HUD: U.S. Department of Housing and Urban Development

ICEIWG: Indian Country Energy and Infrastructure Working Group

IEA: International Energy Agency

IEED: U.S. Department of the Interior Indian Affairs Office of Indian Economic Development

IEMSC: Indian Energy and Minerals Steering Committee

IESC: Indian Energy Service Center

kW: Kilowatt

kWh: Kilowatt hour

kv: Kilovolt

LAR: Land Area Representation

LEAD: Low-Income Energy Affordability Data

$m^{2;}$ square meters

MCF: Million Cubic Feet

MW: Megawatt

MWh: Megawatt-hour

NANA: NANA Regional Corporation, Incorporated

NCAI: National Congress of American Indians

NOAA: National Oceanic and Atmospheric Administration

NRECA: National Rural Electric Cooperative Association

NREL: National Renewable Energy Laboratory

NTUA: Navajo Tribal Utility Authority

ONRR: Office of Natural Resources Revenue

OTSA: Oklahoma Tribal statistical areas

PSPS: Public Safety Power Shutoff

PV: Photovoltaics

RECS: Residential Energy Consumption Survey

SAIFI: System Average Interruption Frequency Index

SCIP: San Carlos Irrigation Project

STEM: Science, Technology, Engineering and Mathematics

TEDC: Tribal Energy Development Capacity

TELGP: Tribal Energy Loan Guarantee Program

TSA: Tribal Statistical Areas

TW: Terawatt

U.S.: United States

U.S.C.: United States Code

USDA: U.S. Department of Agriculture

USEER: U.S. Energy Employment Report

USGCRP: U.S. Global Change Research Program

Glossary

Alaska Native: A member or descendent of any of the indigenous peoples of Alaska.

Alaska Native Regional Corporation: One of the thirteen Alaska Native Regional Corporations, as defined in and established pursuant to the Alaska Native Claims Settlement Act (43 U.S.C. §§ 1602(g)).

Alaska Native Village Corporation or **Village Corporation**: As defined in or established pursuant to the Alaska Native Claims Settlement Act (43 U.S.C. §§ 1602(J)).

American Indian: A member of any of the peoples indigenous to the Americas except Alaska Native people.

Capacity Factor: An estimate of energy output of a system over time divided by the maximum possible energy output of a system over time.

Community: A group of any size whose members reside in a specific locality, share government, and often have a common cultural and historical heritage.

Energy Burden: The average annual housing energy costs divided by the average annual household income, where monthly housing energy costs are based on household monthly expenditures for electricity, gas (utility and bottled), and other fuels (including fuel oil, wood, etc.)

Energy Efficiency: Efficient energy use or the reduction of the amount of energy required to provide products and services.

Energy Sovereignty: For purposes of this report, "energy sovereignty" means the right of individuals, communities and peoples to make their own decisions on energy generation, distribution and consumption in a way that is appropriate within their ecological, social, economic and cultural circumstances.

Indian Country: Defined in 18 U.S.C. § 1151 and 40 C.F.R. § 171.3 as:

a. all land within the limits of any Indian reservation under the jurisdiction of the United States Government, notwithstanding the issuance of any patent, and, including rights-of-way running through the reservation;
b. all dependent Indian communities within the borders of the United States whether within the original or subsequently acquired territory thereof, and whether within or without the limits of a state; and
c. all Indian allotments, the Indian titles to which have not been extinguished, including rights-of-way running through the same.

I**ndian Tribe:** The Congressional language directing this report refers to "Tribes;" however, for purposes of its report, the Office of Indian Energy uses the term "Indian Tribe," as defined in Section 4 of the Indian Self-Determination and Education Assistance Act (25 U.S.C. § 5304, formerly 25 U.S.C. § 450b), which is any Indian Tribe, band, nation, or other organized group or community, including any Alaska Native village or regional or village corporation as defined in or established pursuant to the Alaska Native Claims Settlement Act (85 Stat. 688; 43 U.S.C. §§ 1601, et seq.), which is recognized as eligible for the special programs and services provided by the United States to Indians because of their status as Indians. *See* 25 U.S.C. § 5304.

An Indian Tribe, as used in this report, is "recognized as eligible" as described above if it is listed in *Indian Entities Recognized and Eligible to Receive Services from the United States Bureau of Indian Affairs* as published in the Federal Register on January 28, 2022, 87 FR 19.

Native Americans: Native Americans means a member of any of the indigenous peoples of the United States and is used to refer collectively to American Indians *and* Alaska Natives.

Tribal: Of, relating to, or characteristic of an Indian Tribe or Indian Tribes.

Tribal Lands: Pursuant to 16 U.S.C. § 470w (14), the term Tribal Lands means:

(A) all lands within the exterior boundaries of any Indian reservation; and
(B) all dependent Indian communities.

Renewable Energy: Energy from a source that is not depleted when used and is capable of providing a source of clean energy, such as wind or solar power.

I. Legislative Language

This report responds to the following legislative language set forth in the Energy Act of 2020, Division Z of the Consolidated Appropriations Act, 2021, Pub.L. 116-68 (Dec. 28, 2020), Sec. 8014, Report on Electricity and Reliability:

> *(a) ASSESSMENT.—The Secretary of Energy shall conduct an assessment of the status of access to electricity by households residing in Tribal communities or on Indian land, and the reliability of electric service available to households residing in Tribal communities or on Indian land, as compared to the status of access to and reliability of electricity within neighboring States or within the State in which Indian land is located.*
> *(b) CONSULTATION.—The Secretary of Energy shall consult with Indian Tribes, Tribal organizations, the North American Electricity Reliability Corporation, and the Federal Energy Regulatory Commission in the development and conduct of the assessment under subsection(a). Indian Tribes and Tribal organizations shall have the opportunity to review and make recommendations regarding the development of the assessment and the findings of the assessment, prior to the submission of the report under subsection (c).*
> *(c) REPORT.—Not later than 18 months after the date of enactment of this Act, the Secretary of Energy shall submit to the Committee on Energy and Commerce of the House of Representatives and the Committee on Energy and Natural Resources of the Senate a report on the results of the assessment conducted under subsection (a), which shall include—(1) a description of generation, transmission, and distribution assets available to provide electricity to households residing in Tribal communities or on Indian land; (2) a survey of the retail and wholesale prices of electricity available to households residing in Tribal communities or on Indian land; (3) a description of participation of Tribal members in the electric utility workforce, including the workforce for construction and maintenance of renewable energy resources and distributed energy resources; (4) the percentage of households residing in Tribal communities or on Indian land that do not have access to electricity; (5) the potential of distributed energy resources to provide electricity to households residing in Tribal communities or on Indian land; (6) the potential for Tribally-owned electric utilities or electric utility assets to participate in or benefit from regional electricity markets; (7) a description of the barriers to providing access to electric service to households residing in Tribal communities or on Indian land; and (8) recommendations to improve access to and reliability of electric service for households residing in Tribal communities or on Indian land.*
> *(d) DEFINITIONS.—In this section: (1) TRIBAL MEMBER.—The term "Tribal member" means a person who is an enrolled member of a Federally recognized Tribe or village. (2) TRIBAL COMMUNITY.—The term Tribal community" means a community in a United States census tract in which the majority of residents are persons who are enrolled members of a Federally recognized Tribe or village.*

II. Introduction and Background

Congress directed the Department of Energy to assess and report on the current status for Tribal communities' access to electricity and the electricity reliability for households living in Tribal communities. This assessment helps to further understand the differences in access to electricity by households residing in Tribal communities or on Indian land, when compared to the state or surrounding states. The complexity in understanding these differences requires discussions on many topics, including Federal Indian policy, the Rural Electrification Act, unelectrified homes on Tribal lands, energy burden, and climate change vulnerabilities.

A. Federal Indian Policy

Federal Indian policy establishes the relationship between the United States Government and the Indian Tribes within its borders. The U.S. Constitution gives the Federal Government primary responsibility for engaging with Indian Tribes. Some scholars divide the Federal policy toward Indians in six phases: coexistence (1789–1828), removal and reservations (1829–1886), assimilation (1887–1932), reorganization (1932–1945), termination (1946–1960), and self-determination (1961–1985).[1] Federal Indian policy has shaped the current state and established the complicated legal and jurisdictional framework under which energy development must occur.

A 2018 report, *Broken Promises: Continuing Federal Funding Shortfall for Native Americans,*[2] by the U.S. Commission on Civil Rights, an independent, bipartisan agency established by Congress in 1957, describes the state of Federal Indian policy as follows:

> Since our nation's founding, the United States and Native Americans have committed to and sustained a special trust relationship, which obligates the Federal government to promote Tribal self-government, support the general wellbeing of Native American Tribes and villages, and to protect their lands and resources. In exchange for the surrender and reduction of Tribal lands and removal and resettlement of approximately one-fifth of Native American Tribes from their original lands, the United States signed 375 treaties, passed laws, and instituted policies that shape and define the special government-to-government relationship between Federal and Tribal governments. Yet the U.S. government forced many Native Americans to give up their culture and, throughout the history of this relationship, has not provided adequate assistance to support Native American interconnected infrastructure, self-governance, housing, education, health, and economic development needs.[3]

[1] Wrone, D. (1986, Winter). Indian Treaties and the Democratic Idea. *Wisconsin Magazine of History*, 70(2).
[2] U.S. Commission on Civil Rights. (2018). *Broken Promises: Continuing Federal Funding Shortfall for Native Americans*. www.usccr.gov.
[3] Ibid.

This Federal Indian policy has also created extreme differences in land status and jurisdiction across the country. The land status in Alaska, as a result of Alaska Native Claims Settlement Act (ANCSA),[4] extinguished any future aboriginal land claims in Alaska and mandated a for-profit model with land title under corporate ownership.[5,6] This structure varies greatly from the contiguous 48 States where Tribal land is commonly held in trust by the U.S. government. Federal Indian Reservation land or areas reserved for a Tribe, or multiple Tribes, exist as permanent homelands and are established through treaties, executive orders, acts of Congress, and administrative actions.[7]

Restricted fee land owned by a Tribe or Tribal member is subject to a restriction against alienation (i.e., sale or transfer) or encumbrance (i.e., liens, leases, rights-of-way, etc.) by operation of law. Allotted lands held in trust or restricted fee status by individual Tribal members are afforded these same restrictions.[8] Land held in fee simple can be owned by a Tribe or person and can be freely alienated or encumbered without Federal approval.[9] The many and varied types of land status, along with the different jurisdictional frameworks associated with each type, create varying challenges to energy development.

In a 2012 report by the Board of Governors of the Federal Reserve System, which was based on an in-person workshop, attendees expressed that the complexities and confusion associated with land ownership, legal constraints, and authority thwart effective land management and access to financing. The specific issues raised by workshop attendees include:

- The inability or difficulty in using trust or restricted land as collateral to access financing for business development eliminates a major source of equity and security for loans.
- Fractionation of allotted lands and "checkerboard" land bases are common and significant obstacles to effective use of land for development. For example, they are often obstacles to securing business leases for Native-owned independent businesses, using land as collateral to secure financing, or having a large enough contiguous land base to support operations such as grazing.
- Clear title to real property is often hard to establish in Indian Country because of the Federal government's system of dealing with fractionated interests in real property.

[4] United States Senate and House of Representatives. (1971, Dec. 18). *Alaska Native Claims Settlement Act (ANCSA)*. Office of the Law Revision Counsel of the United States House of Representatives. www.uscode.house.gov.
[5] ANCSA Regional Association. www.ancsaregional.com.
[6] Note: At the time of ANCSA signing, only one community, the Metlakatla Indian Community, held land in trust through reservation status with the Federal government. This status remains to this day.
[7] Congressional Research Service. (2021, October 14). *Tribal Lands: An Overview.* www.crsreports.congress.gov.
[8] Ibid.
[9] Ibid.

- The title status report process, typically administered by the U.S. Department of the Interior, is often burdensome and time-consuming, which interferes with the efficient use of land for business development.
- The Department of the Interior's oversight and approval processes for land-related transactions, such as business lease processes, are burdensome and serve as a disincentive to potential partnerships between Tribes or Tribal members.

Further, each respective Tribe's history, structure, culture, and Federal Indian policy means energy development must address the uniqueness of each of the 574 Federally recognized Tribes, including 229 Alaska Native villages and 345 Tribal communities in the lower contiguous 48 states.[10,11]

B. Rural Electrification Act

In addition to Federal Indian policy, it is important to understand the impact of the Rural Electrification Act of 1936 on Tribal communities in the United States. [12]

The Rural Electrification Act of 1936, enacted on May 20, 1936, provided Federal loans for the installation of electrical distribution systems to serve isolated rural areas of the United States. The funding was channeled through cooperative electric power companies (i.e., small, consumer-owned rural electric cooperatives), hundreds of which still exist today. These member-owned cooperatives purchased power on a wholesale basis and distributed it using their own network of transmission and distribution lines. Unfortunately, on the heels of assimilation, Indian Tribes were not active participants in the rural electrification efforts which began in the 1930s and, therefore, some Native American homes remain unelectrified (i.e., without access to electricity) today. Additionally, Indian Tribes may be served by multiple utilities, may experience unreliable electricity access, and may have higher-than-average energy burdens (i.e., a higher-than-average proportion of their income goes toward energy costs), as detailed later in this report.

Electric cooperatives have grown significantly over time throughout the rural United States. The National Rural Electric Cooperative Association tracks this growth over time through an illustrative video.[13] See also Figure 1.

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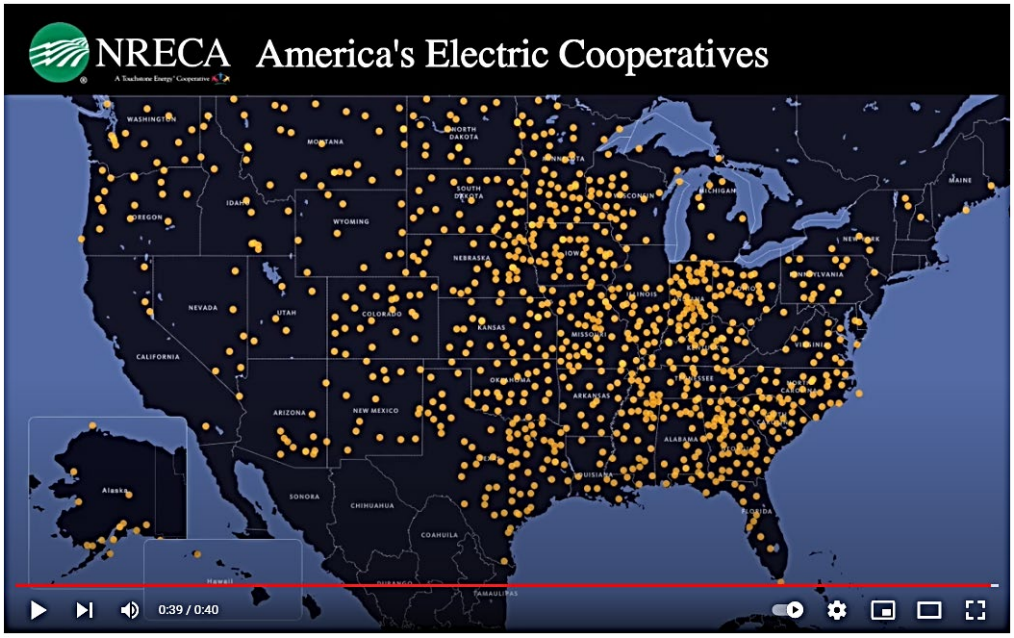
[10] U.S. Government Publishing Office, Federal Register. (2022, January 28). *Indian Entities Recognized and Eligible to Receive Services from the United States Bureau of Indian* Affairs. www.govinfo.govFederal.
[11] Note: There is not a Federally recognized Native Hawaiian government.
[12] United States Senate and House of Representatives. (1936, May 20). *Rural Electrification Act of 1936.* www.rd.usda.gov.
[13] The National Rural Electric Cooperative Association. (2016, April). *Electric cooperative growth 1914 – present* [Video]. YouTube. www.youtube.com.

Figure 1: United States' Electric Cooperatives (Courtesy of NRECA)



C. Unelectrified Native American Homes

Reliable, affordable electricity inside the home is a fundamental service taken for granted by the vast majority of Americans. However, as discussed below, many American Indian and Alaska Native families currently do not have access to electricity and, if they do, they are served primarily by rural electrical cooperatives and generally pay a higher-than-average rate for electricity, use a higher-than-average proportion of their income toward energy costs, and suffer from higher-than-average electricity reliability issues.

In 2000, DOE's Energy Information Administration (EIA) published a report on energy consumption and renewable energy development potential on Indian lands.[14] The EIA report, based on the 1990 Census of Housing data (referred to as the "long-form" Decennial Census data collection) as well as data from the 1997 EIA Residential Energy Consumption Survey (RECS) and EIA Form 861 (a census on all U.S. electric utilities) on the location and rates of electricity providers, quantified electricity access issues and energy cost burden among Tribal households on reservations and compared some of these parameters to those of Tribal and non-Tribal households off-Reservation and the general population. The study reported that 14.2 percent of Native American households on reservations lacked access to basic household electricity, compared to 1.4 percent of all U.S. households. These numbers are further flawed by the fact the 1990 Census data undercounted American Indian on-Reservation populations by

[14] Energy Information Administration. (2000, April). *Energy Consumption and Renewable Energy Development Potential on Indian Lands.* U.S. Dept. of Energy, Energy Information Administration, Office of Coal, Nuclear, Electric and Alternate Fuels. www.energy.gov.

12.2 percent.[15,16] The five Tribes with lack of access greater than 10 percent included: (1) Navajo Reservation and Trust Lands (36.7 percent); (2) Hopi Reservation and Trust Lands (28.6 percent); (3) Standing Rock Reservation (18.1 percent); (4) Mescalero Apache Reservation (15.1 percent); and Salt River Reservation (11.9 percent). An additional 21 Tribes were reported as having between 2-10 percent of households lacking access to electricity. The study found that 10 percent of on-reservation households spent 20 percent or more of their income to pay for electricity.

The U.S. Department of Housing and Urban Development (HUD) has performed three in-depth assessments of housing needs, which included some investigation of electricity quality and access issues.[17,18,19] This work found roughly the same level of actual electricity access issues in Tribal homes on Tribal land as in the general population (approximately one percent in the 2017 assessment). When combined with other facilities issues such as faulty plumbing and heating, however, 14 percent of Tribal households experienced these problems, compared to two percent across the national general population. The causality of the wide disparity between HUD findings and the findings from the 2000 EIA report are unknown and needs further review.

The World Bank additionally estimates access to electricity by collaborative data collection among the International Energy Agency, the International Renewable Energy Agency, the United Nations Statistics Division, the World Bank and the World Health Organization. Despite the EIA and HUD information and reports described above, however, the World Bank data estimates that in 2020, people in the United States have 100 percent access to electricity.[20] The World Bank findings therefore contradict the EIA and Department of Housing and Urban Development information, suggesting its estimate is not inclusive of Native Americans access to electricity. Additionally, there may be more non-Native American homes without electricity that are not reflected in the World Bank findings.

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[15] U.S. Census Bureau. (2012, May). *Census Coverage Measurement Estimation Report: Summary of Estimates of Coverage for Persons in the United States*. U.S. Dept. of Commerce, Economics and Statistics Administration, U.S. Census Bureau*., p. 5.* www.census.gov.

[16] Kostanich, D. (2003a). *A.C.E. Revision II: Design and Methodology: DSSD A.C.E Revision II Memorandum Series*. U.S. Bureau of the Census, Washington, DC.

[17] Kingsley, G.T, Spencer, V.E., Simonson, J., Herbig, C.E., Kay, N., Mikelsons, M. & Tatian, P. (1996) *Assessment of American Indian Housing Needs and Programs: Final Report*. U.S. Department of Housing and Urban Development. Washington, DC.

[18] Pettit, K. L.S., Kingsley G.T., Biess, J., Bertumen, K., Pindus N., Narducci, C., & Budde, A. (2014)., Jennifer Biess, Kassie Bertumen, Nancy Pindus, Chris Narducci, and Amos Budde. 2014. *Continuity and Change: Demographic, Socioeconomic and Housing Conditions of American Indians and Alaska Natives*. U.S. Department of Housing and Urban Development, Office of Policy Development and Research. Washington, DC.

[19] Pindus, N., Kingsley, G.T., Biess, J., Levy, D.K., Simington, J., & Hayes, C. (2017). *Housing Needs of American Indians and Alaska Natives in Tribal Areas: A Report from the Assessment of American Indian, Alaska Native, and Native Hawaiian Housing Needs*. Department of Housing and Urban Development, Office of Policy Development and Research. www.huduser.gov.

[20] The World Bank. (2020). *Access to Electricity (% of Population) – World*. www.data.worldbank.org.

As discussed more thoroughly throughout this document, the findings in each of these studies had potential issues affecting data quality, including significant margins of error in U.S. Census data, changes in U.S. Census data collected (removed electrification questions), and incomplete self-reported information. Further, many changes have occurred since these studies were conducted (infrastructure investments, population growth) that have changed the energy landscape throughout Indian Country.

D. Energy Burden

For purposes of this report and the definition used for the Office of Energy Efficiency and Renewable Energy *Low-Income Energy Affordability Data (LEAD) Tool*, energy burden is defined as the average annual housing energy costs divided by the average annual household income, where monthly housing energy costs are based on household monthly expenditures for electricity, gas (utility and bottled), and other fuels (including fuel oil, wood, etc.). [21, 22] U.S. households spend an average of 3.1 percent of their income on home energy bills.[23] Per a 2020 report by the American Council for an Energy Efficient Economy (ACEEE), "[n]ew research based on data from 2017 finds that high energy burdens remain a persistent national challenge. Of all U.S. households, 25 percent (30.6 million) face a high energy burden (i.e., pay more than 6 percent of income on energy bills) and 13 percent (15.9 million) of U.S. households face a severe energy burden (i.e., pay more than 10 percent of income on energy)."[24,25] The report goes on to state that "[n]ationally, 67 percent (25.8 million) of low-income households (≤ 200 percent of the Federal poverty level [FPL]) face a high energy burden and 60 percent (15.4 million) of low-income households with a high energy burden face a severe energy burden" and that "Black, Hispanic, Native American, and older adult households, as well as families residing in low-income multifamily housing, manufactured housing, and older buildings experience disproportionally high energy burdens nationally, regionally, and in metro areas."

Further, the ACEEE report states that Black, Indigenous, and People of Color (BIPOC) communities and low-income communities experience "disparate access to residential energy-saving appliances and other energy efficiency upgrades. While low-income and communities of

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[21] Office of Energy Efficiency and Renewable Energy. (2023). *Low-Income Energy Affordability Data (LEAD) Tool. U.S. Dept. of Energy, Office of Energy Efficiency and Renewable Energy.* www.energy.gov.
[22] Ma, O. & Laymon, K. (2019). *Low-Income Energy Affordability Data (LEAD) Tool Methodology.* National Renewable Energy Laboratory. www.lead.openei.org.
[23] The American Council for an Energy-Efficient Economy. (2020, Sept. 10). *Report: Low-Income Households, Communities of Color Face High "Energy Burden" Entering Recession*. www.aceee.org.
[24] The American Council for an Energy-Efficient Economy. (2020). *How High Are Household Energy Burdens? An Assessment of National and Metropolitan Energy Burden across the United States*.www.aceee.org.
[25] Note: Researchers estimate that housing costs should be no more than 30% of household income, and household energy costs should be no more than 20% of housing costs. This means that affordable household energy costs should be no more than 6% of total household income. For decades, researchers have used the thresholds of 6% as a high burden and 10% as a severe burden. High and severe energy burdens are not mutually exclusive. All severe energy burdens (> 10%) also fall into the high burden category (> 6%).

color on average consume less energy than wealthier households, they are more likely to live in less-efficient housing."[26]

E. Climate Change Vulnerabilities

In addition to facing a complicated land status situation, multifaceted and complex jurisdictional framework, and unreliable or lack of electricity access, American Indian and Alaska Native communities are severely vulnerable to extreme weather and climate change. According to the United States Global Change Research Program, "[c]limate change increasingly impacts places, foods, and lifestyles of American Indians. In Alaska—home to 40 percent of Federally recognized Tribes—reduced sea ice and warming temperatures threaten traditional livelihoods and critical infrastructure."[27] More specifically in Alaska,

> The increased thawing of permafrost (permanently frozen soil) along the coasts and rivers is an especially potent threat to Alaska Native villages because it causes serious erosion, flooding, and destruction of homes, buildings, and roads from differential settlement, slumping, and/or collapse of the underlying base. As of April 2015, more than 30 Native Villages in Alaska are either in need, or are already in the process, of relocating their entire village. In addition, permafrost thaw is causing food insecurity in Alaska Native communities due to the thawing of ice cellars or ice houses used for subsistence food storage.[28]

The Climate Change and Indigenous Peoples: A Primer provides Tribal perspectives on foundational information on policy and historical information relevant to climate impacts on indigenous peoples.[29] Additionally the U.S. Environmental Protection Agency's (EPA's) Climate Change and Social Vulnerability in the United States found that "American Indian and Alaska Native individuals are 48 percent more likely than non-American Indian and non-Alaska Native individuals to currently live in areas where the highest percentage of land is projected to be inundated due to sea level rise."[30]

The 2015 Office of Indian Energy report, "Tribal Energy System Vulnerabilities to Climate Change and Extreme Weather," documents how climate change and extreme weather events

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[26] Bednar, D. J., Reames, T.G., & Keoleian, G. (2017). *The Intersection of Energy and Justice: Modeling the Spatial, Racial/Ethnic and Socioeconomic Patterns of Urban Residential Heating Consumption and Efficiency in Detroit, Michigan*. Energy and Buildings, pp.25-34.
[27] United States Global Change Research Program. (2020). *Tribal Nations*. www.toolkit.climate.gov.
[28] Ibid.
[29] Quinault Management Center. (2014, May). *Climate Change and Indigenous Peoples: A Primer*." Prepared for the Advisory Committee on Climate Change and Natural Resource Science. www.climatekw.files.wordpress.com.
[30] Environmental Protection Agency (2021, Sept.). *Climate Change and Social Vulnerability in the United States*. Environmental Protection Agency, Office of Atmospheric Programs. www.epa.gov.

affect the way in which American Indian and Alaska Native Tribes are using, receiving, and producing energy. [31] Specifically,

> [V]ulnerabilities to Tribal energy infrastructure vary significantly by region. For example, Tribes on the East and Gulf Coasts may see a greater likelihood of power outages from more intense (e.g., Category 4 and 5) hurricanes, while Tribes in the western United States may see a greater likelihood of energy supply disruption from more intense and frequent droughts and wildfires (DOE 2013a, USGCRP 2014). Meanwhile, Tribes in parts of northern and central Alaska are vulnerable to permafrost thaw and accelerated erosion (DOE 2013a, NOAA 2013h).[32,33,34]

The frequency and severity of wildfires have also increased due to climate change, leading to preemptive measures such as those evidenced by public safety power shutoff (PSPS) events in California. [35]

> The 2019 California power shutoffs, known as public safety power shutoff (PSPS) events, were massive preemptive power shutoffs that occurred in approximately 30 counties in Northern California and several areas in Southern California from October 9 to November 1, 2019, and on November 20, 2019, by Pacific Gas and Electric Company, Southern California Edison, and San Diego Gas & Electric. The power shutoffs were an attempt to prevent wildfires from being started by electrical equipment during strong and dry winds. The shutoffs initially affected around 800,000 customer accounts, or about 2.5 million people, but expanded to cause over 3 million people to lose utility-provided electrical power by late October as more utility companies from around the state also did preemptive power shutoffs.[36]

As a result of wildfires and PSPS, Indian Tribes are exploring options for local energy generation to provide power for essential functions or services. For example, the impetus for the Spokane Tribe of Indians to pursue solar development was the 2016 Cayuse Mountain Fire, which cut off electricity to the Tribe, leaving the community without electricity or water and burning 18,000 acres. Under the Office of Indian Energy co-funded Children of The Sun Energy Infrastructure

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[31] Office of Indian Energy (2015). *Tribal Energy System Vulnerabilities to Climate Change and Extreme Weather*. U.S. Dept. of Energy, Office of Indian Energy. www.energy.gov.
[32] Office of Policy and International Affairs & National Renewable Energy Laboratory (2013). *U.S. Energy Sector Vulnerabilities to Climate Change and Extreme Weather*. U.S. Dept. of Energy, Office of Policy and International Affairs. www.energy.gov.
[33] U.S. Global Change Research Program (2014). *Climate Change Impacts in the United States: The Third National Climate Assessment*. Washington, DC. www.nca2014.globalchange.gov.
[34] National Oceanic and Atmospheric Administration (2013h). "*Regional Climate Trends and Scenarios for the U.S. National Climate Assessment: Part 7. Climate of the Alaska*." Washington, DC.
[35] Center for Climate and Energy Solutions. (2021). *Wildfires and Climate Change*. www.C2es.org.
[36] Wikipedia. (2019). *California Power Shutoffs*. www.en.wikipedia.org.

Initiative, the Spokane Tribe installed more than 600 kilowatts (kW) of rooftop solar photovoltaics as a means to power essential systems and operations if a similar wildfire event or PSPS occurred. [37]

Another example of the resiliency of Indian Tribes is Blue Lake Rancheria which, based on its 2008 Climate Action Plan and technical assistance provided by the Office of Indian Energy in 2014 to support the Tribe's cutting-edge biomass energy system, installed a solar microgrid that now saves the Tribe money, supports the local utility by operating independently during peak power situations, provides emergency power, and acts as a Red Cross emergency evacuation site and shelter during PSPS or extreme weather events.[38]

Other Indian Tribes also realize their vulnerabilities to the changing climate, such as the Quinault Indian Nation whose village in Taholah, Washington is in a tsunami inundation zone. As a result, with Federal support, the Tribe is in the process of relocating its village to higher ground and with a grant from DOE's Office of Indian Energy will install 99 kW of solar, 5-kW/11.2-kWh battery storage system, and backup diesel generator for critical loads in the event of power outages.[39]

In addition to the other factors detailed in this report, American Indians and Alaska Native communities are extremely vulnerable to sea level rise, drought, hurricanes, permafrost thaw, accelerated erosion and wildfires. As a result, many Indian Tribes and villages are exploring local indigenous energy sources to address these vulnerabilities. According to a Department of Interior (DOI) Information Report (2020), "[c]limate-related threats to Tribal infrastructure are expected to increase in frequency and severity under future climate scenarios, thus being highly vulnerable to impacts associated with climate change."[40] These climate change vulnerabilities, as evidenced in the examples above, have motivated Indian Tribes to explore options for distributed clean energy solutions.

[37] Office of Indian Energy (2017). *Spokane Indian Housing Authority – 2017 Project*. U.S. Dept. of Energy, Office of Indian Energy. www.energy.gov.
[38] Office of Indian Energy (2015, Feb.). *Blue Lake Rancheria's Bold Action on the Climate Front Pays Dividends*. U.S. Dept. of Energy, Office of Indian Energy. www.energy.gov.
[39] Office of Indian Energy (2021). *Quinault Indian Nation – 2021 Project.* U.S. Dept. of Energy, Office of Indian Energy. www.energy.gov.
[40] Office of Trust Services. (2020, May). *TribalThe Unmet Infrastructure Needs of Tribal Communities and Alaska Native Villages in Process of Relocating to Higher Ground as a Result of Climate Change*. U.S. Dept. of Interior, Bureau of Indian Affairs, Office of Trust Services. www.bia.gov.

F. Office of Indian Energy Policy and Programs

The Office of Indian Energy Policy and Programs (Office of Indian Energy) is an Assistant Secretarial level office, currently with 13 Federal staff duty-stationed in Washington, DC; Golden, Colorado; and Anchorage, Alaska. Limited contractor support staff are duty stationed at the DOE headquarters office in Washington, DC; a contractor team in Golden, Colorado supports financial assistance grants and agreements across the nation.

The Office of Indian Energy was established by Congress under Title V of the Energy Policy Act of 2005, Pub.L. 109-58 (2005) (EPAct 2005), the "Indian Tribal Energy Development and Self Determination Act of 2005".[41] The Office is congressionally directed to:

> Provide, direct, foster, coordinate, and implement energy planning, education, management, conservation, and delivery programs that –
>
> (1) promote Indian Tribal energy development, efficiency, and use;
>
> (2) reduce or stabilize energy costs;
>
> (3) enhance and strengthen Indian Tribal energy and economic infrastructure relating to natural resource development and electrification; and,
>
> (4) bring electrical power and service to Indian land and homes for Tribal members located on Indian lands or acquired, constructed, or improved (in whole or in part) with Federal funds. 42 U.S.C. § 7144e(b).

The Office of Indian Energy fulfills this charter through a three-pronged approach that includes (1) financial assistance through competitive grants; (2) technical assistance provided at no cost to Tribes and eligible Tribal entities; and (3) education and outreach. Each of the three prongs is addressed separately below.

1. Office of Indian Energy Financial Assistance

The Office of Indian Energy primarily meets its congressional mandates by providing cost shared Federal funding to Indian Tribes and eligible Tribal entities through financial assistance awards, on a competitive basis, as authorized under § 503 of EPAct 2005 (25 U.S.C. § 3502(b)(2)).

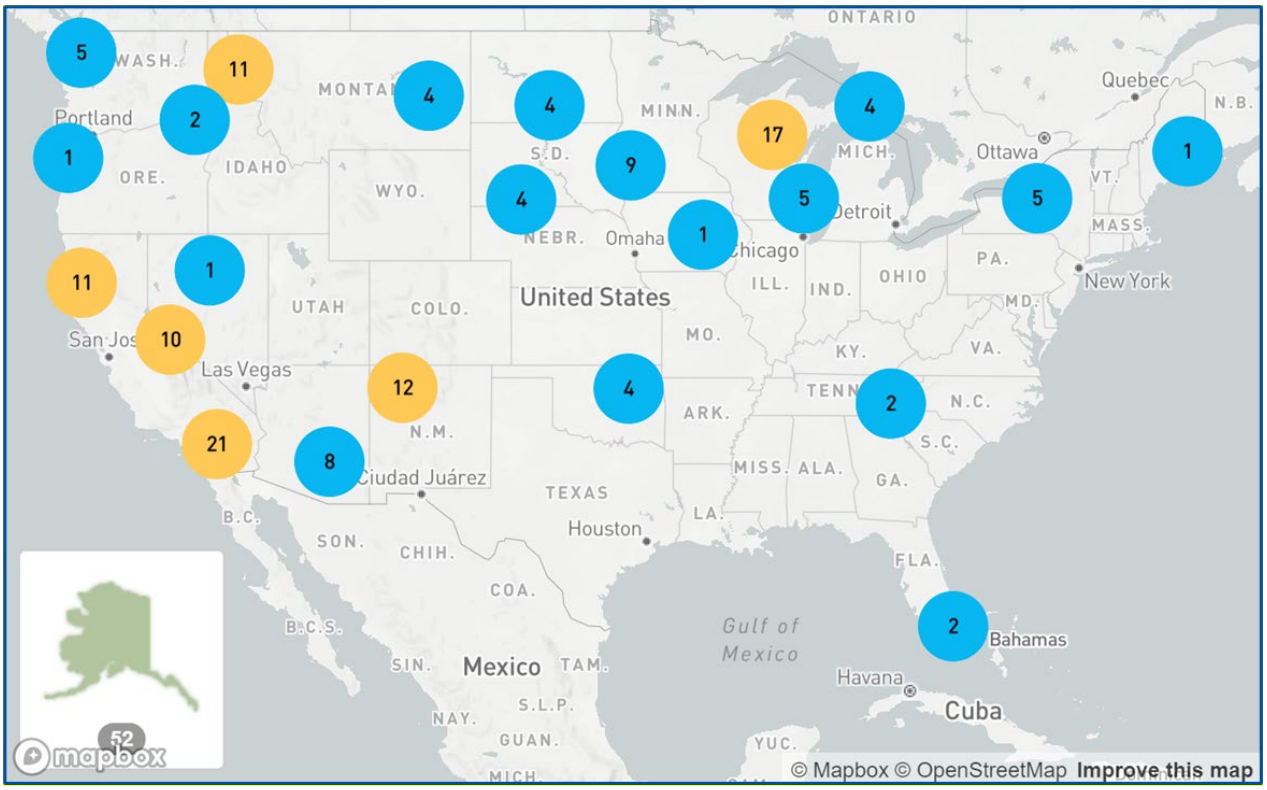
Under this authority, between 2010 and 2021, the Office of Indian Energy has invested over $114 million in more than 200 Tribal energy projects, valued at nearly $200 million.[42] The Office

[41] United States Senate and House of Representatives. (2005, Aug. 8). *Energy Policy Act of 2005.* Title V, § 502, codified at 42 USC § 7144e and 25 USC § 3501, et seq.

[42] Note: The information and data provided in this Section also includes Tribal energy investments made by the Office of Indian Energy's predecessor EERE Tribal Energy Program. The EERE Tribal Energy Program was consolidated into the Office of Indian Energy in 2015. Prior to 2015, the Office of Indian Energy and the EERE Tribal Energy Program coordinated efforts. The information and data herein reflect investments made by the EERE Tribal Energy Program between 2010 and 2015.

of Indian Energy website contains an online interactive project map[43] depicting the distribution of more than 200 Tribal energy projects across the nation funded in part through DOE investments (Figure 2). A summary of each project, along with annual progress reports and, if completed, final reports can also be found on the Office of Indian Energy website.

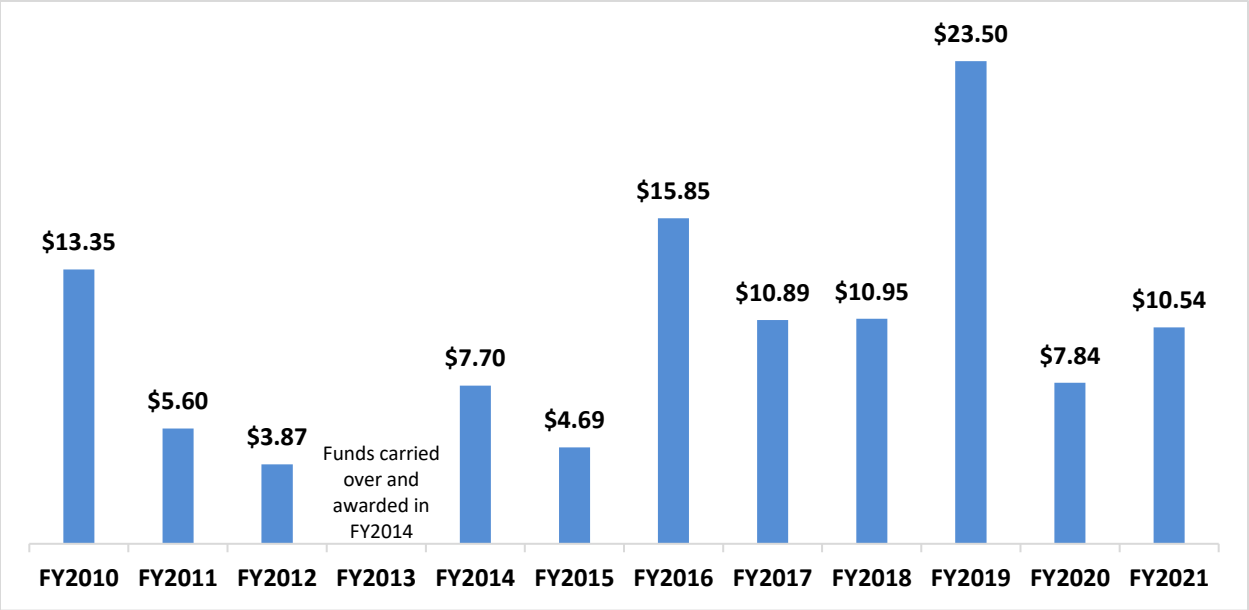
Figure 2: Office of Indian Energy Projects by Location



Office of Indian Energy investments by year average $9.5 million over the 12 years between 2010 and 2021 (Figure 3).

[43] Office of Indian Energy (2023). *Tribal Energy Projects Database*. U.S. Dept. of Energy, Office of Indian Energy. www.energy.gov.

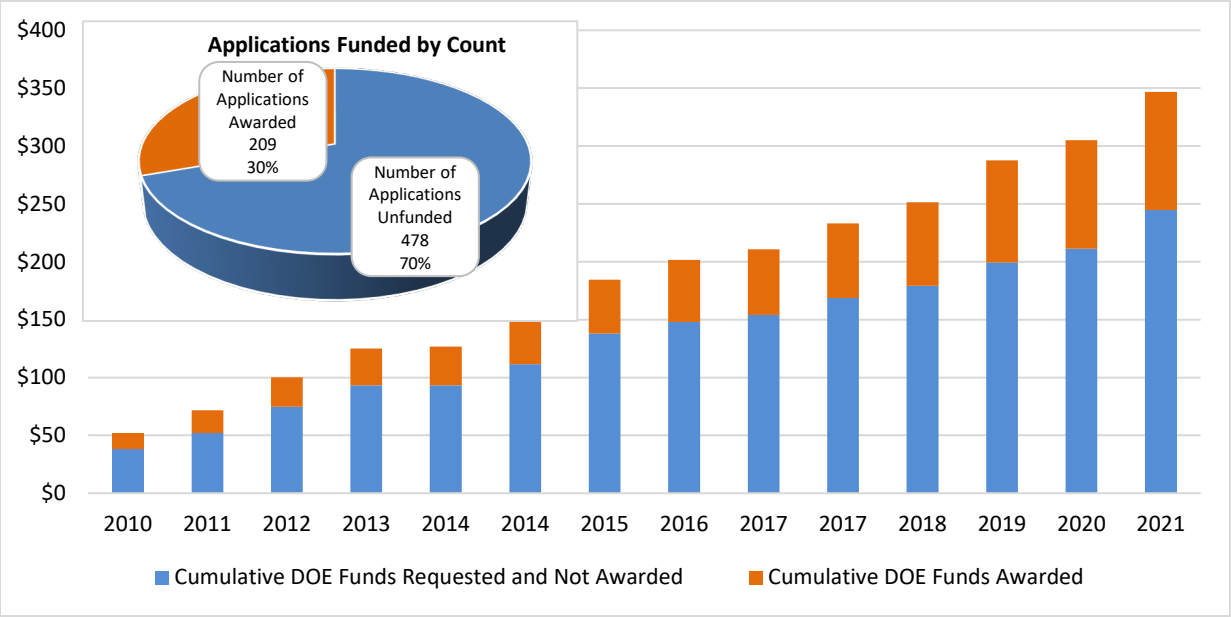
Figure 3: Office of Indian Energy Investments by Year



Includes FY2020 cost share reductions in year of award.

Of nearly 690 applications for competitive Tribal financial assistance grants received between 2010 and 2021, the Office of Indian Energy had sufficient funding to successfully award grants to approximately 30 percent (209 applications). Consequently, nearly 70 percent (478 applications) of those requests were not funded, representing approximately $245 million in unfunded requests and more than $500 million in total proposed project costs (see Figure 4). These unfunded requests demonstrate unmet Tribal energy efficiency and renewable energy needs as a result of Office of Indian Energy funding limitations and the competitive nature of the process.

Figure 4: Office of Indian Energy Funded and Unfunded Requests



Does not include FY2020 cost share

2. Office of Indian Energy Technical Assistance

The Office of Indian Energy provides Federally recognized Indian Tribes, including Alaska Native Regional Corporations, Alaska Native villages, Tribal energy development organizations, and other organized Tribal groups and communities, with technical assistance to advance Tribal energy projects. Technical assistance requests are received on a rolling basis and are completed within several weeks of submission. Ensuring that all requests are addressed, the Office of Indian Energy partners with DOE National Laboratories and other partnering organizations to provide the technical assistance. Technical assistance is provided at no cost to Tribal recipients.

The goal of technical assistance is to address a specific challenge or fulfill a need that is essential to a current project's successful implementation. The intended result is a tangible product or specific deliverable designed to help move a project forward.

The Office of Indian Energy provides technical assistance through a network of subject matter experts and may include (1) technical analysis, (2) financial analysis, or (3) strategic energy planning. Assistance in technical analysis generally involves analysis and modeling, expert review, transmission and/or utility assessment, market access, and energy efficiency reviews. Financial analysis assistance is intended for decision makers in the early stages of energy development, including economic or market analysis. This assistance may include modeling for payback periods, net present value, and levelized cost of energy. Assistance in strategic planning may provide an initial resource assessment, energy options analyses, and development of a viable roadmap for development. This assistance typically includes an on-site

workshop facilitated by Tribal energy expert(s) to assist Tribal leaders, elders, and staff in developing their energy plan.

The request types, geographic distribution of requests from Alaska and the contiguous 48 states, and the requests completed by year are all tracked (Figures 5 and 6).

Figure 5: Office of Indian Energy Completed Technical Assistance Requests

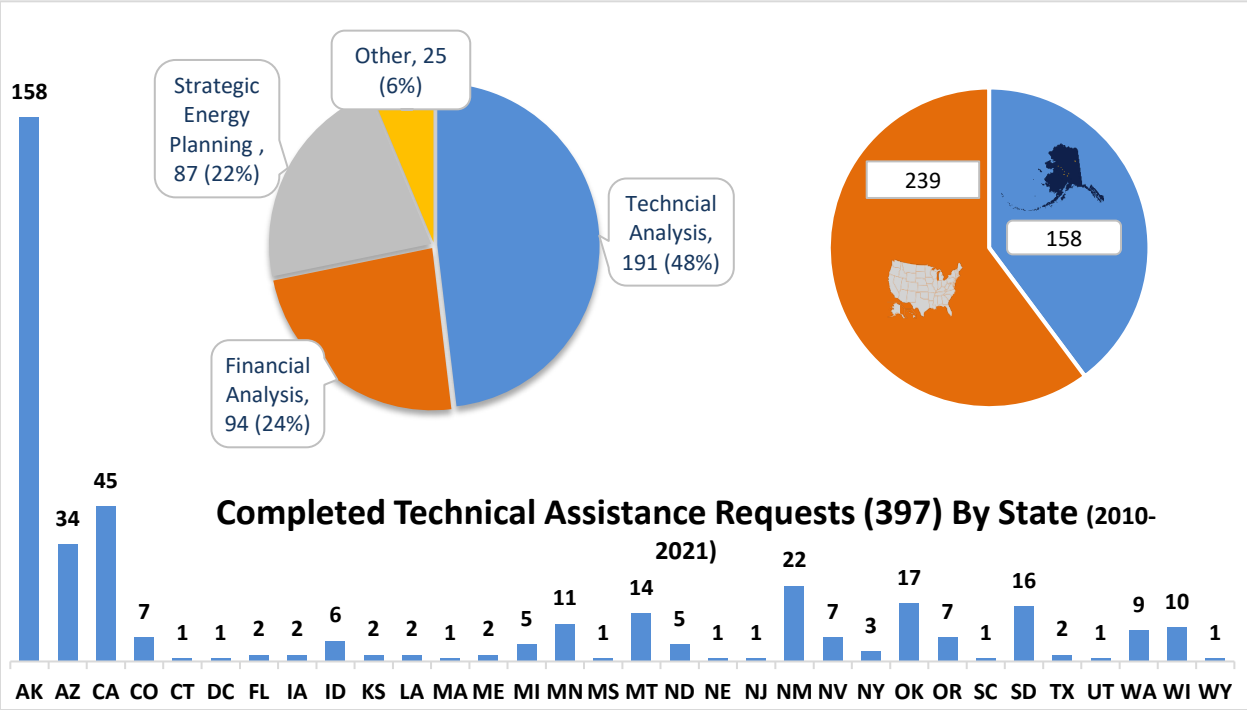
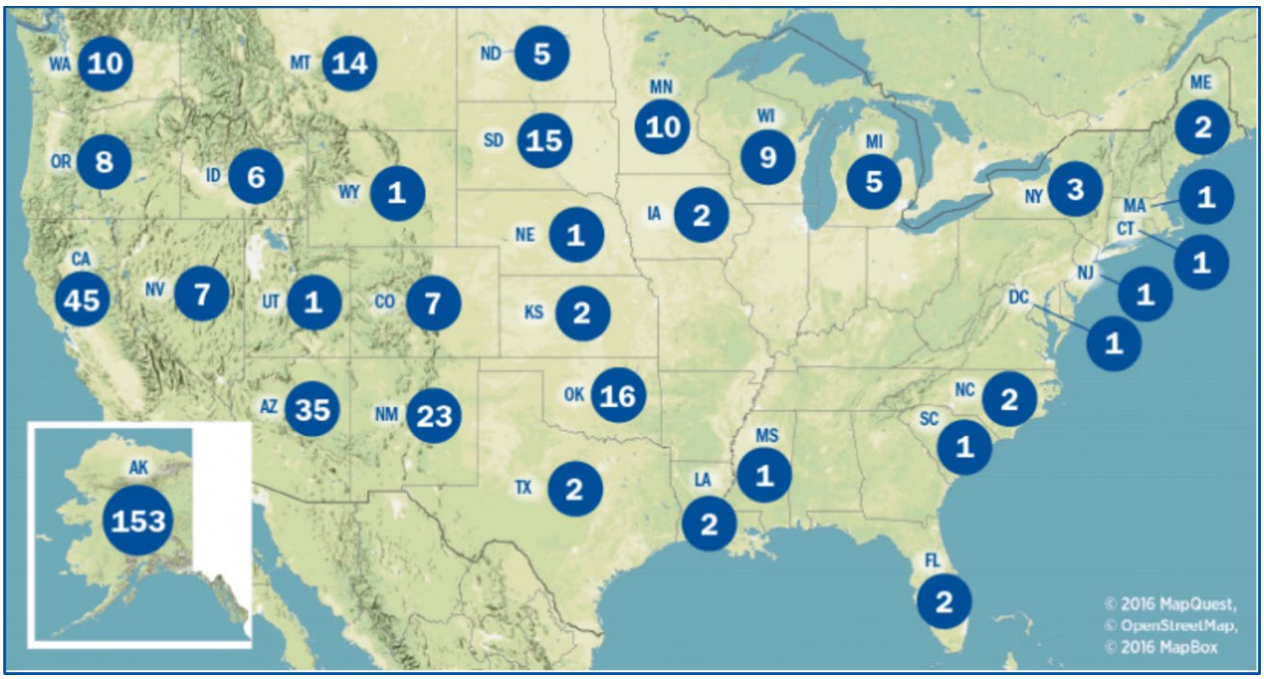


Figure 6: Geographic Distribution of Office of Indian Energy Completed Technical Assistance Requests through 2021



3. Office of Indian Energy Education and Outreach

In addition to financial and technical assistance, the Office of Indian Energy also provides education and outreach for Tribal energy development, consisting of monthly webinars, workshops, online curricula, and online resources and tools. Office of Indian Energy staff additionally attends Tribally specific conferences to present, listen, and support communities across the Nation.

Education and Outreach

Education and outreach for the Office of Indian Energy are executed in various forms. Information resources are available on the Office of Indian Energy website page titled Energy Resource Library.[44] The energy resource library provides links to helpful resources on energy project development and financing on Tribal lands. The library includes links to topically relevant publications, websites, videos, and more produced by the Office of Indian Energy and external organizations. The resources are specifically focused on energy topics that help promote Tribal (1) energy development, (2) efficiency, and (3) use (integrated systems that meet the needs of the community).

[44] Office of Indian Energy (2023). *Resource Library*. U.S. Dept. of Energy, Office of Indian Energy. www.energy.gov.

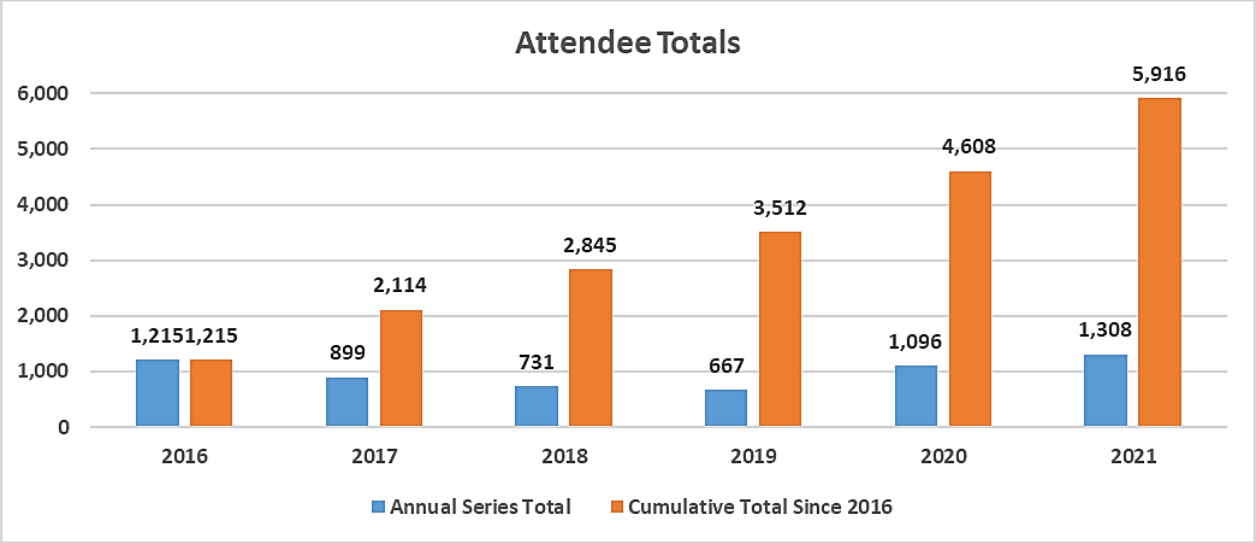
Online Curriculum

Tribal leaders and professionals can also access online curricula pertaining to developing and financing renewable energy projects on Tribal lands on the Office of Indian Energy website.[45] Courses are presented by technical experts from DOE's National Renewable Energy Laboratory and partnering organizations. Foundational courses that are available can provide an overview of renewable energy technologies, strategic energy planning, and grid basics. Leadership and professional courses can provide in-depth information on the components of the project development process and existing finance structures.

Webinars

Monthly webinars have been offered consistently since fiscal year 2016. Between October 2015 and December 2021, the Office of Indian Energy conducted 58 webinars, with 1,120 registrants and 620 attendees, for a 55 percent attendance rate, an average of over 100 attendees per webinar, and a cumulative attendance of nearly 6,000 people (Figure 7). All webinars are also recorded and posted, so registrants unable to attend real-time can listen at a later date.

Figure 7: Office of Indian Energy Monthly Webinar Attendees

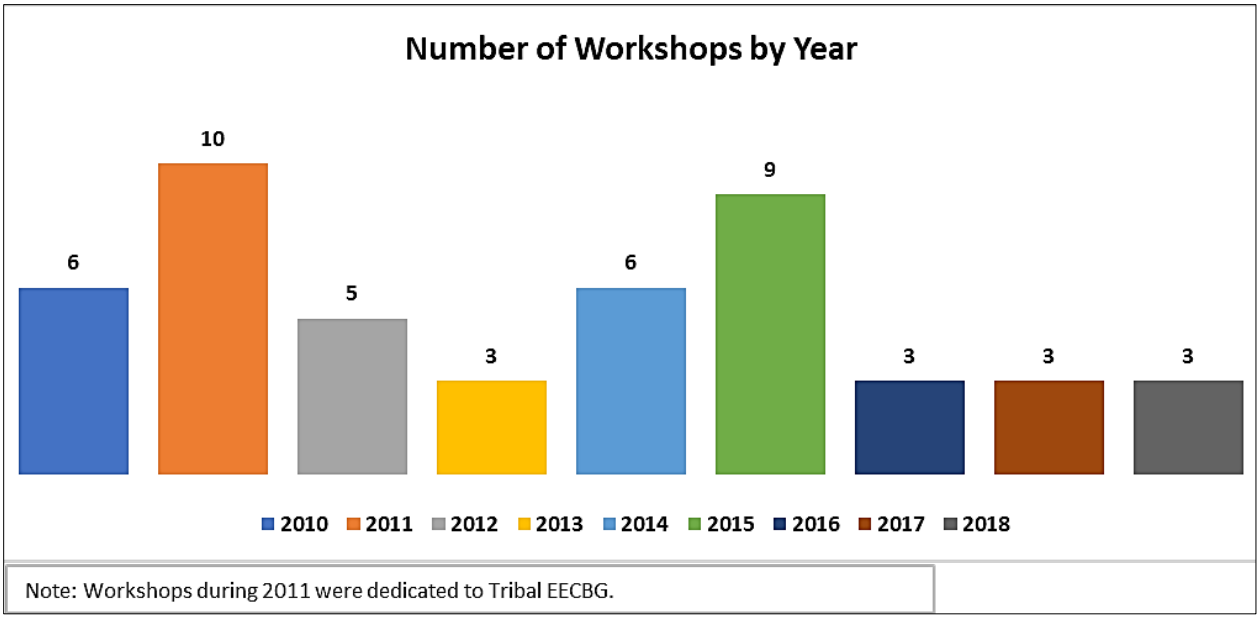


Workshops

In-person workshops are hosted periodically based on demand and Office resource availability. These regional interactive workshops and forums are designed to provide Tribal leaders and their staff members with the information and guidance needed to navigate the complexities of developing and implementing energy projects. Workshops have a wide range of topics and are geared toward salient solutions for regional energy work. Numerous national and regional workshops were held between 2010 and 2018 (Figure 8).

[45] Office of Indian Energy (2023). *Online Curriculum*. U.S. Dept. of Energy, Office of Indian Energy. www.energy.gov.

Figure 8: Office of Indian Energy Workshops by Year



Student Internships

In additional to webinars and workshops, the Office of Indian Energy has supported student internships focused on energy development in Indian Country. Specifically, the Office of Indian Energy, with support and coordination from Sandia National Laboratories, offers a college student internship program for current full-time undergraduate and graduate students who are familiar with Native American culture and Tribal issues. Interns support Tribal energy projects and assist a cross-disciplinary team in performing specific technical tasks in the field and at DOE's Sandia National Laboratories. Below are highlights of the program.

College Student Internship Program Highlights, 2010-2021*

- 26 undergraduate & graduate interns have participated.
- 12 different Tribal affiliations
- 23 percent of the interns converted to year-round status (6 of 26)
- 12 percent of the interns hired as full-time employees or contractors (3 of 26)
- 73 percent female interns (19 of 26)

* No internships were offered in 2020.

Education

In partnership with the Alaska Resource Education, the Office of Indian Energy supports science, technology, engineering, and mathematics (STEM) outreach education in Alaska.[46] Through funding from the Office of Indian Energy, the Alaska Resource Education is providing STEM outreach focused on promoting Tribal energy education for Tribal students and rural teachers across the State of Alaska. Due to the Coronavirus (COVID-19) pandemic, instead of in-person on-site training, the curriculum was provided virtually since the 2020-2021 school year.

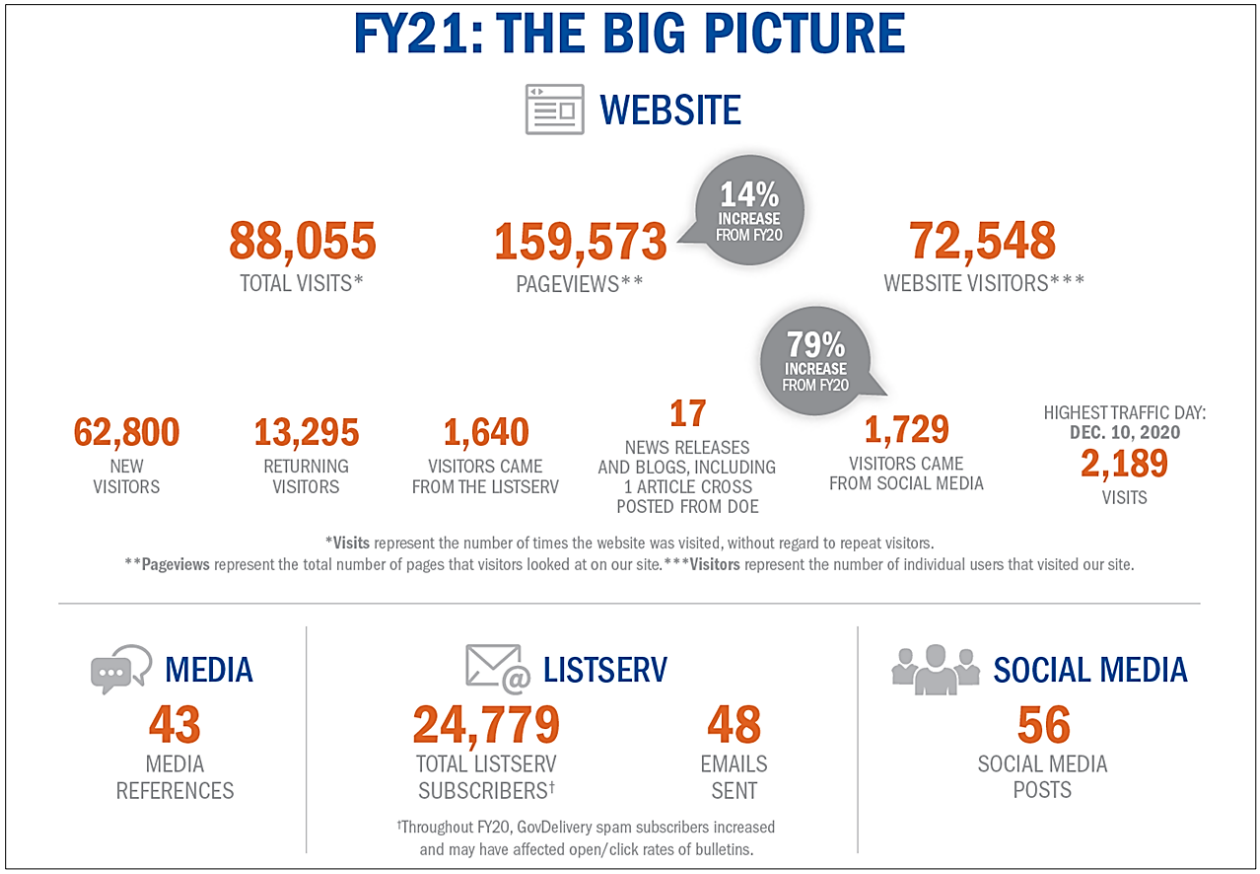
Website and Listserv

In addition to monthly webinars and workshops, the Office of Indian Energy also has an extensive website and broad distribution of the Office of Indian Energy's electronic newsletter.

Website data metrics indicate that the website has received over 72,000 visitors, over 88,000 visits, and over 159,000 page views in 2021 (Figure 9). Further, the electronic newsletter (listserv) had over 24,000 subscribers in 2021 (Figure 9) — and this number does not reflect the full audience being reached, since many entities post and disseminate the information through their websites and listservs, and other agencies provide the information to their Tribal contacts. As such, it is difficult to quantify the total number of people reached by the Office of Indian Energy website and newsletter.

[46] Alaska Resource Education. (2023). *Rural Virtual Energy Camp.* www.akresource.org.

Figure 9: Office of Indian Energy Website and Listserv Metrics for 2021



Annual Program Review

Funded grantees are required to provide project updates at an annual Program Review hosted by the Office of Indian Energy. The typically week-long in-person event provides grant recipients the opportunity to share successes, challenges, and best practices for energy development with other communities. Presentations are saved and provided on the Office website for convenience.[47] Each year during the national health emergency related to the COVID-19 pandemic, the Office has held virtual Program Reviews.

Indian Country Energy and Infrastructure Working Group (ICEWG)

The Indian Country Energy and Infrastructure Working Group (ICEIWG) works collaboratively with the Office of Indian Energy to assist in surveys, analysis, and recommendations related to program and policy initiatives that fulfill DOE's statutory authorizations and requirements.[48]

[47] Office of Indian Energy (2022). *Program Review*. U.S. Dept. of Energy, Office of Indian Energy. www.energy.gov.
[48] Office of Indian Energy (2023). *Indian Country Energy and Infrastructure Working Group*. U.S. Dept. of Energy, Office of Indian Energy. www.energy.gov.

The working group was established in May 2011 to bring Office of Indian Energy leadership and Tribal leaders together to collaborate and gain insight into real-time Tribal experiences representing obstacles and opportunities in energy and related infrastructure development and capacity building in Indian Country.

The Working Group is hosted, managed, and supported as a program initiative in the Office of Indian Energy. It is also supported by the National Conference of State Legislatures through a cooperative agreement.[49]

G. Other Federal Tribal Specific Energy Related Programs

Division of Energy and Minerals Development

The Department of Energy is not the only agency to host a Tribal energy office. The Bureau of Indian Affairs at the U.S. Department of the Interior has an Office of Indian Economic Development, which houses the Division of Energy and Minerals Development (DEMD). The mission statement of DEMD:

> Provide the best possible technical and economic advice and services in assisting Indian mineral owners to achieve economic self-sufficiency by creating sustainable economies through the environmentally sound development of their energy and mineral resources.[50]

DEMD provides energy and mineral grant funding, Tribal energy development capacity grants, grant assistance, technical and software assistance and information, technical and business advisory services and marketing assistance for energy projects.[51]

Indian Energy Service Center

The Indian Energy Service Center (IESC) is a multi-office collaboration among the U.S. Department of the Interior's (DOI) Bureau of Indian Affairs, Bureau of Land Management, Office of Natural Resource Revenue, and Bureau of Trust Funds Administration. DOI's Indian Energy and Minerals Steering Committee recommended creating the IESC to address backlogs across Federal agencies due to the increased energy related activity throughout Indian country.[52] The IESC was approved by the Assistant Secretary of Indian Affairs and began receiving Federal funding in FY 2016.[53]

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[49] National Congress of State Legislatures. (2023). *Indian Country Energy and Infrastructure Working Group.* www.ncsl.org.
[50] Division of Energy and Mineral Development. (2023). *Our Mission*. U.S. Dept. of the Interior, Bureau of Indian Affairs, Division of Energy and Mineral Development. www.bia.gov.
[51] Ibid.
[52] Ibid.
[53] Ibid.

The ISEC expedites "Indian oil and gas activities, standardize processes, and provide for multi-disciplinary engagement in support of gaining efficiencies in the management of all types of Indian Energy, Renewable Energy, and Mineral development and activities to better serve Indian beneficiaries and Tribes".[54]

The ISEC mission statement:

> Streamline business processes to efficiently develop the Indian mineral estate while protecting trust assets by removing barriers to all types of energy, renewable energy, and mineral development on Indian lands.[55]

The ISEC has several primary functions, including:

- Provide a cost-effective centralized and multifunctional processing capacity to ensure DOI's successful fulfillment of its Indian energy and mineral development responsibilities in the face of fluctuating workloads.
- Promotes a common business process that standardizes and streamlines all types of Indian energy, renewable energy, and mineral development functions across DOI's Indian energy organizations to the benefit of DOI and Tribes.
- Gain efficiencies by applying significant streamlining improvements as offered in the recently developed Onshore Federal and Indian Energy and Mineral Lease Management Standard Operating Procedures (SOP). This SOP greatly simplifies processing activities while assuring that DOI responsibilities in Titles 25, 30, and 43 of the Code of Federal Regulations are fulfilled.
- Provides the critical role of facilitating SOP training(s), which support a streamlined and standardized process for all DOI employees that meets DOI's Indian trust responsibility. Each of these offices (Bureau of Indian Affairs, Bureau of Land Management, Office of Natural Resource Revenue, and Bureau of Trust Funds Administration) serves active and extensive roles in the Indian energy, renewable energy, and mineral development processes. The IESC is currently working on Computer Based Training modules and SOP Training for Tribes, Trust Beneficiaries and Operators.

Pursuant to Interior Secretarial Order number 3377, IESC created new guidance for Tribal Energy Resource Agreement and Tribal Energy Development Organization processing to be included in the Onshore Energy and Mineral Lease Management Interagency SOP. [56]

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[54] Office of Natural Resources Revenue. (2023). *Indian Resources*. U.S. Dept. of the Interior, Office of Natural Resources Revenue. www.onrr.gov.
[55] Indian Energy Service Center. (2023). *Our Mission*. U.S. Dept. of the Interior, Bureau of Indian Affairs, Indian Energy Service Center. www.bia.gov.
[56] Office of Natural Resources Revenue. (2023). *Indian Resources*. U.S. Dept. of the Interior, Office of Natural Resources Revenue. www.onrr.gov.

Office of Natural Resources Revenue (ONRR)

DOI's Office of Natural Resources Revenue (ONRR) Federal Indian Minerals Office and Indian Outreach serves as an advocate for the fulfillment of ONRR trust responsibility and to resolve Indian mineral issues.[57] The Outreach program addresses Indian mineral issues and is a point of contact with the Indian community, Indian mineral owners, and involved state and Federal agencies.[58]

ONRR provides the following services:

- Accounts for mineral royalties.
- Reviews volumes used to compute royalties on the leases.
- Ensures that methods used to compute royalties are in accordance with applicable Federal laws, regulations, and lease terms. [59]

Bureau of Trust Funds Administration (BTFA)

The Bureau of Trust Funds Administration, within DOI's Office of the Assistant Secretary for Indian Affairs, provides banking and investment services to Native American beneficiaries who earn royalty income and other monies from activities on Federally managed land.[60] An important aspect of the Bureau of Trust Funds Administration is that it handles management of money earned from land assets owned by Tribes separately from other trust services to avoid any potential or perceived conflicts of interest related to financial accounting.

III. Methods

A multifaceted consultation and outreach strategy was utilized for this report. The Office of Indian Energy held Federal interagency calls early in the research process. Various staff from the National Renewable Energy Laboratory and Sandia National Laboratories participated with staff from several DOI offices, including the Division of Energy and Minerals Development, Indian Energy Service Center, Bureau of Land Management, Office of Natural Resource Revenue, and the Bureau of Indian Affairs. The purpose of these meetings was to review the congressional language directing this report and to gather information resources that would contribute to its preparation.

Grant Application Statistics

Since 2017, the Office of Indian Energy has incorporated a required Data Metrics File as part of the formal grant application process. This file was developed due to the dearth of data related

[57] Office of Natural Resources Revenue. (2023). *Indian Resources*. U.S. Dept. of the Interior, Office of Natural Resources Revenue. www.onrr.gov.
[58] Ibid.
[59] Ibid.
[60] Bureau of Trust Funds Administration. (2023). *About Us*. U.S. Dept. of the Interior, Bureau of Indian Affairs, Bureau of Trust Funds Administration. www.bia.gov.

to energy or electricity and Tribal communities. Data points from over 170 grant applications representing nearly 130 Tribal communities have been collected to date. The self-reported data cover proposed project characteristics, electricity reliability, energy access, environmental impacts, project employment, community impacts, and future energy plans. Many of these applicants went on to receive project funding from the Office of Indian Energy. Data from these self-reported statistics are reported throughout the results section.

Tribal Electricity Access and Reliability Listening Sessions

The Office of Indian Energy held a listening session on November 4, 2021, titled Tribal Electricity Access and Reliability Listening Session. The Office of Indian Energy sent out a "Dear Tribal Leader" letter (a formal letter to Tribal leadership) in mid-October 2021. Two follow-up reminder emails were sent in subsequent weeks leading up to the event. Additionally, the Office of Indian Energy provided event notification and registration links via listserv with over 24,000 subscribers maintained by office staff. An advertisement with event information was also posted on the Office of Indian Energy website.

The Office of Indian Energy used the current Bureau of Indian Affairs Tribal Leader Directory and supplemented the directory with additional phone calls, emails, and research on official Tribal Government websites. Individual Navajo Nation Chapters were contacted via email as Navajo Nation has a known history of unelectrified homes and has the largest land base of all Tribes.

The listening session had over 300 registrants and over 200 attendees, 55 percent of which were representatives from Tribes. The goal of the listening session was to gain important insight directly from Native Nations regarding the current status of unelectrified homes and electricity reliability issues facing their communities. Additionally, Native Nations had opportunities to make recommendations for this report and contribute to its findings.

The first listening session covered Office of Indian Energy introductions, provided an overview of the Office of Indian Energy, and asked polling questions directly related to the different sections of the report. The majority of the time was allocated for participants to share their comments. The listening session polling covered a set of topics relating to the language of the Congressional statute directing this report on Tribal energy access and reliability. Reponses directly from Tribal representatives were separated from other responses and are presented throughout the results section (Appendix B).

A follow-up listening session was held July 28, 2022, to discuss results from the initial listening session and findings from the Office's research. Promotion for this session included a "Dear Tribal Leader" letter invitation that encompassed findings for discussion during the session. Similar to the first listening session, there were two follow-up emails, listserv announcements, and Office website announcements. The outcome of both listening sessions provided the Office of Indian Energy with significant input for this report and assure it addresses Tribal issues.

Additional Research

Using publicly available data and supporting resources, Office of Indian Energy staff and Federal contractors conducted additional research for the completion of this report and to attain further results. Utility related data was derived from public resources and, in many cases, required additional outreach via phone and email for data verification. Contracted work courtesy of the National Renewable Energy Laboratory examined energy burden as it relates to Indian Country. Additionally, the Division of Energy and Minerals Development provided transmission resource data.

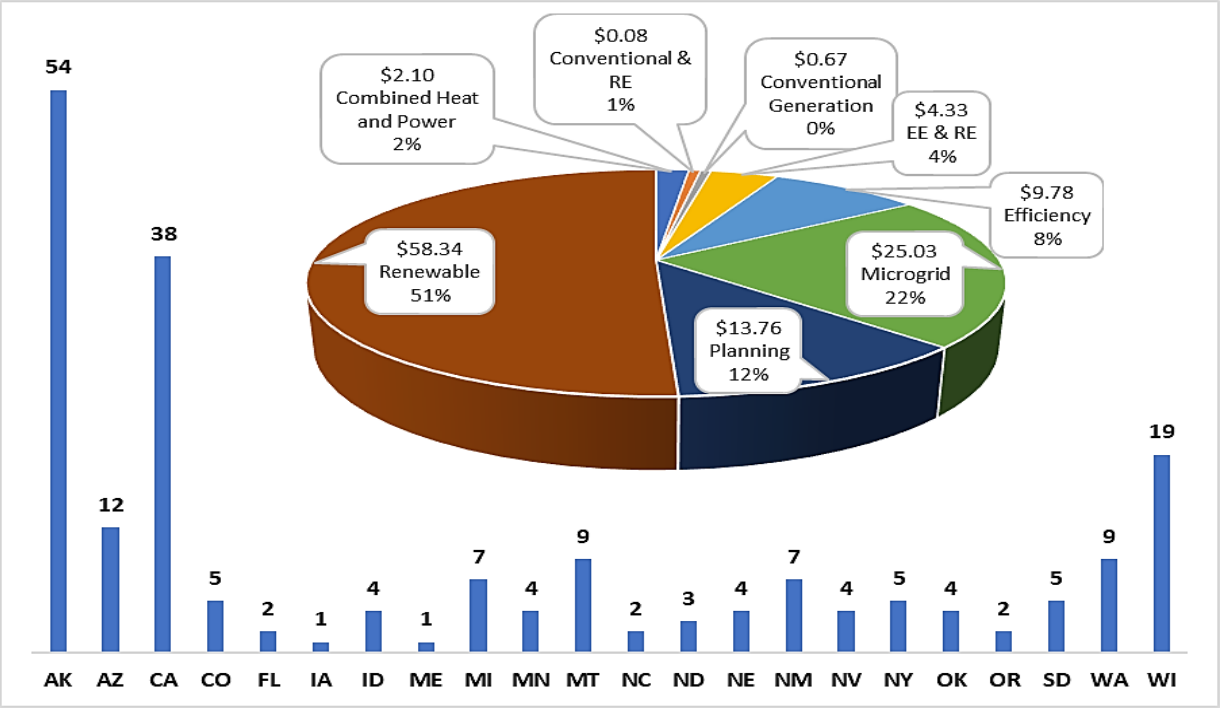
IV. Results

A. Tribal Land Generation, Transmission, and Distribution Assets

Applicable Office of Indian Energy Projects

As mentioned previously, the Office of Indian Energy has funded planning grants, feasibility studies, development grants, and Tribal energy hardware installation or deployment projects across Alaska and the contiguous lower 48 states (Figure 10).

Figure 10: Office of Indian Energy Investment by Type and State



More specifically, the Office of Indian Energy has invested over $114 million in more than 200 Tribal energy projects between 2010 and 2022. These investments include more than $85 million in over 100 hardware installation or deployment projects, $6.3 million in eight

development projects, nearly $9 million in 39 feasibility studies, and $13.8 million in over 50 planning grants (Table 1).

Table 1: Office of Indian Energy Investment by Type

Type	DOE Investment	Number of Awards
Deployment	$85.8	101
Development	$6.3	8
Feasibility	$9.0	39
Planning	$13.8	53
Total	**$114.8**	**201**

The $85.8 million invested by the Office of Indian Energy in Tribal energy hardware installation or deployment projects has significantly impacted Native communities in the following ways:

- More than 43 MW of new generation installed
- More than 10 MWh of battery storage installed
- Over $13.7 million saved every year
- Over $295 million saved over system lifetimes
- $3.46 saved for every DOE dollar invested
- Over 8,600 Tribal buildings affected

The tangible benefits of these investments are further exemplified below.

- The Colusa Indian Community (California) has been leading the way with its operation of a 6 MW co-generation microgrid. The Office of Indian Energy provided a grant to add 450 kW of carport canopy solar PV to the Colusa Indian Community's existing microgrid and a grant to expand their microgrid to 30 homes and other community buildings.
- Funding from the Office of Indian Energy supported the installation of a community-scale biomass district heating system in Huslia Village (Alaska) which, when complete, could provide 60 percent of the heat to the community's buildings and save $57,000 annually in heating costs. Additional information regarding this project success story may be found at Old Ways Fuel Future Vision, Local Economy for Alaska Native Village | Department of Energy.
- Motivated by severe flooding in 2016 which caused extensive power outages, the Bad River Band of Lake Superior Tribe of Chippewa Indians (Wisconsin), supported by a grant from the Office of Indian Energy, recently completed a 500 kW solar PV microgrid installation to provide power to critical facilities in the event of future disasters. Additional information regarding this project success story may be found at New Microgrid Is a Symbol of Resilience for Bad River Band | Department of Energy.

- NANA Regional Corporation, Inc. (Alaska), an Alaska Native corporation formed in 1971 under ANCSA, serves a region in Northwest Alaska encompassing 38,000 square miles, most of which is above the Arctic Circle. In cooperation with the villages and local utilities, and with funding from the Office of Indian Energy through a 2016 grant, NANA Regional Corporation installed a community solar PV project in Buckland, Deering, and Kotzebue and went on to add batteries to those systems, thereby allowing those villages to turn their diesel generators off for a portion of the year. See a video, courtesy of BoxPower, at *BoxPower in Buckland, Alaska – YouTube*.
- Eastern Band of Cherokee Indians (North Carolina) installed a 700 kW community solar PV system with funding provided by the Office of Indian Energy. The nearly $100,000 in savings each year can now be invested in services that enhance quality of life for the community. Additional information regarding this project success story may be found here.
- Northway Village (Alaska), with partial funding from the Office of Indian Energy, installed energy efficiency measures and an 18 kW rooftop solar PV system to reduce energy use in three Tribal buildings. The project is expected to reduce energy use by over 20 percent and save over $20,000 in energy costs each year.
- San Pasqual Band of Mission Indians (California) is constructing a hybrid solar-storage-liquid propane microgrid, co-funded through a grant from the Office of Indian Energy, to power critical loads during power outages.
- Alaska Village Electric Cooperative and the Bethel Native Corporation (Alaska), with grant funding from the Office of Indian Energy, are installing a 900 kW wind turbine that will reduce diesel fuel use in the communities of Bethel, Oscarville, and Napakiak and save over $1 million per year.
- Other successful wind projects installed across Alaska, co-funded by the Office of Indian Energy, include a project in Stebbins (AK) to provide power to Stebbins and Saint Michael, and another project in Pitka's Point (AK) to provide electricity to Pitka's Point and Saint Mary's and through a future intertie, Mountain village.
- The Seneca Nation (New York) installed a 1.5 MW wind turbine in 2017 with funding through a grant from the Office of Indian Energy. This turbine was a means for the Nation to offset energy costs for their members and create cost equity across their various territories. The Nation soon afterwards installed a 2 MW solar installation and went on to develop their natural gas resources. Additional information regarding this project success story may be found at Seneca Nation Celebrates Commissioning of 1.7-MW Wind Turbine with DOE Support | Department of Energy.
- Upgrades to the microgrid in Unalakleet (Alaska) through a grant from the Office of Indian Energy will increase wind energy penetration and save nearly 44,000 gallons of diesel fuel each year, equivalent to over $130,000.
- The Picuris Pueblo (New Mexico), the smallest of New Mexico's 19 Pueblos with approximately 300 members and only 87 of those living in the Pueblo proper, installed a

1 MW community solar PV system through a grant from the Office of Indian Energy. This installation helped reduce the cost of electricity for many of the Pueblo's low-income members. Additional information regarding this project success story may be found at Community Solar to Meet 100 percent of Energy Costs for New Mexico Tribe | Department of Energy

- The Soboba Band (California) installed two 1 MW community solar PV installations through a 2015 grant and a 2016 grant from the Office of Indian Energy. Additional information regarding this project success story may be found at Soboba Band of Luiseño Indians Celebrates Initial Step Toward Achieving Its Tribal Energy Vision | Department of Energy.
- The Southern Ute Indian Tribe (Colorado) and the Ute Mountain Ute Tribe (Colorado) in the four corners area have also installed a 1.3 MW community solar PV installation through an Office of Indian Energy 2014 grant and a 1 MW community solar PV installation under a 2017 grant, respectively. Additional information regarding this project success story may be found at Southern Ute Indian Tribe Dedicates 1.3-MW Community Solar PV System | Department of Energy and Ute Mountain Ute Tribe's Perseverance Pays as Solar Takes Off | Department of Energy.
- Igiugig Village (Alaska), one of about 240 remote communities in Alaska that rely on isolated diesel-powered microgrids, is leveraging DOE funding through a 2019 grant to integrate power produced from the Kvichak River and battery storage into their diesel-powered microgrid – without interfering with the nursery for the largest salmon run on Earth, Lake Iliamna. Additional information regarding this project success story may be found at Free-Flowing River Revs Up Resilience of Alaska Native Village | Department of Energy, a video, courtesy of KATV News, at *Frontiers 180: Igiugig – A River Runs Through It,* and another video, courtesy of Ocean Renewable Power Company, at *Sustainable, Off Grid Energy for Communities from Free Flowing Rivers*.

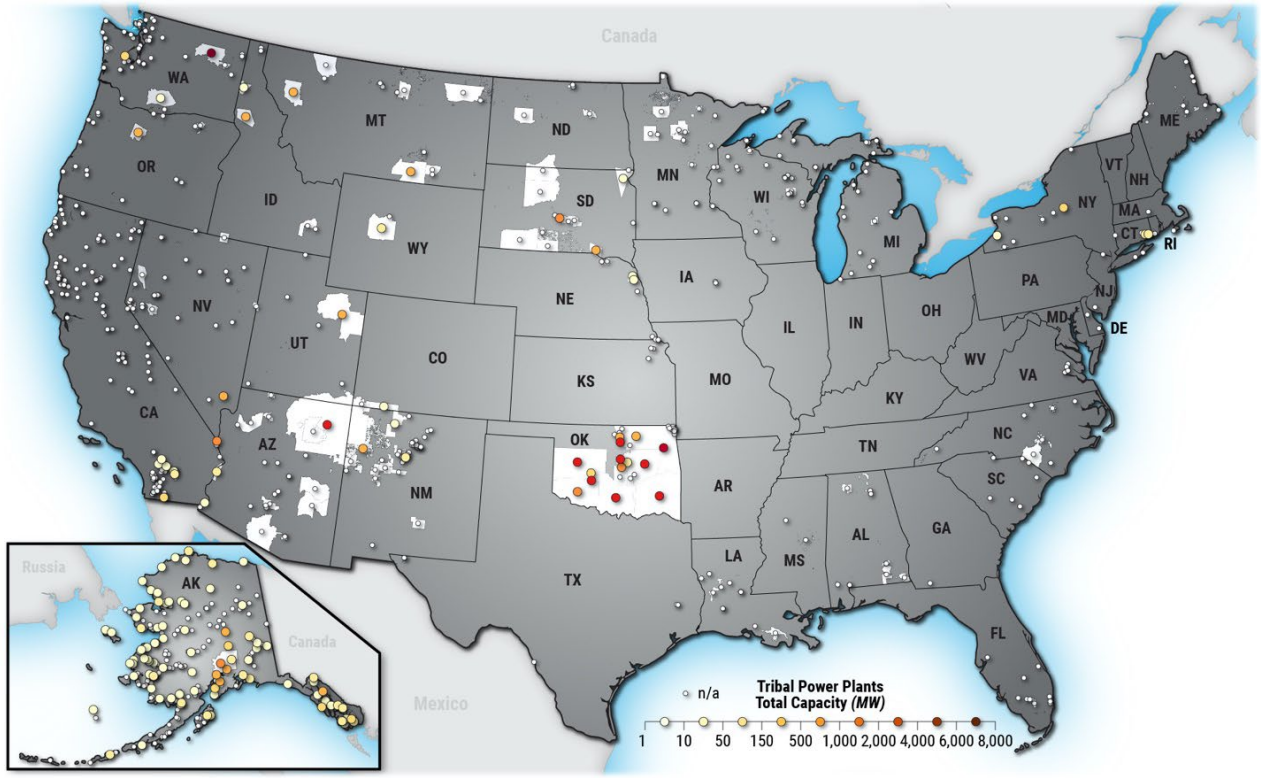
For additional information on projects funded by the Office of Indian Energy that are having tangible benefits in American Indian and Alaska Native communities, see Tribal Energy Project Successes | Department of Energy. For an interactive map and a sortable table of projects, see the Office of Indian Energy project database. Each project summary page includes a summary of the project, annual presentations and, if completed, final reports.

Power Plants on Tribal Lands

In addition to the Office of Indian Energy projects, many existing power plants are located within Tribal lands, covering both conventional and renewable energy sources (Figure 11). While many power plants are located on Tribal lands, it should be noted that the presence of generating stations on Tribal lands in particular is not a proxy for commercial or residential electricity access, nor a proxy for reliability of access energy generation.

Information regarding these existing power plants within Tribal areas was acquired from the Bureau of Indian Affairs, which used EIA data prepared by NREL.[61] The nameplate capacity of a power plant is the maximum instantaneous power that can be generated by the power plant at any given point. However, the actual maximum electricity that reaches the grid from the power plant is reduced by the electricity used by the plant itself, as well as inefficiencies introduced by the temperature of cooling water and ambient air not being ideal. The net summer capacity, as reported by the EIA, considers these factors and is a more realistic measurement of the maximum electricity output that can be expected by the power plant.[62] The net summer capacity is therefore the "capacity" number used for Figure 11. Generation capacity is not delineated between Tribally-run and non-Tribally-run resources.

Figure 11: Estimated Net Summer Capacity of Power Plants on Tribal Lands (Courtesy of NREL)



[61] Note: Spatial maps and associated data produced for this report are courtesy of NREL. Power plant capacity estimates are from 2018 data. Power plants were spatially intersected with Tribal areas and the capacity of each power plant was then summed for each Tribal area. Note, the location data is the best available data at this time and may not lie perfectly within the Tribal area boundaries. True error-free coordinates of existing plants would need confirmation from local stakeholders. Furthermore, EIA generation points are limited to larger- scale projects, typically 1 MW or greater.

[62] Energy Information Administration. (2023, April). *Glossary.* U.S. Dept. of Energy, Energy Information Administration.. www.eia.gov.

Overall, power plants located within Tribal areas have an estimated installed net summer capacity of 37.6 GW. This represents just over three percent of the United States' 1.12 TW of utility-scale electricity generation capacity. While this is a small proportion, it favors comparably to the 1.5 percent of the U.S. population that lives on Tribal area land. However, this capacity is extremely unevenly distributed, with the vast majority of electrical generation capacity being associated with large Tribal areas, particularly Oklahoma. In fact, 84 percent of the Tribal areas surveyed do not contain power plants with electricity generation capacity above 1 MW. Meanwhile, the top 10 Tribal areas by installed generation capacity represent 28.2 GW of the 37.6 GW (Table 2).

Power plants located within Tribal areas represent an estimated installed net summer capacity of **37.6 GW**.

Table 2: Tribal Areas with Highest Existing Generation Capacity (Courtesy of NREL)

Tribal Area Name	State	Maximum Output (MW)
Colville LAR	Washington	7079
Cherokee TSA	Oklahoma	5608.7
Muscogee Creek TSA	Oklahoma	3460.1
Choctaw TSA	Oklahoma	2369.6
Cheyenne and Arapaho TSA	Oklahoma	1982.5
Kiowa Comanche Apache TSA	Oklahoma	1876.3
Navajo LAR	Arizona, New Mexico	1848.3
Cook Inlet Region, Incorporated	Alaska	1454.2
Seminole TSA	Florida	1315
Chickasaw TSA	Oklahoma	1300.2

The breakdown of installed generation capacity on Tribal lands by primary energy source reveals some differences from the capacity by energy source for the United States as a whole (Table 3). While the top four energy sources (Natural Gas, Hydropower, Coal, and Wind) are the same in Tribal areas and the United States, Tribal areas have comparatively high Hydropower capacity (29 percent for Tribal areas vs nine percent for the United States) and comparatively low Coal (12 percent vs. 18 percent), Solar (one percent vs. five percent), and Nuclear (0 percent vs. eight percent) capacity.

Table 3: Electricity Generation Capacity on Tribal Areas Compared to U.S. (Courtesy of NREL)

Energy Source	Tribal Areas (MW)	% Tribal Installed Capacity	United States (MW)	% US Installed Capacity
Natural gas	16,688.50	44%	491,293.40	43%
Hydropower	11,073.30	29%	103,049.20	9%
Coal	4,330.60	12%	209,688.10	18%

Wind	4,226.40	11%	132,400.60	12%
Petroleum and Other	966.7	3%	44,094.40	4%
Solar	330	1%	61,014.40	5%
Nuclear	0	0%	95,491.60	8%
Total	37,615.50		1,137,031.70	

Large-Scale Renewable Energy Developments

There is a growing list of Tribally owned or affiliated large-scale, over 20MW, renewable energy generation projects. These projects, which are primarily in the western half of the United States, have a combined nameplate capacity of more than 2250 MW (Table 4). The electricity generated from these assets is the equivalent to the powering of several hundred thousand homes based on national average home energy consumption.

More than **2250 MW** of large-scale renewable energy generation is known on Tribal lands.

Because there are likely additional large-scale projects being planned and/or in development, the list in Table 4 is not considered exhaustive.

Table 4: Known Large-Scale Renewable Energy Projects on Tribal Lands

Tribe	State	Generation Project	Nameplate Capacity	Other Details
Campo Kumeyaay	California	Kumeyaay Wind	50 MW	
Jicarilla Apache	New Mexico	Solar Direct	50 MW	This project also includes a 20MW/80MWh battery storage unit
Moapa Band Paiutes	Nevada	Moapa Southern Paiute Solar Project	250 MW	
Moapa Band Paiutes	Nevada	Arrow Canyon Solar Project (December, 2022)	275 MW	This project also includes a 91 MW-5 hr. battery storage unit
Moapa Band Paiutes	Nevada	Southern Bighorn Solar Project (Planned)	400 MW	This project also includes up to 1,000 MWh of battery storage
Moapa Band Paiutes	Nevada	Chuckwalla Solar Project (Operational, end of 2023)	700 MW	This project also includes a 180 MW-4 hr. battery storage unit
Navajo Nation*	Arizona	Kayenta I (solar PV)	27.3 MW	
Navajo Nation*	Arizona	Kayenta II (solar PV)	27.3 MW	

Navajo Nation*	Utah	Red Mesa Tapaha Solar PV Park (Operational, November 2022)	70 MW	
Navajo Nation*	Arizona	Cameron Solar Project (Planned, Lease Signed)	200 MW	
Salish and Kootenai	Montana	Seli'š Ksanka Qlispe' Dam	208 MW	
* By law, Navajo Nation plants must hire using preference for Navajo people.				

Conventional Energy

Tribal lands have long been sought after for conventional energy sources. Decades of conventional energy development, which has included coal, uranium, and petroleum, has provided significant employment and revenue for many Tribal communities. While there is not data available on total revenue shift, the graphs below indicate a decline in coal production. Such development has also resulted in noted impacts to the environment, cultural resources, and human health.[63] Historically, much of the conventional energy development on Tribal lands has been operated and managed by non-Tribal entities.[64]

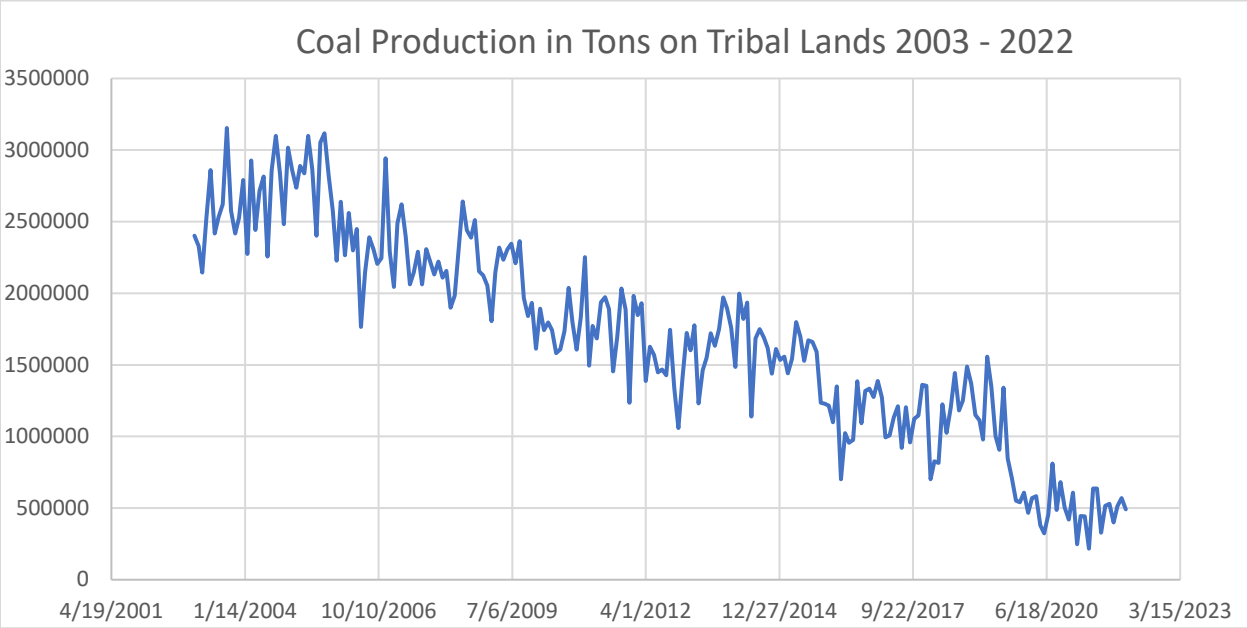
More recently, Tribal communities have taken a larger role in developing their own conventional energy resources, while many communities maintain leasing agreements. The DOI ONRR tracks and manages data related to natural resource production on Tribal lands and publishes up-to-date reports every three to four months.[65] The data set includes monthly production data for coal, natural gas, and oil since the inception of the tracking in January of 2003. While production data is not publicly available for respective Tribes, total nationwide data amongst all Tribes that produce coal, natural gas, and oil is available (Figures 12,13,14). Data represents production on Tribal lands and does not differentiate between Tribally run and non-Tribally run operations.

Coal-producing Tribes have historically consisted, and currently consist primarily of the Crow Tribe of Montana, the Hopi Tribe, and Navajo Nation, the latter two of which have coal resources in Arizona. While production has continually dropped over time, over five million tons of coal are still produced annually from Tribal lands (Figure 12). Coal production on Tribal lands totaled 5,525,087 tons in 2021, which represents roughly one percent of total United States coal production (578.1 million tons) that year.[66,67] The coal produced on Tribal lands, for illustrative purposes, would fill nearly 48,000 average train cars, with coal extending several

[63] Jones, T.E. & Necefer, L.E. (2016). *Identifying Barriers and Pathways for Success for Renewable Energy Development on American Indian Lands*. Sandia National Laboratories. www.energy.gov.
[64] Ibid.
[65] Natural Resources Revenue Data. (2022). *Production by Month*. U.S. Dept. of the Interior, Natural Resources Revenue Data. www.revenuedata.doi.gov.
[66] Ibid.
[67] Energy Information Administration. (2021). *Short-Term Energy Outlook.* U.S. Dept. of Energy, Energy Information Administration. www.eia.gov.

hundred miles. The total recorded production of coal on Tribal lands since 2003 equates to 389,802,148 tons of coal, or over 3,360,300 train cars of coal.[68]

Figure 12: Coal Production in Tons on Tribal Lands 2003-2022



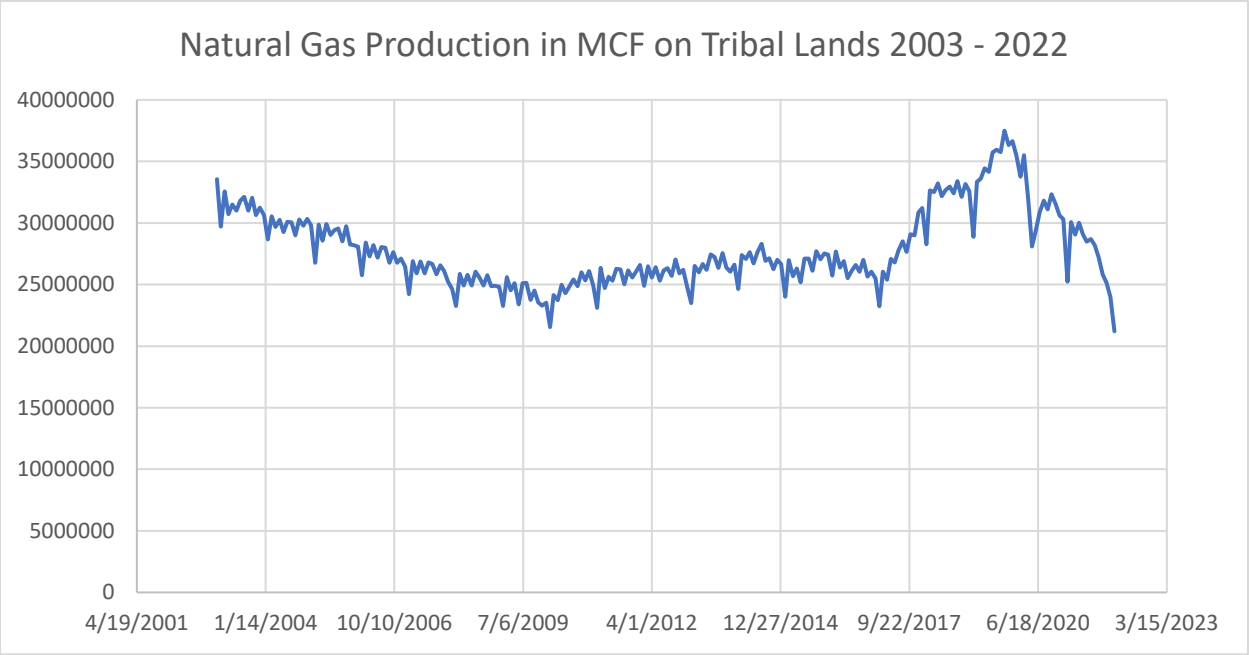
Natural gas development on Tribal lands produced 337,330,625 MCF (thousand cubic feet) of natural gas in 2021 (Figure 13), less than one percent of the total U.S. natural gas that year (41,483,478,000 MCF).[69] The natural gas produced from Tribal lands has the potential to heat more than five million homes annually.[70] The total recorded production of natural gas on Tribal lands since 2003 equates to 6,399,603,361 MCF, or, over average, the power to heat over 96,000,000 homes annually.

[68] Note: Assumes each train car carries an average of 116 tons of coal.

[69] Natural Resources Revenue Data. (2022). *Production by Month*. U.S. Dept. of the Interior, Natural Resources Revenue Data. www.revenuedata.doi.gov.

[70] Note: Assumes 1 TCF of Natural Gas equals the approximate amount to heat 15 million homes.

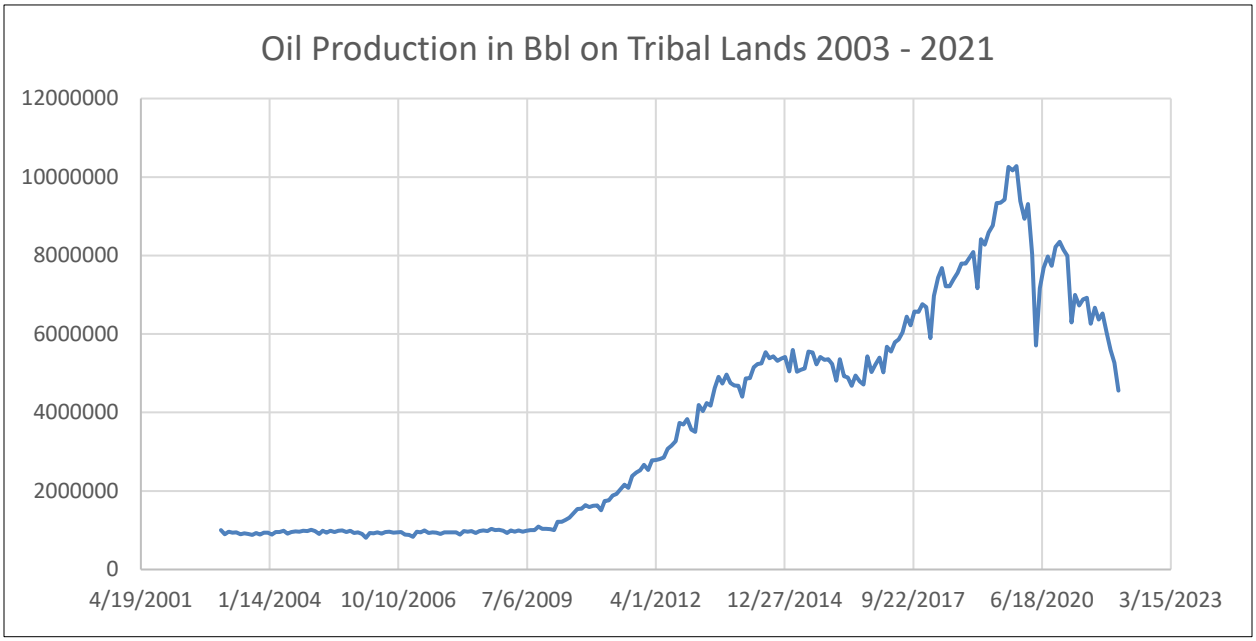
Figure 13: Natural Gas Production in MCF on Tribal Lands 2003-2022



Oil production has occurred on Tribal lands since the late 1800's and continues to this day. Oil produced on Tribal lands in 2021 equated to 79,268,397 Bbl (barrels of crude oil; Figure 14), nearly two percent of total U.S. oil production that year (4,083,493,000 Bbl). [71] The total recorded production of oil from Tribal lands since 2003 equates to 848,843,616, or roughly 1.5 percent of total United States oil production during the same period (Figure 14).

[71] Natural Resources Revenue Data. (2022). *Production by Month*. U.S. Dept. of the Interior, Natural Resources Revenue Data. www.revenuedata.doi.gov.

Figure 14: Oil Production in Bbl on Tribal Lands 2003-2022

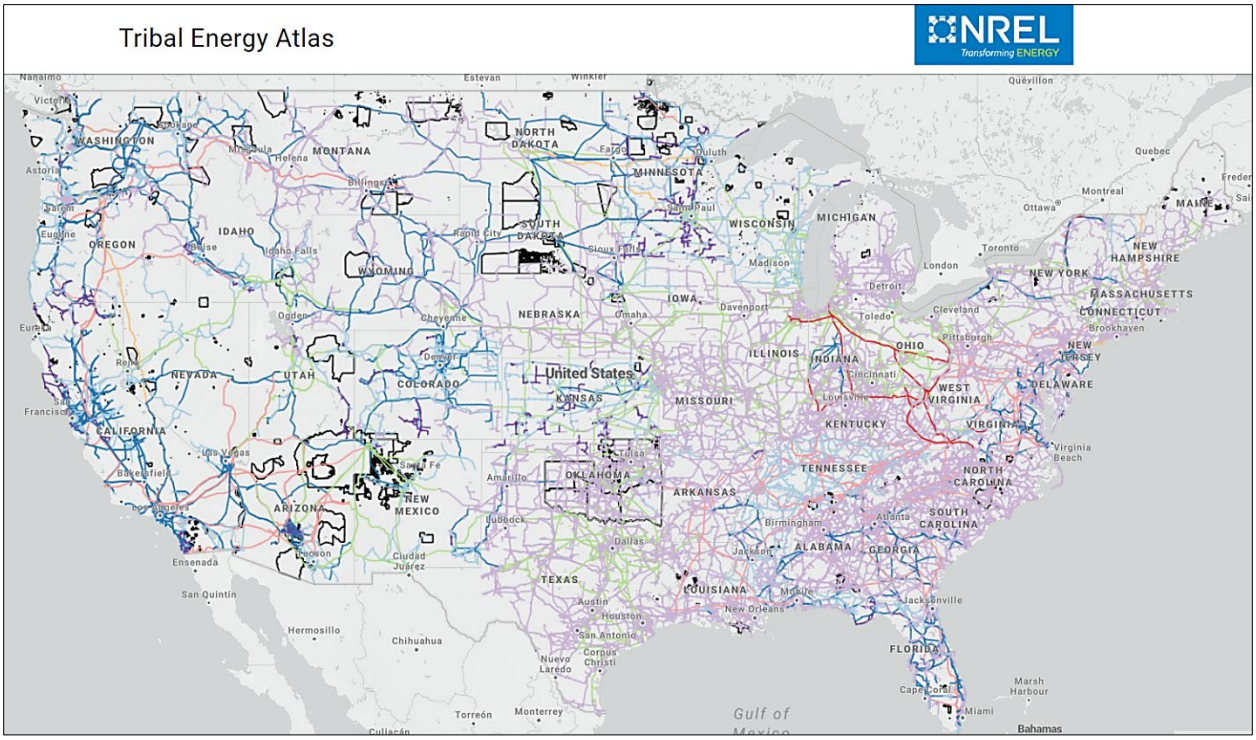


Transmission Assets

For the purpose of addressing transmission assets for this report, the Division of Energy and Minerals Development provided estimated data concerning the electric transmission line voltage and miles on Tribal lands. This data, derived by spatially intersecting transmission line data and Tribal reservation boundary data from the Bureau of Indian Affairs and is separated into three categories: (1) reservation boundaries, (2) land area representation, and (3) Oklahoma Tribal statistical areas.[72] All transmission line data consists of combined Tribally and non-Tribally owned lines located on Tribal lands (Figure 15).

[72] Note: Per the U.S. Census: "OTSAs are statistical areas that were identified and delineated by the Census Bureau in consultation with Federally recognized American Indian Tribes based in Oklahoma. An OTSA is intended to represent the former American Indian reservation that existed in Indian and Oklahoma territories prior to Oklahoma statehood in 1907. OTSAs are intended to provide geographic entities comparable to the former Oklahoma reservations so that statistical data can be viewed over time. OTSAs were referred to as Tribal Jurisdiction Statistical Areas (TJSAs) in the 1990 Census data products."

Figure 15: U.S. Transmission Lines



Data provided by the Division of Energy and Minerals Development indicates that just over 16,500 miles of transmission lines are estimated to exist on 215 Tribal reservation lands across the Nation, which represents roughly 2.3 percent of all transmission miles in the United States. The combined transmission line size of the transmission lines that cross Tribal lands is estimated to be more than 58,000 kV (excluding areas with no known sizing of kV transmission lines). The voltage of transmission line recorded ranges from 7 kV to 1000 kV. Of known individual line voltage sizes, approximately 33 percent (114) were less than 100 kV, 37 percent (130) were 100-200 kV, 24 percent (83) were 201-400 kV, 6 percent (21) were 500 kV, and less than one percent (1) was 1000 kV.

More than **16,500 miles** of transmission lines are estimated to exist on **215** Tribal reservation lands.

The BIA uses a GIS dataset titled land area representation (LAR) to depict the exterior extent of many Federal Indian land areas. These data indicate that there is estimated to be over 16,000 miles (roughly 2.3 percent of all transmission miles in the United States) of transmission in these areas.

Oklahoma Tribal statistical areas (OTSAs) have historically been used to describe a majority of the eastern regions of Oklahoma. The data for OTSAs detail 27 distinct Tribal areas within Oklahoma. OTSAs account for over 30,000 miles (4.2 percent of all transmission miles in the U.S.) of transmission in Tribal areas in Oklahoma alone. The total size of these lines is estimated to be over 14,500 kV with the size of known transmission lines ranges from 69kV to 345kV. It

should be noted that OTSAs have considerable non-Tribal populations living within the fractionated former (and now current) reservation boundaries. Data for the current extent of reservation land in Oklahoma have, therefore, not been researched, and are not presented in this report.

The preceding data should be considered a general estimate and not precise. Importantly, approximately 30 percent of all estimated transmission line voltage data is not known in this data set. Alaska Tribal areas were not included in this dataset as much of rural Alaska is not connected to a centralized electric grid. The total available space for additional transmission on these lines is not known. Additionally, the total amount of transmission lines that specifically service Tribal communities is unknown.

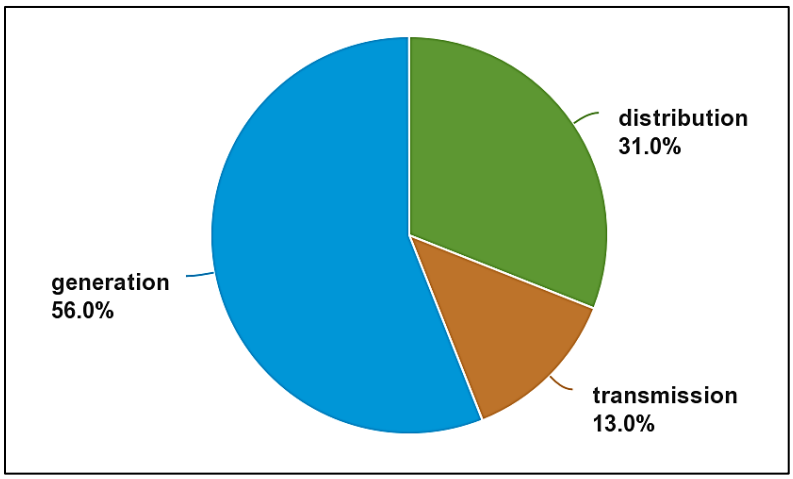
B. Tribal Community Retail and Wholesale Electricity Prices

This section focuses on both retail price, which is the price of energy purchased by a consumer (end user) from a utility; and wholesale price, which is the cost of energy purchased from a wholesale energy generator. Wholesale purchases are typically made by a utility. The national U.S. average for the retail price of household electricity fluctuates throughout the year and annually.

According to the Energy Information Administration, retail electricity prices typically reflect the cost to build, finance, maintain, and operate power plants and the electricity grid.[73] The major components to the U.S. average retail price of electricity are generation (56 percent), distribution (31 percent), and transmission (13 percent) (Figure 16). EIA also notes that some for-profit utilities include a financial return for owners and shareholders in their electricity retail prices.[74]

[73] Energy Information Administration. (2022). *Electricity Explained: Factors affecting electricity prices.* U.S. Dept. of Energy, Energy Information Administration. www.eia.gov.
[74] Ibid.

Figure 16: Major Components of the U.S. Average Retail Price of Electricity, 2020 (Courtesy of EIA)



EIA indicates that retail prices are higher for residential and commercial consumers than for industrial consumers due to the higher cost of distributing electricity at lower voltages with higher losses.[75] For industrial consumers, demand for more electricity and the potential to receive higher voltages makes supplying electricity to these customers more efficient and less expensive.[76] As a result, industrial customer electricity retail prices are close to the wholesale price of electricity.[77]

EIA details several key factors that influence the price of electricity:

> Fuels: Fuel prices, especially for natural gas and petroleum fuels (mainly in Hawaii and villages in Alaska), may increase during periods of high electricity demand and when there are fuel supply constraints or disruptions because of extreme weather events and accidental damage to transportation and delivery infrastructure. Higher fuel prices, in turn, may result in higher costs to generate electricity.
>
> Power plant costs: Each power plant has financing, construction, maintenance, and operating costs.
>
> Transmission and distribution system: The electricity transmission and distribution systems that connect power plants with consumers have construction, operation, and maintenance costs, which include repairing damage to the systems from accidents or extreme weather events and improving cybersecurity.

[75] Ibid.
[76] Ibid.
[77] Ibid.

Weather conditions: Extreme temperatures can increase demand for heating and cooling, and the resulting increases in electricity demand can push up fuel and electricity prices. Rain and snow provide water for low-cost hydropower generation, and wind can provide low-cost electricity generation when wind speeds are favorable. However, when there are droughts or competing demand for water resources, or when wind speeds drop, the loss of electricity generation from those sources can put upward pressure on other energy/fuel sources and prices.

Regulations: In some states, public service/utility commissions fully regulate prices, while other states have a combination of unregulated prices (for generators) and regulated prices (for transmission and distribution). [78]

Considering these factors, in 2021, the U.S. annual average retail price of electricity, including those on Tribal lands, was about 11.18 cents per kWh.[79] As calculated by EIA, the average price of retail electricity by type of utility customer in 2021 is reflected in Table 5 below.

Table 5: U.S. Annual Average for Retail Price of Electricity by Sector

Customer Type	Average Price in 2021
Residential	13.72 cents/kWh
Commercial	11.27 cents/kWh
Industrial	7.26 cents/kWh
Transportation	10.21 cents/kWh
Total U.S. Average	11.18 cents/kWh

The current retail prices estimated by EIA, which represent all regions of the United States, including Tribal lands, have increased since 2021 to 13.83 cents/kWh for the residential sector, 11.78 cents/kWh for the commercial sector, and 7.46 cents/kWh. for the industrial sector at the time of this writing.

Based on a 2018 NREL report, there are currently no centralized data source that capture the wholesale market price of electricity on a uniform basis across the United States.[80] The wholesale cost of electricity can vary depending upon numerous factors, including state and Federal policies, environmental attributes, existing electric transmission lines, and shifting changes in energy resource prices.[81]

[78] Ibid.
[79] Energy Information Administration. (2022). *Electricity Explained: Factors affecting electricity prices.* U.S. Dept. of Energy, Energy Information Administration. www.eia.gov.
[80] Milbrandt, A., Heimiller, D. & Schwabe, P. (2018, July). *Techno-Economic Renewable Energy Potential on Tribal Lands*. National Renewable Energy Laboratory.www.nrel.gov.
[81] Ibid.

Electricity prices on Tribal lands were specifically addressed with participants at the Office of Indian Energy listening sessions described in Section III. Methods of this report involved elucidating self-reported perceptions and realities on Tribal lands. In response to the listening session polling question "*Do you consider the cost of electricity to be high for households in your community?"* responses included:

- Yes (56 percent of total responses),
- No (31 percent of total responses), and
- Don't Know (14 percent)

In response to the listening session polling question *"What is the cost of electricity for households (residential) residing in your community?"* responses included:

- Less than 14 cents/kWh (36 percent of total responses),
- 14 to 20 cents/kWh (21 percent of total responses),
- 20-40 cents/kWh (18 percent of total responses), and
- Above 40 cents/kWh (15 percent of total responses).

Grant application data yielded similar results to the listening sessions. When asked what the current average cost of electricity in their community was, information provided by Office of Indian Energy grant applicants indicated the average was 28 cents/kWh, or roughly double the U.S. national average. The lowest cost reported was 4.2 cents/kWh, with the highest being 91 cents/kWh.

Energy Burden

Energy burden is defined as the average annual housing energy costs divided by the average annual household income, where monthly housing energy costs are based on household monthly expenditures for electricity, gas (utility and bottled), and other fuels (including fuel oil, wood, etc.). Energy burden estimates for Indian Tribes at the census tract level are available on the Low-Income Energy Affordability Data (LEAD) tool.[82] LEAD tool estimates of the energy burden for Indian Tribes range from 0.87 percent to 13.66 percent.[83, 84] The average national

[82] Note: The Low-income Energy Affordability Data (LEAD) Tool is an online, interactive platform that allows users to build their own national, state, county, city, or census tract profiles. LEAD provides estimated low-income household energy data based on income, energy expenditures, fuel type, and housing type.

[83] Ma, O. & Laymon, K. (2019). *Low-Income Energy Affordability Data (LEAD) Tool Methodology.* National Renewable Energy Laboratory. www.lead.openei.org.

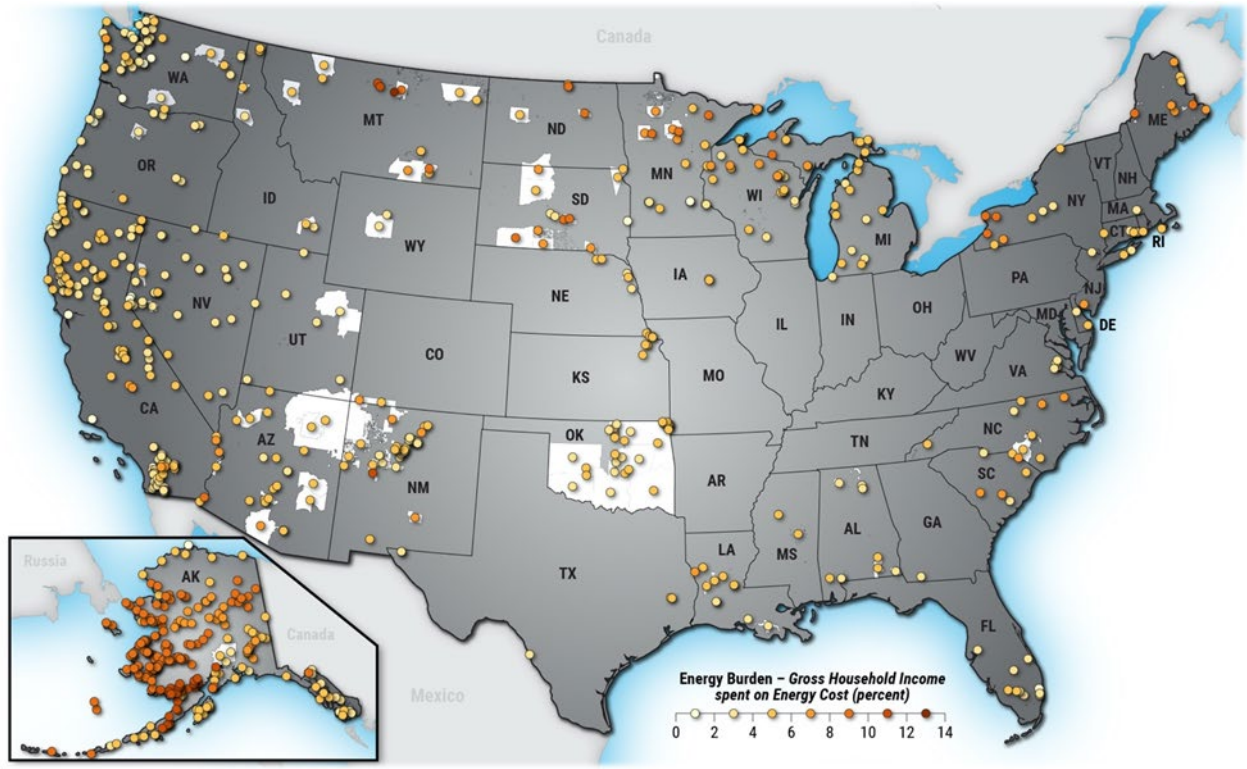
[84] Note: The National Renewable Energy Laboratory's methodology to translate data from the spatial unit of census tracts to Tribal areas, used a population weighted mean of tracts that intersect with the Tribal area. Population estimates for census tracts were pulled from the 2016 American Community Survey (ACS) to match the census data used as an input to the LEAD tool. In cases where a census tract was not entirely within a Tribal area, the population of the census tract within the Tribal area was assumed to be proportional to the amount of the area of the census tract within the Tribal area. Using a spatial intersection between census tracts and Tribal areas, an estimate of each tracts population within the Tribal area is created. This population estimate is then used for the population weighted mean of energy burden for each Tribal area.

energy burden is three percent and the average population-weighted energy burden on all Tribal lands is 3.85 percent.[85] While this represents a low absolute change, it means that the energy burden of the average Tribal land resident is 28.3 percent higher than the average U.S. citizen. This is due to both lower average incomes in Tribal areas as well as higher energy costs in rural areas where Tribal lands tend to be located.

The **energy burden** of the average Tribal land resident is **28.3% higher than the average U.S. citizen.**

Additionally, the average energy burden is highly variable between different Tribal lands, with the highest energy burden of 13.66 percent being well over four times the average national energy burden. Many Indian Tribes spend a disproportionate amount of their income on energy (exceeding the U.S. National mean energy burden of three percent) and a significant number, especially in Alaska, experience a severe energy burden (i.e., spend more than 10 percent of their income on energy). It should be noted that in some remote Alaska Native villages, where electricity is generated from fuel that is barged or flown to the community, electricity costs exceed $1.00/kWh – reportedly up to $1.77/kWh – more than 12 times the national average retail cost of ~$0.145/kWh (Figure 17).

Figure 17: Energy Burden - Gross Household Income Spent on Energy Costs (Courtesy of NREL)



[85] Ibid.

Specifically, based on this analysis and as can be seen in the map above, the highest energy burdens are often found in rural, northerly locations and particularly in Alaska (Figure 17).

Table 6: Energy Burden Values by Tribal Area (Courtesy of NREL)

	Energy Burden
Minimum	0.87%
1st Quartile	3.24%
Median	4.30%
Mean	5.08%
3rd Quartile	6.46%
Max	13.66%

On the other end of the spectrum, there are Tribal areas with lower average energy burden (0.87 percent) than the Nation as a whole (U.S. National mean energy burden of 3.0 percent). As reflected in Table 6 above, the energy burden for the first quartile (25 percent) of Tribal area is 3.24 percent, meaning that well over 75 percent of Tribal areas have a higher average energy burden than the national average. [86]

Well **over 75% of Tribal areas** have a **higher average energy burden** than the national average.

Grant application responses to energy burden questions substantiate both polling data and LEAD estimates. When grant applicants were asked "**Do you think paying for energy is a significant financial burden for the majority of households in your community?"** the response was **81 percent affirming** that paying for energy is a significant burden. Applicants were also asked to describe why paying for energy was a significant burden; their responses were primarily related to low-income or poverty, unemployment, high electricity costs, and the rurality of their communities.

81% of grant applicants indicated that paying for energy is a significant financial burden for the most households in their communities.

C. American Indians and Alaska Natives Energy Workforce

The U.S. Energy Employment Report (USEER) started tracking energy employment data within key sectors beginning in 2016 at the recommendation of the first Department of Energy Quadrennial Energy Review. [87] The USEER report is a substantial improvement for

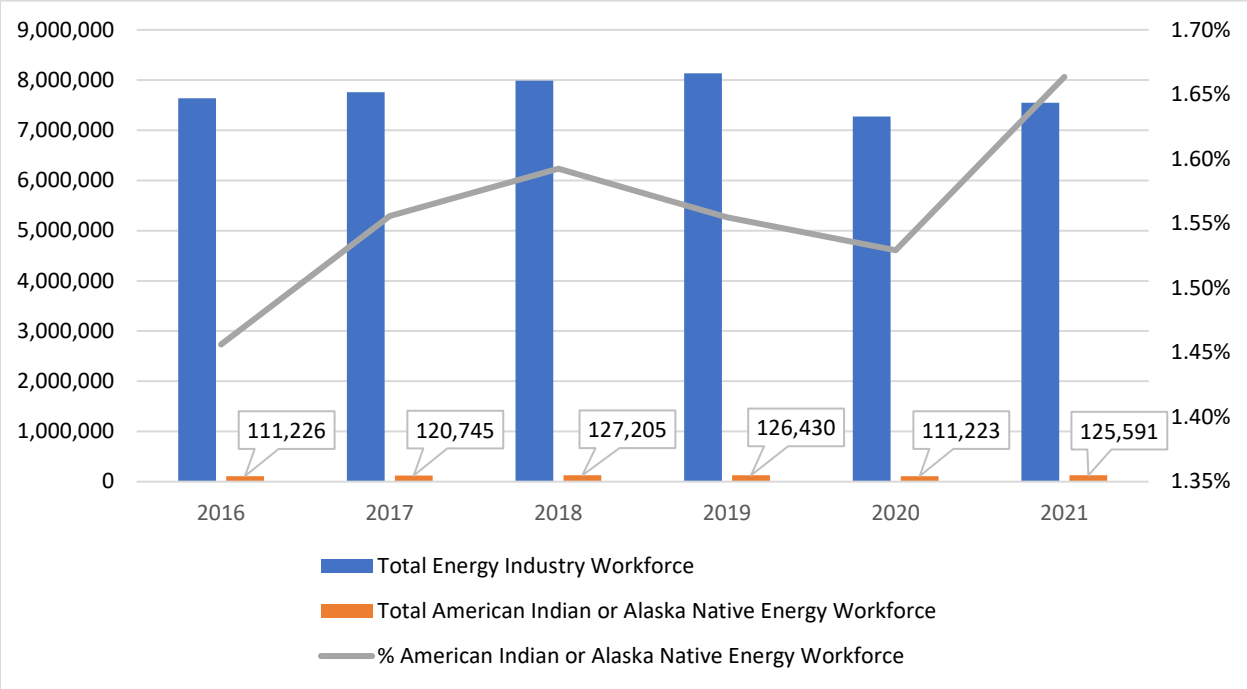
[86] Note: Quartile means each of four equal groups into which a population can be divided according to the distribution of values of a particular variable.

[87] Note: The USEER Reports states the energy sector jobs include all the professional, construction, utility, operations, and production occupations associated with energy infrastructure, production, and use, including the manufacturing of motor vehicles. Further assumptions and information on these reports can be found in the Executive Summary of the 2022 United States Energy and Employment Report at www.energy.gov.

understanding energy workforce characteristics and other labor data where previous publicly available data was limited or did not exist. Included in the USEER report is American Indian and Alaska Native (AI/AN) workforce data. Although the USEER reports are not specifically focused on the AI/AN workforce, they do provide an approximate baseline for understanding trends in this population's participation in the energy workforce.

The most recent data from 2021 estimate that 125,591 (Figure 18) self-identified AI/AN workers are employed in the energy industry.

Figure 18: Total American Indian Energy Workforce Comparison in U.S., 2016-2021 (Adapted, courtesy of USEER Report Data)



The 2021 USEER report breaks down the energy industry into five different sectors. The sectors include motor vehicles and component parts (37,646 AI/AN workers), energy efficiency (30,198), fuels (14,026), transmission distribution and storage (32,526), and electric power generation (11,195).

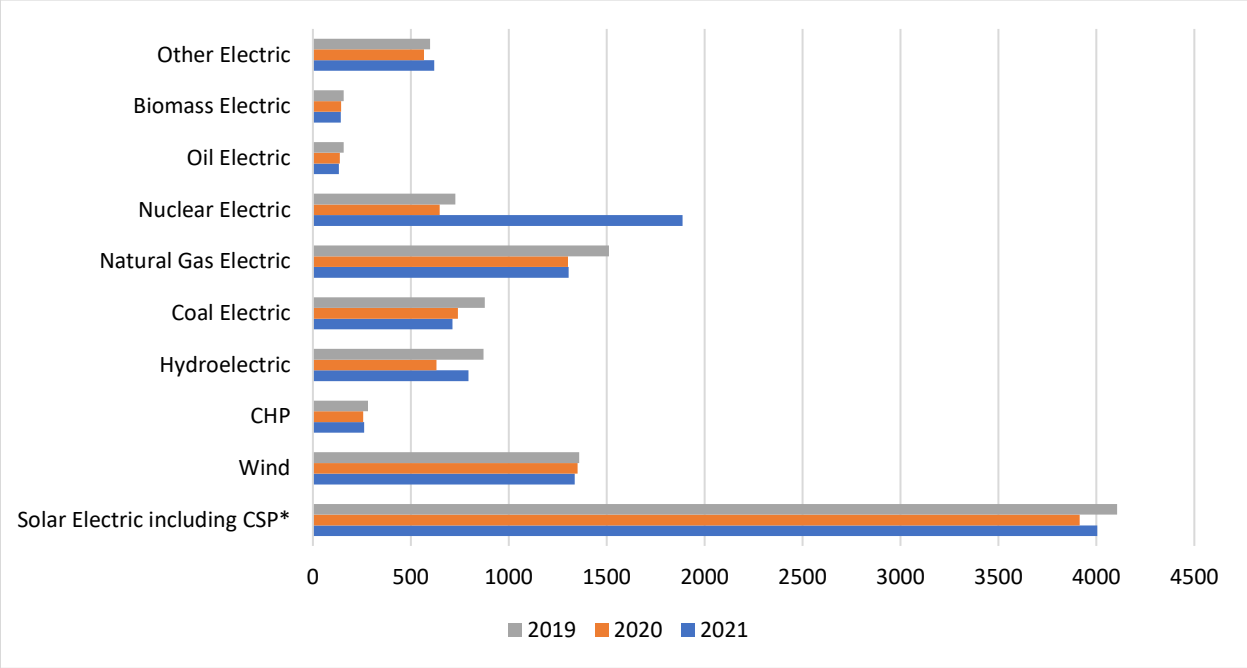
Across all energy sectors, the AI/AN workforce comprises approximately two percent of the total U.S. energy workforce. This is higher than the one percent estimate of AI/AN participating in the workforce across all workforce industries.[88]

125,591 self-identified American Indian and Alaska Native workers were employed in the **energy industry in 2021,** comprising roughly **2%** of the **energy industry workforce.**

[88] Office of Energy Jobs. (2022, June). *United States Energy & Employment Report* 2022. U.S. Dept. of Energy, Office of Policy, Office of Energy Jobs. www.energy.gov.

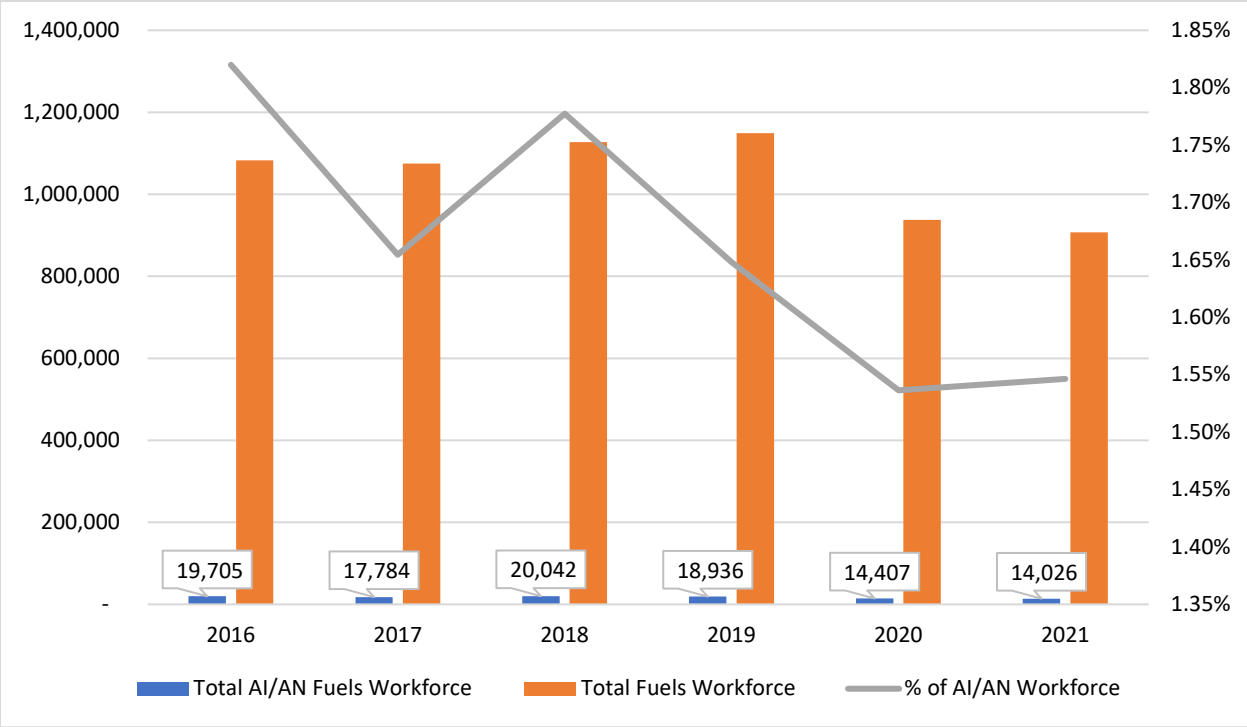
The electric power generation sector and fuels sector further disaggregate the data by technology and industry. For 2021 and previous years of the USEER report, by far the greatest number of AI/AN workers work in solar electric generation (4,004) (Figure 19). Typically, more than half of solar electric jobs are from the construction industry for physical installation of the solar arrays. Other 2021 AI/AN electric power generation jobs by technology include biomass electric (143), oil electric power generation (133), combined heat and power (262), hydroelectric (794), nuclear (1,887), natural gas electric (1,305), coal electric (712), wind (1,336), and other electric power generation (619) (Figure 19).

Figure 19: AI/AN Electric Power Generation Workforce by Technology (Adapted, courtesy of USEER Report Data)



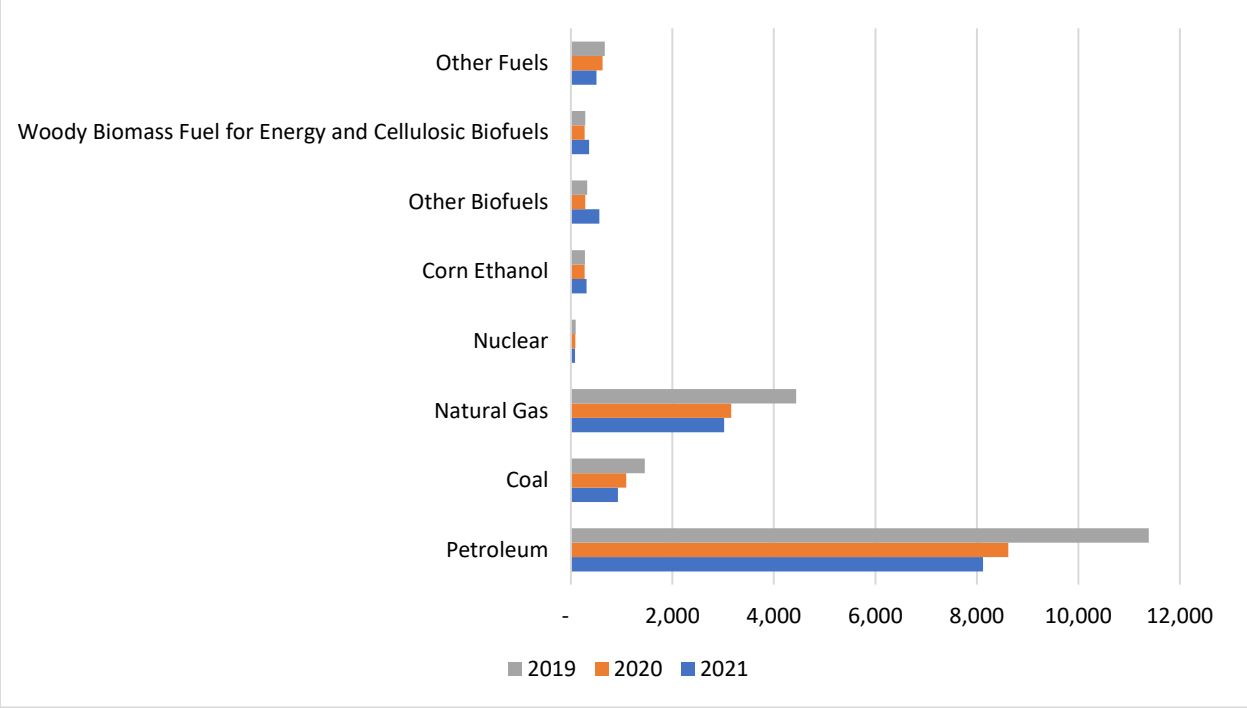
Due to various factors such as greater renewable energy development adoption, COVID-19, and state energy policies, employment in the fuels sector continues to decline among the AI/AN workforce (a similar trend is also observed in the non-AI/AN workforce). Employment in the fuels sector includes any work related to fuel extraction, mining, and processing. As of 2021, there were 14,026 AI/AN workers in the fuels sector, the lowest number since the inception of the USEER Report (Figure 20).

Figure 20: Total American Indian Fuels Workforce Comparison in U.S., 2016-2021 (Adapted, courtesy of USEER Report Data)



Over the last three reporting years, the largest decreases in AI/AN employment within the fuels sector have been from coal (-37 percent), natural gas (-32 percent), and petroleum (-29 percent)—representing a loss of over 5,000 AI/AN jobs. However, there has been greater interest in work related to biofuel technologies. While the number of workers in this subsector remains relatively small, the number of AI/AN with jobs related to "other" biofuels (i.e., as non-woody biomass, renewable diesel fuels, biodiesel fuels, waste fuels, and ethanol not produced from corn).

Figure 21: AI/AN Fuels Workforce by Technology (Adapted, courtesy of USEER Report Data)



An additional source for potential job creation stems from the enaction of the Infrastructure Investment and Jobs Act, Pub.L. 117-58 (Nov. 15, 2021). The host of programs created by the law are expected to add 1.5 million in climate action-related job including but not limited to manufacturing, construction, and service industries annually over the course of a decade. Considering that roughly two percent of the energy sector workforce is comprised of American Indian and Alaska Natives suggests that potentially 300,000 new jobs, or more than double the current AI/AN energy sector workforce, will benefit Indian Country.

Grant application data received from Office of Indian Energy grant opportunities between 2017- to present has shown considerable promise in short- and long-term job creation from small-scale projects. Among all proposed projects the estimated potential short-term jobs created was 1,796 and potential long-term jobs created is 485. Applicants also indicated that the proposed projects would additionally train another 1,314 workers. While not all the proposed projects were selected for funding by the Office of Indian Energy, and total Tribal workforce percentage of potential jobs is unknown, there exists considerable local job creation potential with small scale energy development. Projects that received co-funding by the Office of Indian Energy will also benefit from cost savings for both project development and energy cost savings from those installed projects. These savings can be re-invested back in the Tribal community, including the potential of freeing-up capital for additional job creation.

During the Office of Indian Energy listening sessions, attendees were asked the following polling question: "*Are there Tribal members in your community that are directly a part of the energy job sector?"* Responses included:

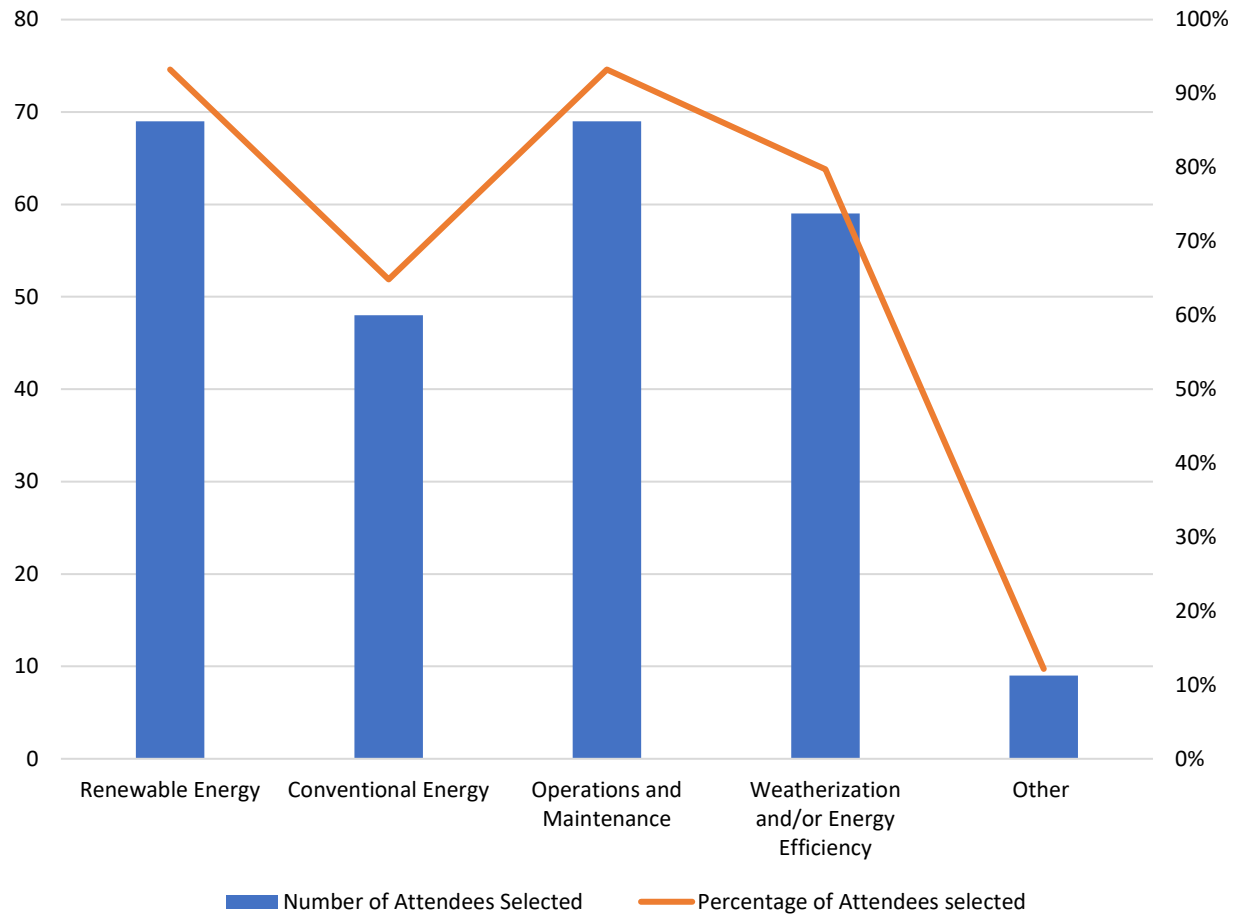
- Yes (51 percent of total responses),
- No (47 percent of total responses), and
- Unknown (3 percent of total responses).

In response to listening session polling question "*What training and/or education is needed to support these types of jobs for Tribal members? (Select all that apply),"* participants stated:

- Renewable Energy (93 percent of total responses),
- Conventional Energy (65 percent of total responses),
- Operations and Maintenance (93 percent of total responses),
- Weatherization and/or Energy Efficiency (80 percent of total responses), and
- Other (12 percent of total responses) (Figure 22.)

Written responses in the "Other" category included (1) information technology training – control systems; (2) telecommunications – cellular and internet connectivity to enable energy systems, and electrified transportation; (3) leadership advancement and career pathways and training; (4) education for Tribal government and "certificate" training; (5) heating, ventilation, and air conditioning (HVAC) systems maintenance; and (5) general electrical and transmission line information, e.g., substations.

Figure 22: Responses to the listening session polling question: What training and/or education is needed to support these types of jobs for Tribal members?



D. Energy Access and Reliability on Tribal Lands

Energy or Electricity Access on Tribal Lands

During the listening sessions held to prepare for this report, the Office of Indian Energy conducted several polling activities, with the following results.

In response to listening session polling question *"Are any households in your community not connected to the centralized grid or not connected to a community-scale microgrid?"* responses included:

- Yes (47 percent of total responses),
- No (43 percent of total responses), and
- Don't know (10 percent of total responses).
- A written response stated that "Those not on grid are doing so by choice".

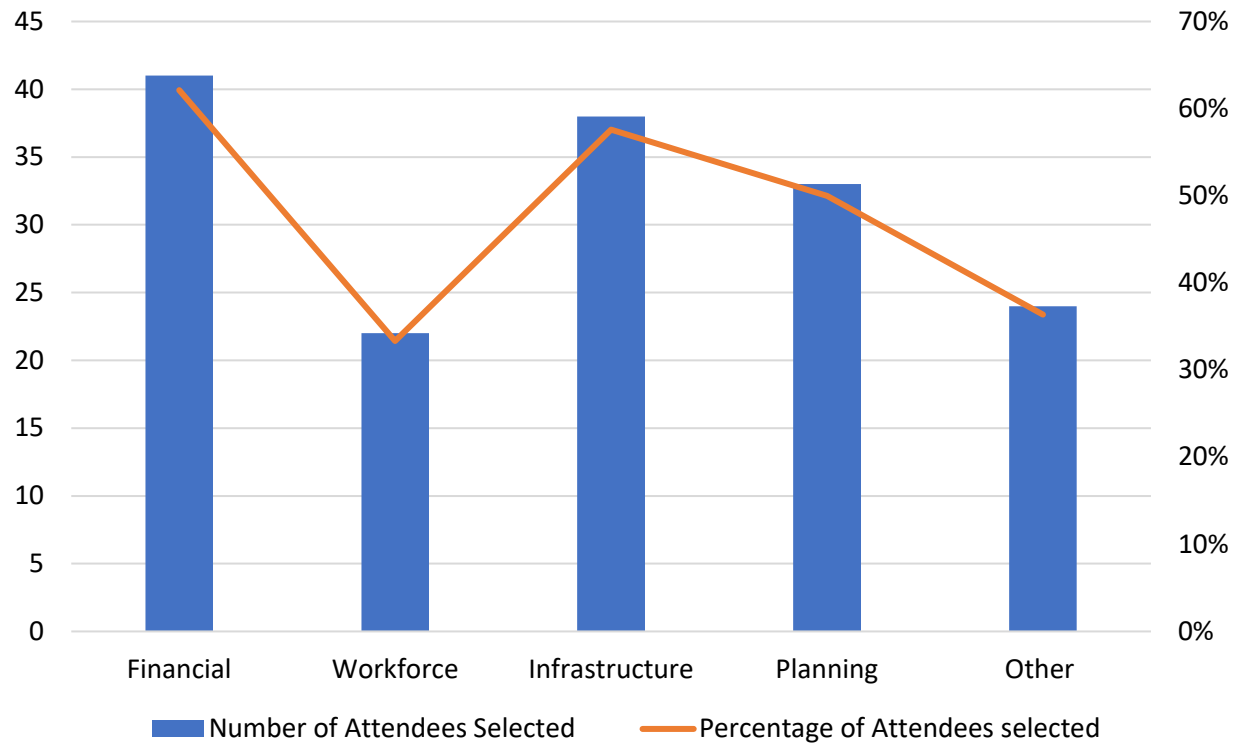
In response to listening session polling question "*How many households in your community are not connected to the grid? (Provide an estimate in the question box if known)"* responses included:

- 0 (42 percent of total responses),
- 1-50 (38 percent of total responses),
- 50-100 (2 percent of total responses),
- 100+ (6 percent of total responses), and
- Add estimate to question box or if unknown type unknown (12 percent of total responses)
- Written responses included: "There are 3 households not connected to electricity from the power plant. In addition, the Solid Waste Landfill operated by the Tribe is off the grid and operations for recycling and waste reduction is powered by onsite generators." Less than 10; Approximately 14,000; "10-15 homes…".

In response to listening session polling question "*What barriers exist to providing electric service to unelectrified homes in your community? (Select all that apply)*" responses included:

- Financial (62 percent of total responses),
- Workforce (33 percent of total responses),
- Infrastructure (58 percent of total responses),
- Planning (50 percent of total responses), and
- If no issue, NA (36 percent of total responses) (Figure 23).

Figure 23: Responses to the listening session polling question: What barriers exist to providing electric service to unelectrified homes in your community?



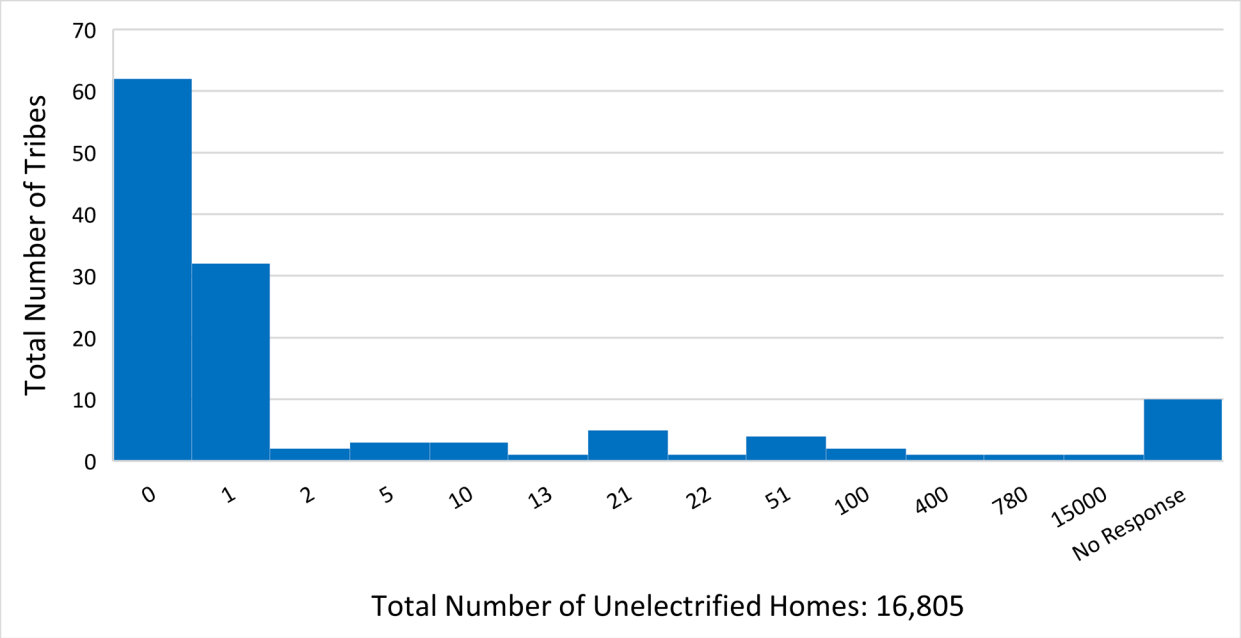
Additionally, when **polled about extending existing infrastructure to electrify currently unelectrified homes** 65 percent of respondents stated that it could be extended. Eighteen percent of respondents indicated that there was not existing infrastructure that could be extended to provide electricity to unelectrified homes. There are multiple reasons why this issue exists, including: (1) Existing infrastructure that could be extended vs. no infrastructure to extend or energy extraction that bypasses community; (2) There are large areas of Tribal lands where infrastructure does not exist, so there is not existing infrastructure to extend; or (3) Most transmission lines on Tribal lands are not owned by a respective Tribe, but by non-Tribal utilities, so they do not have authority to assume they can extend existing power lines.

65% of polling respondents indicated that existing infrastructure could be extended to electrify currently unelectrified homes.

Applicants for financial funding through Office of Indian Energy grants (2017 – present) were also asked to estimate the number of unelectrified homes in their communities. Collected data in response to that question indicated that the communities that applied for financial funding contained an estimated total of 16,805 homes without access to electricity (Figure 24). Because the average household size for AI/AN residents is 3.2 individuals, the data indicates an

estimated 53,776 people are without electricity throughout the communities that applied to Office of Indian Energy funding opportunities.[89, 90]

Figure 24: Distribution of Unelectrified homes in Tribal Communities from Application Data



The two Tribal communities that have historically contained the highest number of unelectrified homes are the Navajo Nation and the Hopi Tribe, both of which are in the Four Corners region of the United States.[91] The current estimated number of homes on the Navajo Reservation is 68,101, with an estimated 21 percent, or 14,063, lacking access to electricity. These estimated numbers suggest an estimated 45,001 people on the Navajo reservation are living without electricity. The Hopi reservation encompasses an estimated 2,508 homes, with an estimated 35 percent, or 878 homes, lacking access to electricity. These numbers reflect an estimated 2,810 people on the Hopi reservation without electricity.

[89] Pindus, N., Kingsley, G.T., Biess, J., Levy, D.K., Simington, J., & Hayes, C. (2017). *Housing Needs of American Indians and Alaska Natives in Tribal Areas: A Report from the Assessment of American Indian, Alaska Native, and Native Hawaiian Housing Needs*. U.S. Dept. of Housing and Urban Development, Office of Policy Development and Research. Tribalwww.huduser.gov.

[90] Note: Assume 3.2 average household size of AI/AN population.

[91] Note: The Four Corners region of the United States is where Arizona, Colorado, New Mexico, and Utah adjoin.

The estimated number of unelectrified homes within these two communities is nearly 15,000, representing nearly 48,000 Tribal residents without access to electricity. Combining and not duplicating polling data, application data and focused results for the Navajo Nation and the Hopi Tribe, the Office of Indian Energy would conservatively estimate there are approximately 17,000 homes or 54,400 people without access to electricity across Indian Country.[92, 93]

DOE estimates roughly **17,000 Tribal homes** are unelectrified impacting more than **54,000 people**.

Arizona Public Service (APS), an Arizona electric utility serving more than 1.3 million homes and 11 of the 15 counties of Arizona, is currently exploring a pinpointed census for the Navajo Nation and Hopi Reservation.[94] At the time of this writing, APS issued a request for proposals (RFP) for a bidder to create a database that identifies every occupied/inhabited/used and useful unelectrified home and business on the Navajo Nation and/or the Hopi Reservation that is located within APS's service area. Once complete, this census may shed significant light on current electrical access in these two communities.

Electricity Reliability on Tribal Lands

Electric utilities throughout the United States are required to adhere to meet mandatory reliability standards that maintain the safety of their systems and plan power needs of their customers.[95] These standards are developed by the North American Electric Reliability Corporation and approved by the Federal Energy Regulatory Commission.[96]

The Energy Information Administration states that U.S. electricity customers experienced an average of just over eight hours of electric power interruptions in 2020 (Figure 25). This average was the highest recorded since EIA began collecting electricity reliability data in 2013. The causes for such power interruptions include weather, vegetation patterns, and utility practices.[97]

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[92] Pindus, N., Kingsley, G.T., Biess, J., Levy, D.K., Simington, J., & Hayes, C. (2017). *Housing Needs of American Indians and Alaska Natives in Tribal Areas: A Report from the Assessment of American Indian, Alaska Native, and Native Hawaiian Housing Needs*. U.S. Dept. of Housing and Urban Development, Office of Policy Development and Research.Tribalwww.huduser.gov.

[93] Note: Assumes 3.2 average household size of AI/AN population.

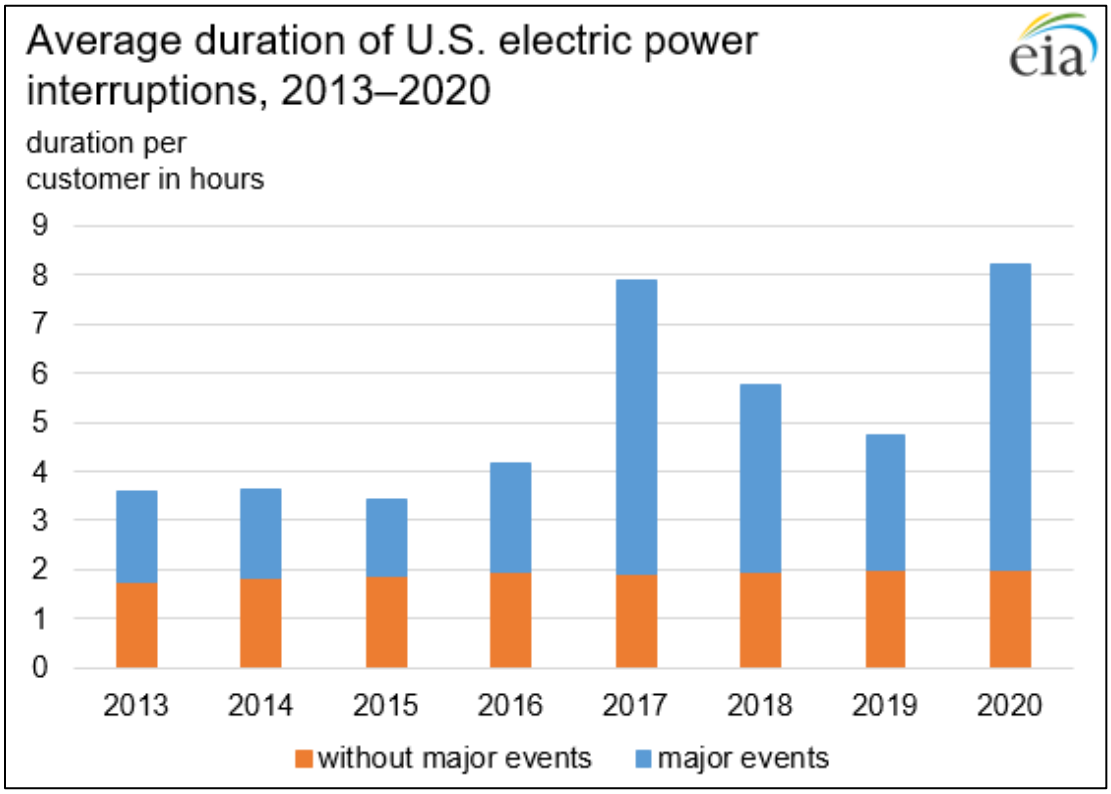
[94] Arizona Public Service (APS). (2022, May 16). *APS Adding New Clean Energy Resources to Power Historic Growth in Arizona.* www.aps.com.

[95] Energy Information Administration. (2022). *Electricity Explained: How electricity is delivered to consumers.* U.S. Dept. of Energy, Energy Information Administration. www.eia.gov.

[96] Ibid.

[97] Energy Information Administration. (2021). *U.S. Electricity Customers Experienced Eight Hours of Power Interruptions in 2020.* U.S. Dept. of Energy, Energy Information Administration. www.eia.gov.

Figure 25: Average Duration of U.S. Electric Power Interruptions, 2013-2020[98]



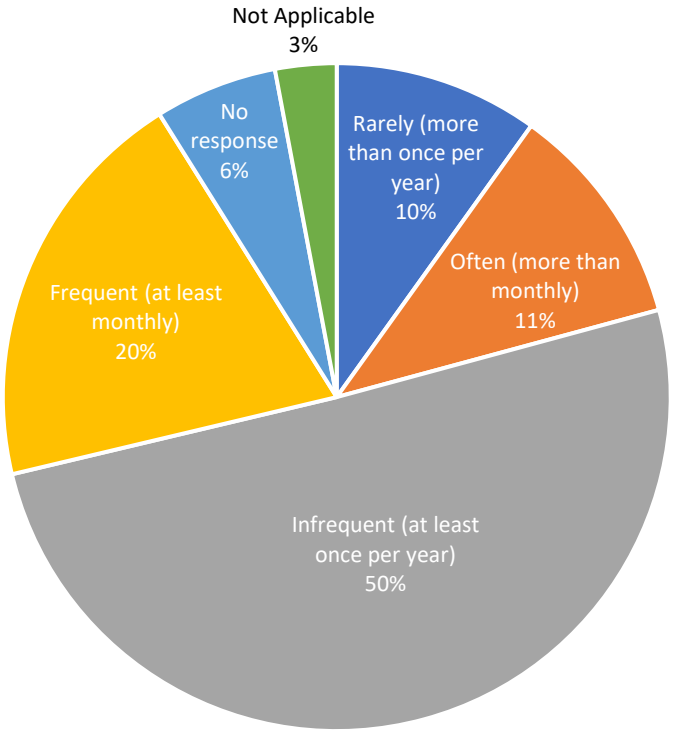
The System Average Interruption Frequency Index is an index the EIA uses to measure the frequency of electricity outages experienced by the average homeowner connected to a centralized grid in the United States. The United States average for frequency of outages is 1.6 outages per year based on the most recent data.[99]

When grant applicants to Office of Indian Energy funding opportunities responded to questions concerning power outages, the differences in such occurrences on Tribal communities as compared with the national average were stark. Ninety-two percent of Tribal respondents indicated that power outages were normal in their communities. The outage frequency responses further suggested that 50 percent of the applicants had at least one power outage per year, with 31 percent reporting outages at least monthly (Figure 26).

[98] Ibid.

[99] Energy Information Administration. (2021). *U.S. Electricity Customers Experienced Eight Hours of Power Interruptions in 2020.* U.S. Dept. of Energy, Energy Information Administration. www.eia.gov.

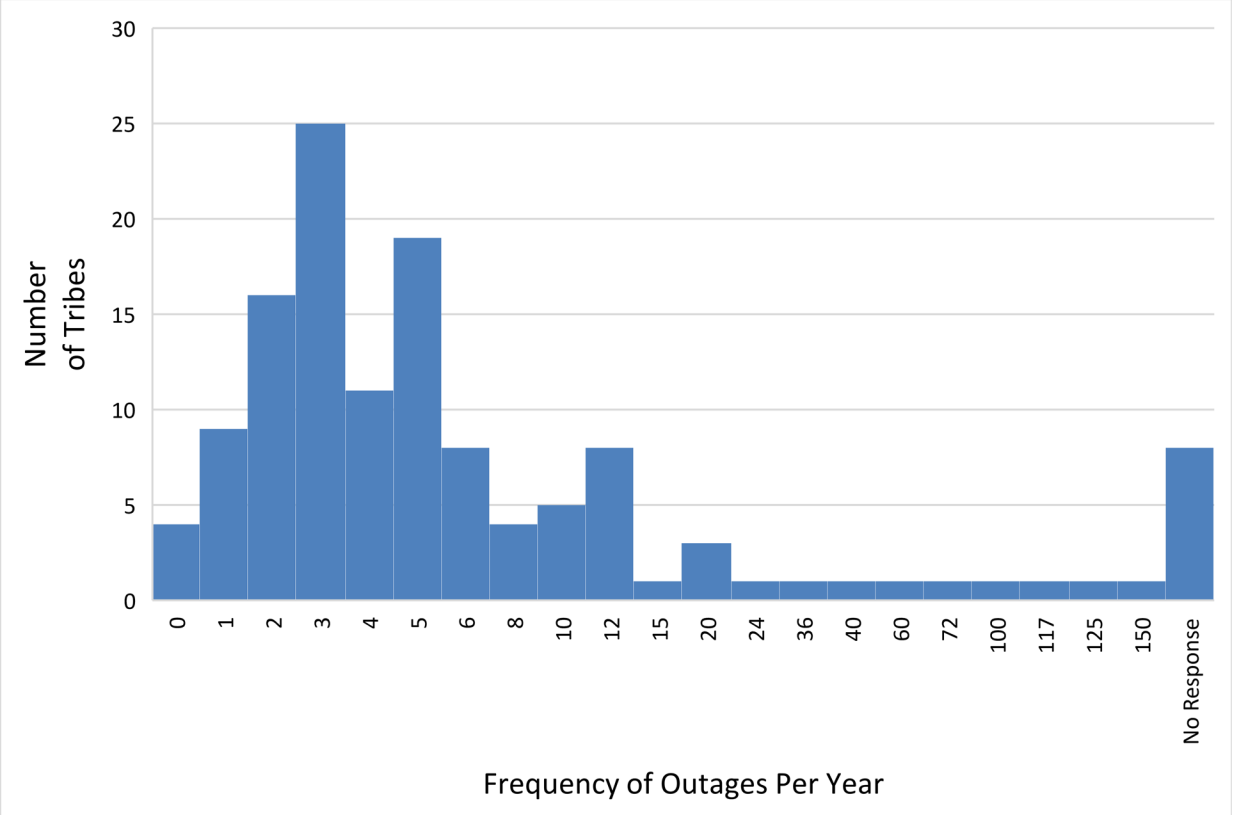
Figure 26: Self-reported Outage Frequency in Tribal Communities from Polling Data



Grant applicants were asked to describe the total number of electricity outages experienced annually in their community. Outages ranged from zero to 150 per year (Figure 27). The average number of reported electricity outages across these applicants was 10.5 outages per year, or roughly 6.5 times the national average of 1.6.

Self-reported grant applicant data indicates that those **Tribal communities experience electricity outages 6.5 times higher than the national average of 1.6**.

Figure 27: Self-reported Electricity Outage Frequency in Tribal Communities from Application Data



Applicants were also asked to further detail outage frequency, duration, and causes. Responses for frequency included:

- 75 percent of respondents indicated electricity outages happen occasionally;
- 11 percent stated outages occur each month; and
- 5 percent indicated outages happen multiple times each month.

The durations of electricity outages were categorized into three lengths of time. Responses on length of electricity outages included:

- Hours (68 percent);
- Minutes (16 percent); and
- Days (7 percent).

The self-reported causes of outages were generally grouped into three areas that included:

- Storms (64 percent);
- Inadequate infrastructure (13 percent); and
- 'End-of-the-line' electricity distribution or utility-directed (13 percent).

E. Distributed Energy Potential on Tribal Lands

Distribution Assets

Distribution assets are difficult to determine on Tribal lands and there are not databases that have inventory of existing infrastructure. However, technical potential for development was analyzed in this section to elucidate known data.

A 2013 geospatial analysis of renewable energy technical potential on Tribal lands, sponsored by the Office of Indian Energy, quantified the renewable energy potential on Tribal lands for either community-scale on-Tribal-land use or for revenue-generating electricity sales.[100] Specifically, the analysis showed that "the technical potential on Tribal lands is about six percent of the total national technical generation potential. This is disproportionately larger than the two percent Tribal lands in the United States, indicating an increased potential density for renewable energy development on Tribal lands."[101] The technical generation potential on Tribal lands equates to 4.8 percent of the total national technical capacity potential.

After the geospatial analysis referenced above, the Office of Indian Energy funded a study conducted by National Renewable Energy Laboratory, resulting in a 2018 report, Techno-Economic Renewable Energy Potential on Tribal Lands.[102] This study updated the earlier report on renewable energy technical potential analysis on Tribal lands and estimated the technical and economic potential for renewable energy development on Tribal lands. Per the report, renewable energy technical potential "represents the achievable energy generation of a particular technology given system performance, topographic limitations, environmental, and land-use constraints."[103]

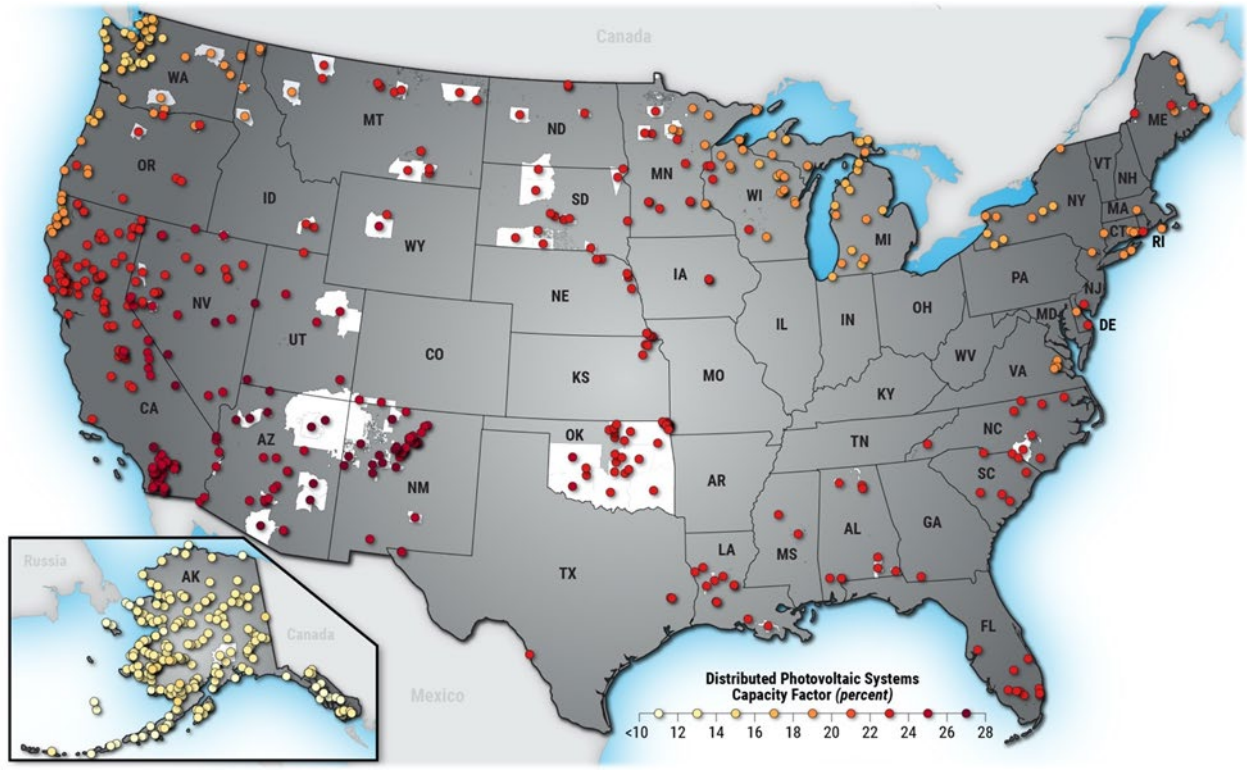
The report also defined economic potential as "the subset of available resource technical potential where the cost required to generate the electricity (which determines the minimum revenue requirements for development of the resource) is below the revenue available in terms of displaced energy and displaced capacity".[104] Specifically, the NREL analysis showed that the utility-scale technical potential on Tribal lands, which compose approximately 5.8 percent of the land area in the contiguous United States, is approximately 6.5 percent of the total national technical potential.

The technical potentials for photovoltaic within Tribal areas based on the NREL study referenced above are reflected in Figure 28.[105] The capacity factors shown in Figure 28 are an

[100] Doris, E., Lopez, A., & Beckley D. (2013, Feb.). *Geospatial Analysis of Renewable Energy Technical Potential on Tribal Lands*. National Renewable Energy Laboratory. www.nrel.gov.
[101] Ibid.
[102] Milbrandt, A., Heimiller, D. & Schwabe, P. (2018, July). *Techno-Economic Renewable Energy Potential on Tribal Lands*. National Renewable Energy LaboratoryTribal. www.nrel.gov.
[103] Ibid.
[104] Ibid.

estimate of the energy output of a system over time divided by its maximum possible energy output over time. For example, because the sun only shines during the day, the capacity factor must be significantly less than 100 percent. For instance, the average percentage of time between sunrise and sunset, during which sunshine reaches the ground (percent sun), is 45 percent in Portland (Oregon) and 85 percent for Las Vegas (Nevada) and Phoenix (Arizona).[106] The amount of sunlight is also affected by cloud cover, meaning the capacity factor is reduced further. Using the cities above, Portland, Oregon has only 68 clear days (average number of days annually when cloud covers at most 30 percent of the sky during daylight hours), whereas Las Vegas experiences 210 clear days and Phoenix experiences 211 (*Courtesy of NREL*).

Figure 28: Distributed Photovoltaic Systems Capacity Factor (Courtesy of NREL)



The capacity factor for solar photovoltaics (PV) on Tribal land ranges from 9.5 percent in Alaska to 27.9 percent in the southwestern United States. For reference, the mean capacity factor across the U.S. is 15.7 percent for residential PV and for 15.8 percent for commercial PV. The solar resource (i.e., the amount of solar insolation received in kilowatt-hours (kWh)/square meters (m^2)/day) in some regions of Alaska is at least comparable to that of Germany, which ranked 4th in the world in 2019 for installed solar capacity with more than 49.2 gigawatts (GW) and ranked 1st in installed solar capacity per capita (595 watt/capita), according to the

[106] Note: Average Annual Sunshine in American Cities. www.currentresults.com. Accessed January 2021.

International Energy Agency (IEA). [107, 108] Hence, depending on the current cost of energy, solar may be worth exploring even in places with a lower PV capacity factor. Table 7 reflects the PV capacity factor estimates for Tribal areas, and Table 8 shows the ten Tribal areas with the highest distributed PV capacity factors.

The capacity factor for solar photovoltaics (PV) on Tribal land varies from **9.5% in Alaska to 27.9% in the southwestern United States**. For reference, the mean capacity factor across the U.S. for residential PV is **15.7%** for residential PV and for commercial PV, **15.8%** for commercial PV.

Table 7: PV Capacity Factors on Tribal Areas (Courtesy of NREL)

	PV Capacity Factor
Minimum	9.5 percent
1st Quartile	13.7%
Median	20.1%
Mean	19.1%
3rd Quartile	23.1%
Max	27.9%

As reflected in Table 8, the Tribal areas with the highest PV capacity factor are in Arizona, California, New Mexico, and Utah.

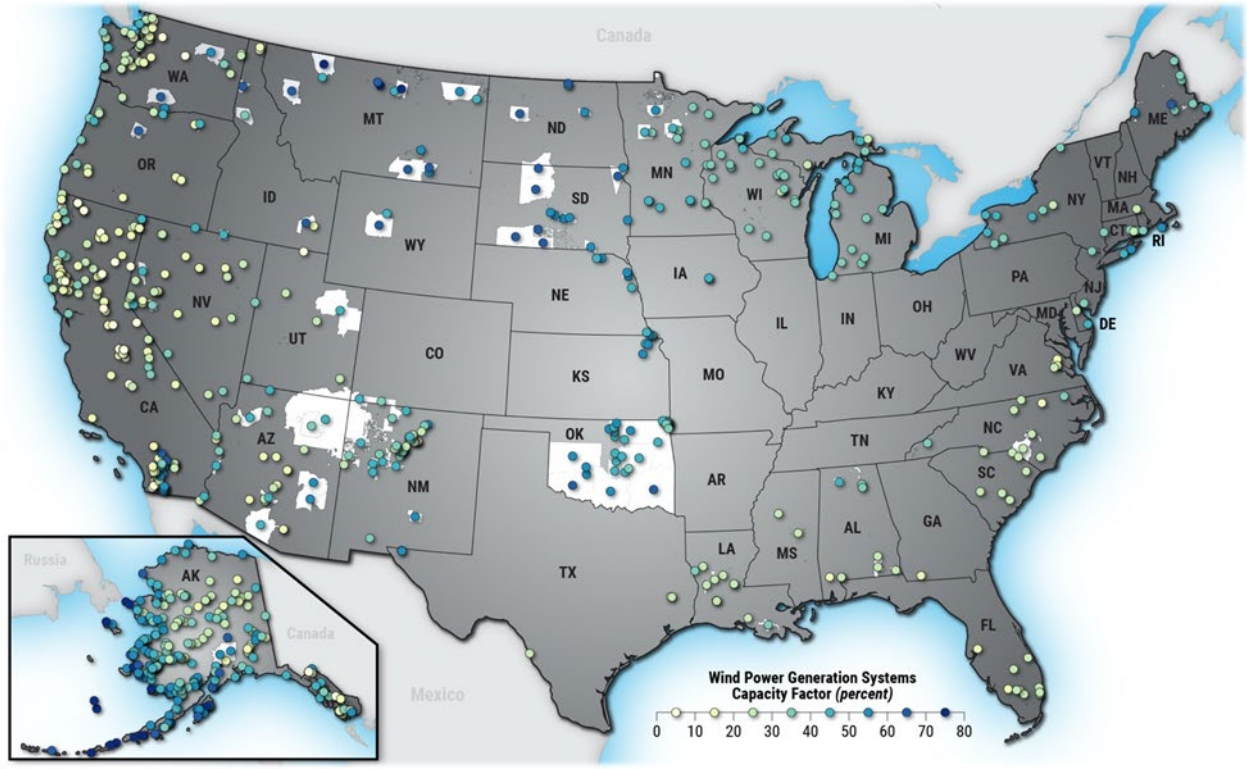
Table 8: Ten Tribal Areas of Highest Distributed PV Capacity Factors (Courtesy of NREL)

Tribal Area Name	PV Capacity Factor	State
Navajo Nation Reservation	27.9%	AZ/CO/NM/UT
Navajo Nation Off-Reservation Trust Land	27.9%	AZ/CO/NM/UT
Acoma Off-Reservation Trust Land	27.5%	NM
Tohono O'odham Nation Reservation	27.4%	AZ
Zuni Reservation	27.4%	NM
Zuni Off-Reservation Trust Land	27.3%	NM
Timbi-Sha Shoshone Reservation	27.3%	CA
Timbi-Sha Shoshone Off-Reservation Trust Land	27.3%	CA
Hualapai Indian Reservation	27.0%	AZ
Hualapai Off-Reservation Trust Land	27.0%	AZ

For wind energy, the capacity factor is influenced by a wind plant's generation profile, expected downtime, and in-plant energy losses. The specific power (i.e., the ratio of machine rating to rotor swept area, or watt/square meter) and hub height are design choices that influence the capacity factor. Tribal lands have a high potential for on-shore wind development along the coasts of Alaska, in the Plains, upper Midwest, Southwest, and the East coast of the contiguous United States (Figure 29).

[107] Schwabe, P. (2016, Feb.). *Energy Solar Energy Prospecting in Remote Alaska: An Economic Analysis of Solar Photovoltaics in the Last Frontier State*. National Renewable Energy Laboratory. www.energy.gov.
[108] International Energy Agency. (2020). *Snapshot of Global PV Markets 2020*. www.iea-pvps.org.

Figure 29: Distributed Wind Power Generation Systems Capacity Factor (Courtesy of NREL)



According to the 2021 Distributed Wind Market Report, the average capacity factor of newly installed distributed wind projects is 20 percent. [109] Therefore, based on the wind capacity factors included in Table 9, over 75 percent of Tribal areas have better wind resources than recently installed distributed wind projects.

Table 9: Wind Capacity Factors on Tribal Areas (Courtesy of NREL)

	Wind Capacity Factor
Minimum	0.7%
1st Quartile	22.0%
Median	34.0%
Mean	35.1%
3rd Quartile	47.3%
Max	79.2%

75% of Tribal areas have better wind resources than recently installed distributed wind projects of this size included in the 2021 Distributed Wind Market Report.

Table 10 includes the ten Tribal areas with the highest distributed wind capacity factors. As reflected in Table 10, nine of the 10 Tribal areas with the highest distributed wind capacity

[109] Orrell, A., Kazimierczuk, K., & Sheridan L. (2021). *Distributed Wind Market Report: 2021 Edition*. Pacific Northwest National Laboratory. www.energy.gov.

factor are on the coast of Alaska and a number on the Aleutian Islands, Alaska located in Alaska Native Village Statistical Areas (ANVSA).

Table 10: Top Ten Tribal Areas of Highest Distributed Wind Capacity Factors (Courtesy of NREL)

Tribal Area Name	Wind Capacity Factor	State
Inalik ANVSA	79.2%	AK
St. George ANVSA	76.6%	AK
Gambell ANVSA	75.5%	AK
Platinum ANVSA	75.1%	AK
Unalaska ANVSA	74.9%	AK
Nikolski ANVSA	74.5%	AK
Wales ANVSA	74.2%	AK
Rocky Boy's Reservation	73.9%	MT
King Cove ANVSA	73.7%	AK
False Pass ANVSA	73.6%	AK

The results of the Office of Indian Energy-funded Techno-Economic Renewable Energy Potential on Tribal Lands study were used to develop the *Tribal Energy Atlas*, a first-of-its-kind interactive geospatial application that enables Tribes to conduct their own analyses of installed energy projects and resource potential on Tribal lands. [110] Developed by NREL researchers for the Office of Indian Energy, the *Tribal Energy Atlas* is the most robust tool ever designed to assist Tribal energy project planners, technicians, and investors with analyzing energy options in Indian Country.

The latest energy resource data related to renewable energy resource potential on Tribal lands, existing known energy infrastructure, Tribal land boundaries, end user energy costs was used to populate the *Tribal Energy Atlas*, along with other relevant information on infrastructure (e.g., conventional and renewable energy facilities, transmission lines, railroads), environment (e.g., water availability, protected areas), energy efficiency, electricity and natural gas prices, and more.[111] The data is not limited to renewable energy; it also includes natural gas, petroleum, and other conventional energy sources.[112] The tool includes built-in tutorials to assist users, as well as the ability for users to provide direct feedback on usability.

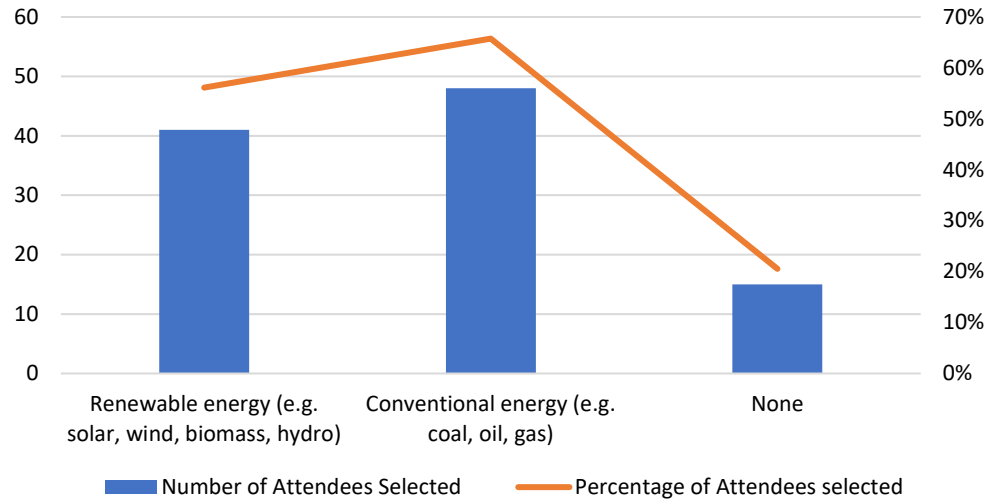
Although these analyses provide insight into the potential for renewable energy development on Tribal lands, further identification and removal of barriers to Tribal renewable energy development and identification of processes for overcoming existing barriers are needed to lead to actual increases in renewable energy generation on Tribal lands.

[110] Note: NREL developed Tribal Energy Atlas on behalf of the Office of Indian Energy (2017).
[111] Office of Indian Energy (2018, July 17). *New Interactive Tool Puts Tribal Energy Resource Data in Tribes' Hands*. U.S. Dept. of Energy, Office of Indian Energy. www.energy.gov.
[112] Ibid.

Participants in the initial listening session were asked **what type, if any, of energy generation currently occurred in their respective communities**. Responses show that 56 percent of communities had some form of renewable energy generation in their communities and 66 percent responded that they had some form conventional energy generation in their communities (Figure 30). When asked to detail the type of **generation preferred** for their respective communities, 59 percent responded to a mix of renewable and conventional resources, 33 percent said renewable only, and eight percent responded conventional only.

92% of polling respondents indicated that a mix of renewable and conventional resources or only renewable energy development is preferred.

Figure 30: Polling responses to What type of energy generation



F. Tribally Owned Utility Potential

Office of Indian Energy staff and contractors researched utility-related data derived from public resources and, in many cases, conducted additional outreach via phone and email for data verification. The following are results from this effort.

Although Tribes were not active participants in the rural electrification efforts that began in the 1930s, Tribes have more recently formed Tribal utilities to meet local needs and gain energy security and sovereignty. There are currently 15 Tribally-owned electric utilities that additionally own part, some or all associated electric distribution lines. Each utility is owned by a distinct Tribal community and are all located in the western half of the United States.

The oldest Tribal utility, Navajo Tribal Utility Authority (NTUA), was established in 1959 to address the absence of utilities on the 27,000 square-mile Navajo Nation (Arizona, New Mexico, and Utah), well after the rural electrification efforts began in the 1930s.

More recently, the Tohono O'odham Utility Authority was created on the Tohono O'odham Nation (Arizona) in 1970 to provide the Tribe with electricity, water, wastewater, and telephone service. Tribal utilities in various other communities began operations in the 1980s (one Tribal utility), 1990s (four Tribal utilities), 2000s (two Tribal utilities), and 2010 to present (six utilities).

The total known energy generation assets from these Tribal utilities have a combined capacity over 430 MW. Combined, they directly service more than 70,000 end users. The type of end users includes Tribal and non-Tribal residences, Tribal and non-Tribal commercial users, and Tribal buildings. Based on average home energy use of 10,715 kWh per year, this capacity could potentially provide electricity to nearly 40,000 households annually.[113]

The services provided by these utilities often include more than just electricity. The Navajo Tribal Utility Authority, for example, also provides gas, water, wastewater, and telecom internet to many parts of the Navajo Nation reservation. Other services provided by Tribal utilities can include, and are not limited to, propane, telephone, cellular, internet, trash pick-up, and sewer. Often, these services would otherwise not be available to Tribal community members without significant Tribal investments.

Tribal communities participate in other forms of utility engagement as well. In addition to the 15 Tribally owned and operated utilities above, there are 13 Tribally-owned electric utilities that do not own their own distribution lines; 13 wholesale energy generators; 10 Tribal government-related energy companies; and eight Tribal communities that regulate utility or energy services on-reservation. Combined, these various structures support more than 3,000 MW of known generation assets. The business structures of these utilities vary, and range from non-profit to for-profit, Tribally chartered, Tribal enterprise, arm of Tribal government, and supported through contracting stemming from Public Law 93-638.[114]

Examples of Tribal utilities include:

- Aha Macav Power Service was created by the Fort Mojave Indian Tribe (California) in 1991 to improve the economic situation on the reservation and increase Tribal self-determination.
- Umpqua Indian Utility Cooperative was created by the Cow Creek Band of Umpqua Tribe of Indians (Oregon) in 2001 to lower the cost of electric service to the Tribal casino and to approximately six other loads associated with the Tribal economic development center.

[113] Energy Information Administration. (2022). *Frequently Asked Questions.* U.S. Dept. of Energy, Energy Information Administration. www.eia.gov.

[114] Bureau of Indian Affairs & Indian Health Service. (1996, August 23). *Public Law 93-638 Indian Self-Determination and Education Assistance Act, as Amended, Regulations, Final Rule.* U.S. Dept. of the Interior and U.S. Dept. of Health and Human Services. www.bia.gov.

- Yakama Power signed initial contracts to purchase wholesale power and transmission in July 2000 to reduce electricity costs for all consumers on the Yakama Reservation (Washington) and in 2006 acquired distribution assets form PacifiCorp and began serving retail customers.
- Energy Keepers Incorporated, a corporation of the Confederated Salish and Kootenai Tribes of the Flathead Reservation (Montana), was established in 2012 to implement the Tribe's option to acquire the 180-megawatt (MW) Kerr Dam which occurred on September 5, 2015.
- Kalispel Tribal Utilities, formed by the Kalispel Tribe of Indians (Washington), began operations October 1, 2017, to service the Tribe's Airway Heights property.
- The Gila River Indian Community Utility Authority, re-established by Gila River Indian Community (Arizona) Tribal Council Resolution in 1998 to serve the Community's Wild Horse Pass Casino, began serving local loads in 1999.
- Ak-Chin Energy Services, established by the Ak-Chin Indian Community (Arizona) in 1992 and began providing all electricity service to the Ak-Chin Indian Community Reservation in 1997.

Additional information on how two Northwest Tribes (Cow Creek Band of Umpqua Indians and Yakama Nation) realized their vision of creating Tribally owned utilities, Umpqua Indian Utility Cooperative and Yakama Power, may be seen on the video Northwest Tribes Provide Electricity, Prove Power to Lead.[115]

The Office of Indian Energy's First Steps Toward Developing Renewable Energy and Energy Efficiency on Tribal Lands (First Steps) planning grants and DOI Division of Energy and Mineral Development's Tribal Energy Development Capacity grants have seen increased interest in the formation of new Tribal utilities. [116, 117]

The Office of Indian Energy First Steps grants, for example, provided funding to the following Indian Tribes and Tribal entities to explore establishment of Tribal utilities:

(1) Pechanga Band of Luiseno Mission Indians (California): In 2017, the Office of Indian Energy provided a grant to the Tribe to explore expanding the Pechanga Tribal Utility services to Tribal residences (DOE $225,000; Cost share $25,000).

[115] Bonneville Power. (2011, Nov. 1). *Northwest Tribes Provide Electricity, Prove Power to Lead* [Video]. YouTube.*Tribes* www.youtube.com.
[116] Office of Indian Energy. (2011). *First Steps Toward Developing Renewable Energy and Energy Efficiency on Tribal Lands*. U.S. Dept. of Energy, Office of Indian Energy. www.energy.gov.
[117] Division of Energy and Mineral Development. (2023). *Tribal Energy Development Capacity*. U.S. Dept. of the Interior, Bureau of Indian Affairs, Division of Energy and Mineral Development. www.bia.gov.

(2) Pueblo of Acoma (New Mexico): In 2017, the Office of Indian Energy provided a grant to the Tribe to explore expanding its Pueblo of Acoma Utility Authority and adding an energy utility department (DOE $163,363; Cost share $23,365).

(3) San Manuel Band of Mission Indians (California): In 2017, the Office of Indian Energy provided a grant to the Tribe to explore developing a Tribal utility (DOE $250,000; Cost share $100,000).

(4) Confederated Tribes of the Colville Reservation (Washington): In 2011, the Office of Indian Energy provided a grant to the Tribe to determine the feasibility of implementing a Tribal electric utility program to unify electric service on the reservation under a single Tribally controlled organization (DOE $207,995; Cost share $85,050).

(5) Confederated Salish and Kootenai Tribes (Montana): In 2011, the Office of Indian Energy provided a grant to the Tribe to hire and train staff for the acquisition of the Kerr Dam (DOE $200,000; Cost share $193,701).

The DOE Energy Efficiency and Renewable Energy Tribal Energy Program, a precursor program which was consolidated into the Office of Indian Energy in 2015, also provided funding to the following Indian Tribes to explore establishment of a Tribal utility:

(1) Hualapai Tribe (Arizona): In 2005, the EERE Tribal Energy Program provided a grant to establish a Tribally operated utility to provide service to Tribal customers at Grand Canyon West, which was operating without grid power (DOE $96,105; Cost share $14,410).

(2) Minnesota Chippewa Tribe, White Earth Band (Minnesota): In 2003, the EERE Tribal Energy Program provided a grant to the Band to explore the development of a Tribal utility (DOE $131,590; Cost share $29,400).

(3) Yurok Tribe (California): In 2003, the EERE Tribal Energy Program provided a grant to conduct a utility services study and evaluate potential forms of organization (DOE $99,120; Cost share $0).

The project summary pages hyperlinked above provide more details on the projects, status presentations and, if completed, final reports.

For more Tribal utility case studies, see the 2010 report funded by the EERE Tribal Energy Program, titled Tribal Authority Process Case Studies: The Conversion of On-Reservation Electric Utilities to Tribal Ownership and Operation.[118]

[118] Western Area Power Administration. (2010). *Tribal Authority Process Case Studies: The Conversion of On-reservation Electric Utilities to Tribal Ownership and Operation*. U.S. Department of Energy, Tribal Energy Program. TribalTribalwww.energy.gov.

A DOI Division of Energy and Mineral Development 2016 TEDC grant to the Pechanga Band of Luiseño Indians (California) helped establish the Pechanga Tribal Utility, the first Tribally-owned and operated utility company in California to buy and transmit power through the California Independent System Operator.

There are also Federally-owned and operated electric utilities that provide power to Tribal communities. These utilities are the San Carlos Irrigation Project (SCIP), which services Tribal members in Arizona; Mission Valley Power, which is operated and maintained by the Salish and Kootenai Tribes of the Flathead Indian Reservation; and the Colorado River Agency, which is an electrical service through the Branch of Electrical Services at the BIA, which services Colorado River Indian Tribes.[119]

Utility Workforce

Additional data provided through contracted work and Office of Indian Energy staff provided estimates of the Tribal utility workforce. The results indicate that the workforce employed by the various Tribal utility structures is estimated to be more than 1,200 individuals. This estimate, however, does not delineate ethnicities.

The workforce for respective Tribally-owned utilities vary considerably. For example, Navajo Tribal Utility Authority has the greatest number of employees, including nearly 850 regular and 22 temporary employees. Gila River Indian Community Utility Authority has a workforce of more than 30 employees, Ak Chin Utility Authority has only one full-time employee because they outsource operations and maintenance to a neighboring utility, and Tohono O'odham Utility Authority has a total of 105 regular employees.

Limited workforce data is available for Tribal utilities that do not own distribution lines or for large energy generators owned by Tribes that either sell power on the market or will sell to Tribal entities.

As discussed above, a relatively small percentage of the total number of Federally recognized Indian Tribes (574) have established electric utilities. As a result, most American Indian and Alaska Natives in rural areas are predominantly served by rural electric cooperatives established as a result of the Rural Electrification Act of 1936.

Application data derived from the Office of Indian Energy grant applications focused specifically on the current status of electric grids in Tribal communities. Roughly 77 percent of all applicants self-reported that their community was connected to a centralized electric grid. Twenty-three percent indicated they were not connected to the centralized electric grid. It should be noted that those who reported that they are not connected to the centralized grid were entirely from Alaska and one Navajo Nation chapter. Additionally, among all applicants, 42 percent reported that there were energy generation assets in the community that were not connected to a grid.

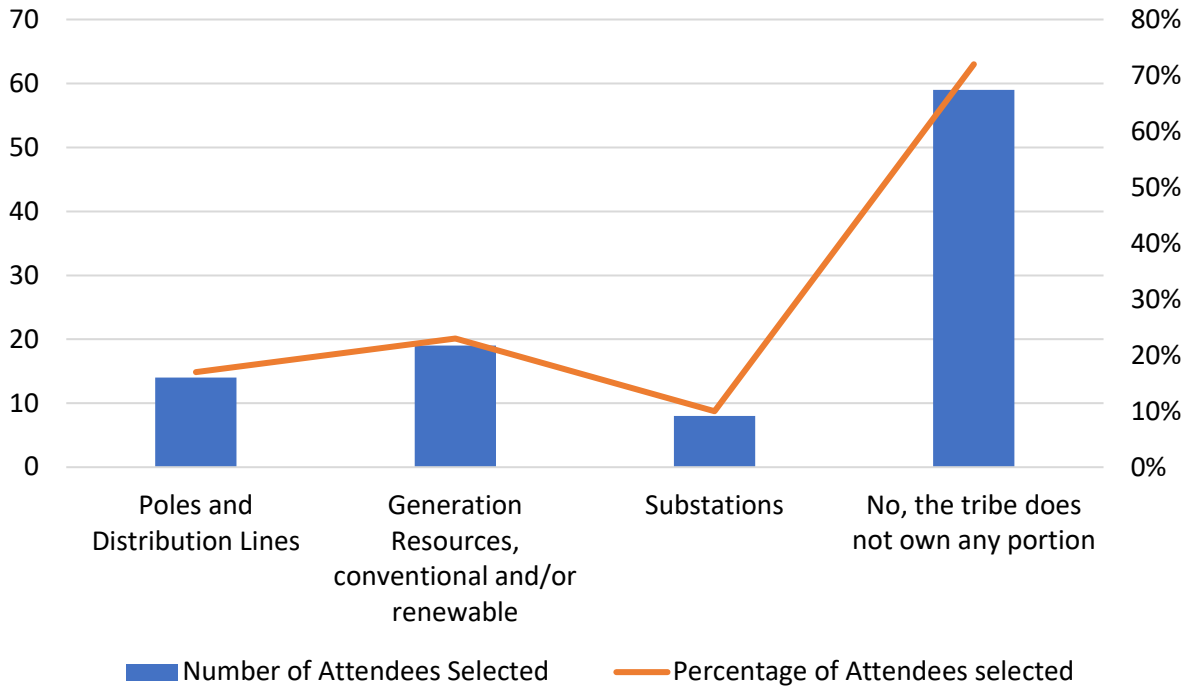
[119] Bureau of Indian Affairs. (2023). *Power Utilities.* www.bia.gov.

95% of polling respondents indicated either yes, or yes, with more information that their community wanted their own community utility.

Polling responses from the initial listening session further elucidate the utility realities on Tribal lands. Participants were asked *how many distinctive utilities were in their community* and the responses were one utility (33 percent), two utilities (31 percent), three utilities (five percent) and four utilities (22 percent). Written responses included communities that are served by five and six non-Tribal utilities respectively. Additionally, when asked if there are any current agreements with non-Tribal utilities (i.e., rights-of-way, power purchase agreements) 49 percent responded "yes", with 27 percent indicating "no" and 24 percent "unsure" if any agreements are currently in place. Finally, participants were asked if their community would want to create its own utility, and 65 percent responded in the affirmative. An additional 30 percent indicated "possibly, with more information" and five percent indicated "no" they would not want to create a utility. It is unknown, however, if the "no" responses were a result of an already existing utility in place.

Polling data from the initial listening session also found that different communities own different portions of generation assets and infrastructure, with the overwhelming majority stating that the Tribe does not own any portion. Polling responses to "*Does your Tribe own any portion of the electrical infrastructure in your respective community? (Select all that apply)*", included Poles and Distribution Lines (17 percent of total responses); Generation Resources, conventional and/or renewable (23 percent of total responses); Substations (10 percent of total responses); and No, the Tribe does not own any portion (72 percent of total responses) (Figure 31).

Figure 31: Does your Tribe own any portion of the electrical infrastructure in your respective community? (Select all that apply)"



G. Barriers to Electricity Access on Tribal Lands

As discussed throughout this report, American Indian and Alaska Native communities face complex land and jurisdictional challenges, unreliable or lack of electricity access, and are generally more susceptible and vulnerable to the effects of climate change. To compound theses vulnerabilities and challenges, American Indian and Alaska Native communities also face a multitude of barriers to energy development.

A 2016 study, *Identifying Barriers and Pathways for Success for Renewable Energy Development on American Indian Lands*, conducted by Dr. Thomas Jones and Dr. Len Necefer while interns under the Office of Indian Energy internship program, identified barriers to renewable energy development on Indian lands.[120] The report found through an elicitation process that although renewable energy holds promise for Tribes, there remain significant barriers to that development. Specifically:

> Decades of developing coal, uranium, petroleum, and hydropower have provided significant employment and revenue while also negatively impacting the environment, cultural resources, and human health. Almost all development occurring on Tribal land

[120] Jones, T.E. & Necefer, L.E. (2016). *Identifying Barriers and Pathways for Success for Renewable Energy Development on American Indian Lands*. Sandia National Laboratories. www.energy.gov.

> has been operated and managed by non-Tribal entities. As a result of these arrangements, requisite knowledge and capacity for future energy development within Tribal governments and communities is lacking.[121] (Page 7. Adamson, 2003; Brugge & Goble, 2002; deLemos et al., 2009; Grossman, 2005; Krepps, 1991; LaDuke, 1994; Snipp, 1986; Rosser, 2008; Trosper, 2009USEPA, 2007.

The study found that the most significant barriers include: (1) funding and financing; (2) infrastructure; and (3) Tribal leadership and staff capacity.

Financing and funding were considered to be the most significant barriers to Tribal energy development, consistent with findings well known through much of Native American energy literature. Specifically,

> "[E]xperts mentioned various economic factors in identifying financing and funding as significant barriers including: small-scale projects not being economically feasible as an alternative to grid connection, large-scale projects often require significant outside capital, high infrastructure costs are necessary to reach remote locations, and there is a dearth of Tribal financial resources available to dedicate to energy development or grant matching."[122] Pages 23-24.

This may also be exacerbated in part by an aversion of some Tribes to incurring debt; the ability to incur debt may be hindered by a Tribe's credit history or inability to provide sufficient collateral. The study further noted that, under Federal law, Tribal governments cannot use Federal renewable energy financial incentives because they are sovereign, non-taxable entities.

The second most significant barrier identified in the 2016 study was transmission infrastructure, or lack thereof, which significantly increases the costs of Tribal energy development – especially due to the remote location of many Tribal lands and distance from existing infrastructure.

Another identified barrier was Tribal leadership and staff capacity. The report found that

> [M]]any, but not all, Tribal governments lack the technical and institutional capacity to make informed decisions regarding energy resource management. Therefore, increasing capacity at the staff level could ensure that there is a buffer to larger issues of governance within Tribal governments that might thwart energy development.[123] Page 25. (Royster, 2009)

Additionally, per the report, the experts interviewed stressed that separating business and governance is important for project development.

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[121] Ibid.
[122] Ibid.
[123] Ibid.

According to a 2012 report by the Board of Governors of the Federal Reserve System, many challenges to economic and business development in Native American communities were expressed by the Growing Economies in Indian Country (GEIC) workshop attendees. [124] Those challenges fall into eight broad categories of issues that workshop participants indicated, to varying degrees, impede development on Tribal lands. They include (1) insufficient access to capital; (2) capacity and capital constraints of small business resource providers; (3) insufficient workforce development, financial management training, and business education; (4) Tribal governance constraints; (5) regulatory constraints on land held in trust and land designated as restricted use; (6) underdeveloped physical infrastructure; (7) insufficient research and data; and (8) a lack of regional collaboration.

With respect to challenges related to insufficient access to capital for Tribal business enterprises, the report identified the following:

- Even Tribal business enterprises with adequate collateral and good credit histories perceive commercial bank financing as difficult to secure.
- Tribal business enterprises often find it difficult to establish public-private partnerships and thereby diversify funding sources.
- Federal funding programs and resources are sometimes difficult to understand, access, and utilize. Concerns expressed by workshop participants include:
  - The fragmentation of Federal funding programs across multiple agencies and programs, exacerbated by inconsistencies and regulatory complexities, which makes it difficult to understand what is available and how the programs can be utilized together;
  - A general lack of understanding of Federal programs by financial institutions; and
  - Insufficient outreach about Federal programs to Tribal communities.

The report also observed that, relative to underdeveloped infrastructure (where critical infrastructure includes telecommunications; public transportation; road systems; basic utilities such as water, sewer, and electricity; and building facilities for businesses):

> GEIC workshop participants noted that the underdeveloped infrastructure in many Native American communities is a major barrier to economic and business development. Participants identified the following infrastructure-related issues:
>
> - Basic telecommunications services, including broadband infrastructure, are severely underdeveloped on some Tribal lands, which deters business

[124] Board of Governors of the Federal Reserve System (2012). *Growing Economies in Indian Country: Taking Stock of Progress and Partnerships A Summary of Challenges, Recommendations, and Promising Efforts.* www.Federalreserve.gov.

development and education opportunities. Specific obstacles to telecommunications development include:

  - Difficulties in obtaining rights-of-way on Tribal lands;
  - Few incentives for the private sector to invest in these high-cost small markets;
  - U.S. Department of Agriculture (USDA) lending and other regulatory restrictions pertaining to competition with rural telecommunications companies;
  - The lack of flexible financing options to develop telecommunications infrastructure; and
  - Prohibitive cost for small businesses where broadband is provided.[125]

- The necessary utilities for business development, such as water, sewer, and electricity, are lacking or underdeveloped in many Native American communities.
- Many Native American communities suffer from poor road infrastructure, which serves as a major impediment to business development.
- Limited public transportation often precludes residents in Native American communities from accessing employment and education/training opportunities.
- Effective development may be hampered by a Tribe's failure to engage in long-term land use planning, such as business and industrial zoning, or to implement the associated zoning and land use codes.
- Many Native American communities have insufficient or inadequate buildings and facilities to house aspiring or expanding Native-owned small businesses or have prohibitive business leasing processes and requirements.[126]

In summary, Federal Indian law and jurisdictional uncertainties and complexities limit private investment; the inability to use or difficulty in using trust or restricted land as collateral to access financing for business development eliminates a major source of equity and security for loans; critical underdeveloped infrastructure in many Native American communities is a major barrier to economic and business development; Tribal governance structures without a clear separation between business and governance can hinder development; and limited Tribal leadership and staff knowledge and capacity impedes energy development on Tribal lands.

[125] Ibid.
[126] Ibid.

Complicated Federal Application Processes

As identified above, barriers exist to Tribal energy development, with funding and financing identified as one of the most significant impediments. As described below, research conducted by the Office of Indian Energy supports that conclusion and is confirmed by continual input identifying funding and financing as one of the priorities of American Indian and Alaska Native communities.

One part of addressing the barrier to accessing funds and capital is simplifying and streamlining the processes. Improving the grant application and award process was one of the key theme's emerging from the questions and comments received during a Tribal Roundtable conducted by the Office of Indian Energy and the Loan Programs Office on May 5, 2021. [127] Below are some key comments provided during that Tribal Roundtable:

- Delays in the grant process tie up valuable resources for Tribes and prevent them from combining DOE funding with other resources.
- To address these issues, DOE should consider greater funding of technical support to assist Indian Tribes in developing funding requests and projects.
- DOE should also consider reducing the monetary match requirements for grants and providing additional financial support to build capacity for Indian Tribes in energy project development.

Recent changes in the Office of Indian Energy's guiding legislation will help address some of the concerns expressed during this Tribal Roundtable, prior studies, and input. Specifically, § 8013 of the Energy Act of 2020 amended Office of Indian Energy authorities in the following two significant ways:

- The Act broadened the definition of "Indian land" – on which the Office of Indian Energy's Tribal energy projects must be deployed – to include land located in a census tract where most residents are either Alaska "Natives" or enrolled members of a Federally recognized Tribe or village; and
- The Act addressed the cost share requirement applicable to Tribal grants by excluding Office of Indian Energy grants from the cost share requirements of the Energy Policy Act of 2005 (EPAct 2005) § 988 (with related Secretarial authority to reduce any applicable cost share to no less than 10% under certain circumstances). [128]

Broadening the definition of "Indian land" helps address the land status complexities which exist in Indian Country, such as checkerboard land in the contiguous 48 states and the

[127] Note: A joint Office of Indian Energy Policy and Programs and Loan Programs Office Tribal Roundtable was held virtually May 5, 2021. www.energy.gov.

[128] United States Senate and House of Representatives. (2020, Dec. 28*). Division Z-Energy Act of 2020.* www.republicans-science.house.gov.

complicated land ownership in Alaska and will simplify the land eligibility requirements for Office of Indian Energy grants. The change in cost share requirements also makes Office of Indian Energy financial assistance accessible to more Indian Tribes and eligible Tribal entities.

To address concerns expressed by Indian Tribes and Tribal entities during the Tribal Roundtable, barriers identified through studies, and other input, the Office of Indian Energy is exploring:

- Increased assistance and training to Indian Tribes and eligible Tribal entities in developing funding requests;
- Simplifying its funding opportunity announcements;
- Expediting the award process;
- Expanding training to build capacity for Tribes in energy project development.

As a result of the May 5, 2021 Tribal Roundtable, the DOE Loan Programs Office is exploring ways in which the Tribal Energy Loan Guarantee Program can better address Indian Country's needs and simplify access to capital.[129]

Lack of Information and Data

In addition to the barriers addressed above, a significant lack of information and data (data gaps) create an additional obstacle to quantifying current energy-related needs in Indian Country (e.g., number of homes unelectrified). Addressing these data gaps is necessary to understand and quantify those needs. As reflected in a May 2020 DOI informational report, "[t]here is an unmet need to address the lack of information and data: A lack of baseline data and a limited ability to gather new data creates gaps in information, planning documents, and information technology. These data gaps make it impossible for Tribes to create informed solutions. With some exceptions, very little necessary scientific information exists for Tribal communities to make decisions on adaptation solutions such as relocation, protection-in-place or managed retreat efforts."[130]

The U.S. Census Bureau provides online access to census data for American Indian and Alaska Native (AI/AN) populations on its *My Tribal Area* website. *My Tribal Area* gives quick access to selected statistics from the American Community Survey (ACS). [131, 132] The ACS provides detailed demographic, social, economic, and housing statistics every year for U.S. communities. Specifically, the 2015-2019 ACS 5-Year Estimates are the basis for data included on the *My Tribal Area* site. Although U.S. Census Bureau data is one of the few datasets available, there is significant uncertainty in the data as evidenced by the margins of error provided by the U.S.

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[129] U.S. Dept of Energy (2023). *Tribal Energy Loan Guarantee Program*. www.energy.gov.
[130] Tribal Climate Resilience Program. (2020). *The Unmet Infrastructure Needs of Tribal Communities and Alaska Native Villages in Process of Relocating to Higher Ground as a Result of Climate Change*. U.S. Dept. of the Interior, Bureau of Indian Affairs, Office of Trust Services, Tribal Climate Resilience Program. TribalTribalwww.bia.gov.
[131] U.S. Census Bureau. (2023). *My Tribal Area*. www.census.gov.
[132] U.S. Census Bureau. (2023). *About the American Community Survey*. www.census.gov.

Census Bureau, discussed below. Both the margins of error and the changes in the data being collected have impacted the data's usability.

For example, the ACS margin of error can be significant. A random sampling conducted by the Office of Indian Energy of Alaska village data on the U.S. Census Bureau's *My Tribal Area* website found that the stated margins of error in population size include 95 percent (Alakanuk), 47 percent (Allakaket), 66 percent (Brevig Mission), 68 percent (Buckland), 21 percent (Chignik Lake), 23 percent (False Pass), 61 percent (HusliaK), 33 percent (Igiugig), 40 percent (Minto), 54 percent (Napakiak), 57 percent (Ouzinkie), 47 percent (Port Graham), 58 percent (Saint Michael), 83 percent (Tuntutuliak), and 83 percent (Wainwright). [133] Margins of error, although not necessarily as significant, are also seen in ACS data on the median household income, percentage of families below the poverty level, and unemployment rates.

Another random sampling conducted by the Office of Indian Energy of data on the U.S. Census Bureau's *My Tribal Area* website for Indian Tribes in the contiguous United States reflected similar stated margins of error in the data. [134] For example, population data reflected margins of error of 228 percent (Bishop Reservation, California), 126 percent (Coyote Valley Reservation, California), 342 percent (Ute Mountain Reservation, Colorado), 49 percent (Fort Pierce Reservation, Florida), 161 percent (Omaha Reservation, Iowa), 49 percent (Little River Reservation and Off-Reservation Trust Land, Michigan), 40 percent (Red Lake Reservation, Minnesota), 100 percent (Santee Reservation, Nebraska), 843 percent (Chickasaw Oklahoma Tribal Statistical Area, Oklahoma), 165 percent (Pine Ridge Reservation, South Dakota), and 389 percent (Wind River Reservation and Off-Reservation Trust Land, Wyoming). As was found in Alaska, margins of error exist in median household income, percentage of families below the poverty level, and unemployment rates, albeit not as significant as margins of error in population.

Per the National Congress of American Indians (NCAI) Policy Research Center, "Unfortunately, the data describing Native communities is often insufficient, unreliable, or completely absent. The lack of data affects policymaking at Federal, Tribal, and state levels."[135] The National Congress of American Indians Policy Research Center further states:

> There is a critical need for accurate, meaningful, and timely data collection in AI/AN communities. Federal agencies are charged with collecting data in AI/AN communities, as well as from the general U.S. population, in order to determine budget requests; support and strengthen budget justifications; allocate resources; provide services; conduct strategic planning; and comply with statutory and regulatory reporting processes. Accurate data collection and community-based planning captures true needs, and thus can drive larger

[134] Ibid.

[135] NCAI Policy Research Center. (2021). *Data Disaggregation*. www.ncai.org.

> programmatic investments resulting in a cost-effective use of Tribal, Federal, and private resources. Without quality data, policymakers and community planners cannot set policy goals, monitor implementation, measure impact, or plan for demographic shifts in an effective way.[136]

And, regarding data quality, the National Congress of American Indians Policy Research adds: "[a]nother major data quality issue has to do with gaps in existing data, which can relate to non-existence of data on key indicators or the inconsistent reporting over time that leads to gaps in data."[137]

Similarly, in its 2018 report, *Broken Promises: Continuing Federal Funding Shortfall for Native Americans,* the U.S. Commission on Civil Rights found that:

> Data on Native American and Native Hawaiians and Other Pacific Islander racial groups are often incomplete, inaccurate, old, or not tracked by the Federal government. The best available data suggest sometimes extreme social and economic disparities between these communities and national averages. There is a critical need for more accurate and current data collection for these communities, including disaggregated data on American Indian, Alaska Native, and Native Hawaiian and Other Pacific Islander subpopulations, to improve the ability of Federal, state, local, and Tribal governments to monitor conditions and make more informed policy and spending decisions. *138,* [139]

V. Recommendations and Conclusion

A. Recommendations for Improving Energy or Electricity Access and Reliability on Tribal Lands

Numerous reports, including reports previously submitted to Congress, document needed energy-related and non-energy-related investments throughout Indian Country. Approximately one in three American Indians and Alaska Natives (32%) live in poverty, which is nearly double the United States average (18 percent) (2006-2010 American Community Survey).[140] Based on the Housing and Urban Development Needs Report, Native Americans are nearly five times as likely to live in inadequate housing (HUD Housing Needs Report).[141] Additionally, American Indian and Alaska Native communities in Tribal areas are eight times more likely to live in

[136] Ibid.
[137] Ibid.
[138] U.S. Commission on Civil Rights. (2018). *Broken Promises: Continuing Federal Funding Shortfall for Native Americans*. www.usccr.gov.
[139] Ibid.
[140] U.S. Census Bureau. (2021). *2006-2010 American Community Survey*. www.catalog.data.gov.
[141] U.S. Dept. of Housing and Urban Development (2017). "Housing Needs of American Indians and Alaska Natives in Tribal Areas." www.huduser.gov.

overcrowded housing, or 16 percent versus two percent for the United States (2013 American Housing Survey Data).

A 2018 report by the U.S. Commission on Civil Rights, an independent, bipartisan agency established by Congress in 1957, summarized Federal funding pertaining to Native Americans in *Broken Promises: Continuing Federal Funding Shortfall for Native Americans*.[142] This 2018 Broken Promises report, commissioned by Congress, updates its 2003 report, *A Quiet Crisis: Federal Funding and Unmet Needs in Indian Country,* which evaluated budgets and spending of Federal agencies that sponsor Native American programs.

In both the 2018 Broken Promises report and in the 2003 report, focus was given to the adequacy of funding and whether it has kept pace with inflation.[143] The 2003 report focused on "unmet needs."[144] Specifically, the 2018 Broken Promises report found that,

> Over the last 10 years, Federal funding for Native American programs has increased significantly. However, this has not been nearly enough to compensate for a decline in spending power, which had been evident for decades before that, nor to overcome a long and sad history of neglect and discrimination. **Thus, there persists a large deficit in funding Native American programs that needs to be paid to eliminate the backlog of unmet Native American needs**, an essential predicate to raising their standards of living to that of other Americans. Native Americans living on Tribal lands do not have access to the same services and programs available to other Americans, even though the government has a binding trust obligation to provide them. [Emphasis added]

In the 2018 *Broken Promises* report, the Commission also found:

> "**a crisis in the persistence and growth of unmet needs**. The conditions in Indian Country could be greatly relieved if the Federal government honored its commitment to funding, paid greater attention to building basic infrastructure in Indian Country, and promoted self-determination among Tribes."[145]

One of the recommendations concluded:

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[142] U.S. Commission on Civil Rights. (2018). *Broken Promises: Continuing Federal Funding Shortfall for Native Americans*. www.usccr.gov.Federal

[143] U.S. Commission on Civil Rights. (2003). *A Quiet Crisis: Federal Funding and Unmet Needs in Indian Country*. www.usccr.gov.

[144] Note: Unmet needs are defined as: the portion of basic needs among Native Americans that the government is supposed to supply but does not. Basic needs encompass such critical items as health (e.g., medical facilities, clean drinking water); education (e.g., books, structurally sound school buildings); law enforcement (e.g., enough law enforcement personnel); and housing (e.g., indoor plumbing, enough houses).

[145] U.S. Commission on Civil Rights. (2018). *Broken Promises: Continuing Federal Funding Shortfall for Native Americans*. www.usccr.gov.Federal

> "**Federal appropriations must compensate for costs that are unique to Tribes, such as those required to build necessary infrastructure, those associated with geographic remoteness, and those required for training and technical assistance.** The unique needs of non-reservation and urban Native Americans must also be assessed, and adequate funding must be provided for programs to serve these individuals." [Emphasis added][146]

Further, it found that:

> "**Federal funding for Native American programs across the government remains grossly inadequate to meet the most basic needs** the Federal government is obligated to provide. Native American program budgets generally remain a barely perceptible and decreasing percentage of agency budgets. Since 2003, funding for Native American programs has mostly remained flat, and in the few cases where there have been increases, they have barely kept up with inflation or have actually resulted in decreased spending power." [Emphasis added][147]

Documented needs and further investment opportunities extend to energy security, resilience, and development in Tribal communities. Specific to the Office of Indian Energy and as previously addressed, of the nearly 690 applications received between 2010 and 2021, the Office of Indian Energy had sufficient funding to successfully award grants to approximately 30 percent (209 applications). Consequently, nearly 70 percent (478 applications) of those requests were not funded, representing approximately $245 million in unfunded requests and more than $500 million in total proposed project costs.

These unfunded requests demonstrate unmet Tribal energy efficiency and renewable energy needs as a result of Office of Indian Energy funding limitations and the competitive nature of the process. That said, to meet the current Administration's goal of net-zero emissions by no later than 2050, significant investments will be needed, not only to address basic needs (electrifying Indian Country) and past disparities, but to transition American Indian and Alaska Native communities to clean energy.

The Office of Indian Energy addresses these disparities through stated goals from legislation and Tribal input. While legislative action and funding appropriations determine the scale and type of investments, all new Office of Indian Energy initiatives are guided by statute and informed by Tribal input. Feedback derived from Tribal constituents including through Tribal listening sessions, Tribal Roundtables, workshops, research, and recommendations from the Indian Country Energy and Infrastructure Working Group (ICEIWG) are vital to ensuring that the direction of the Office of Indian Energy addresses the present day needs and realities of Indian

[146] Ibid.
[147] Ibid.

Country. [148] Therefore, the Office of Indian Energy must be receptive, adaptive, and forward-thinking to best prepare to meet the evolving needs of Indian Country.

Based on this collective input and the data presented herein, funding and financing remains one of the greatest barriers to energy development and one of the highest priorities of Indian Country. A 2016 survey of ICEIWG members rated access to capital as the highest priority.[149] Interest in renewable energy for local electricity generation remains high. Based on an ICEIWG survey, 86.7 percent of 113 respondents are considering or planning energy projects and over 70 percent want to develop their renewable energy resources. [150]

Many challenges communities face relative to energy development are shared across Indian County. In addition to already ongoing Office of Indian Energy initiatives, new investments are being explored to better address the needs in Indian Country. As indicated, the level of funding through appropriations will determine the level of support the Office of Indian Energy can provide Tribes (See Indian Tribal Energy Development and Self Determination Act of 2005).[151] Subject to appropriations, and consistent with the President's FY2023 Budget Request, the Office of Indian Energy's priorities are to address the following initiatives:

(1) Provide energy access to Tribal members currently without electrical power;
(2) Empower American Indian and Alaskan Native nations to lead the transition to clean energy by providing financial and technical assistance; and
(3) Assist Tribal Colleges and Universities to power their institutions with clean energy.

These Tribal constituent informed initiatives are meant to reduce the disparities discussed in this report and work toward greater Tribal self-determination and energy security.

Additionally, as evidenced by project applications submitted to the Office of Indian Energy, interest in microgrids is increasing as a means of locally producing and storing electricity during extreme weather events and combatting the effects of climate change. This observation is confirmed by the ICEIWG survey, where 45 percent to 59 percent of respondents indicated their desire to pursue microgrid systems. [152]

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[148] Note: Indian Country Energy and Infrastructure Working Group (ICEIWG) is a group comprised of Indian Tribe and Alaska Native Corporation leaders, who meet on a quarterly basis to provide insight and feedback to the Secretary of Energy and the Office of Indian Energy. For more information on ICEIWG, see the Office of Indian Energy website and for ICEIWG membership and information on quarterly meetings, see the National Conference of State Legislatures website.
[149] Doris, E. & MacCourt, D. (2016, June). *Policy Priorities Report.* Quarterly Meeting of the Indian Country Energy and Infrastructure Working Group (ICEIWG). Portland, OR.
[150] Indian Country Energy and Infrastructure Working Group. (2020, August 7). *Tribal Energy COVID-19 Survey*.
[151] United States Senate and House of Representatives. (2005, Aug. 8). *Energy Policy Act of 2005.* Title V, § 502, codified at 42 USC § 7144e.
[152] Indian Country Energy and Infrastructure Working Group. (2020, August 7). *Tribal Energy COVID-19 Survey*.

Unmet Need

Foundational unmet needs exist for Tribal communities, including infrastructure needed for continued energy development and security. A 2017 NCAI report entitled Tribal Infrastructure: Investing in Indian Country for a Strong American states, "In 2009, as one indication, a contingent of U.S. Senators penned a letter to the Administration citing a **$50 billion unmet need for infrastructure on Indian reservations**. [153, 154] The number of 'shovel ready' infrastructure projects in Indian Country remains too many to count, and many of those have been that way for years if not decades." [Emphasis added] [155]

Regionally, needs are further exacerbated by climate change impacts that are already affecting Tribal communities. As indicated in a May 2020 DOI Information Report, "[c]limate-related threats to Tribal infrastructure are expected to increase in frequency and severity under future climate scenarios, thus being highly vulnerable to impacts associated with climate change."[156] **The report's initial estimates suggest that the unmet relocation infrastructure needs for Indian Tribes and villages vulnerable to climate change in Alaska are "$3.45 billion over the next 50 years**," This amount, according to the report, "would equate to approximately $90 - $110 million in the first 10 years to address Tribal infrastructure threats, which includes $32 million to complete all site-specific assessments." The report also notes that the **unmet relocation infrastructure needs for those Indian Tribes and villages vulnerable to climate change in the Contiguous 48 States is $1.365 billion**." [Emphasis added] [157, 158]

With specific respect to providing electricity to Navajo Nation homes that lack access to electricity, Navajo Tribal Utility Authority (NTUA) provided the following testimony to the U.S. House of Representatives Committee on Natural Resources Subcommittee on Indigenous Peoples of the United States on April 21, 2021 (updated and corrected May 5, 2021):

> Based on NTUA's last three years of historic costs, the average cost to connect one home to the electric grid is approximately $40,000, which includes a $1,500 subsidy from NTUA and all of the permitting and construction costs. Utilizing NTUA's historic average cost it will cost approximately $562.52 million to connect 14,063 homes to the

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[153] National Congress of American Indians (2017). *Tribal infrastructure: Investing in Indian Country for a Strong American. An initial report by NCAI to the Administration and Congress*. www.ncai.org.

[154] National Congress of American Indians. (2010, March). *Investing in Tribal Governments: An Analysis of Impact and Remaining Need under the American Recovery and Reinvestment Act*. www.ncai.org.

[155] Ibid.

[156] Tribal Climate Resilience Program. (2020). *The Unmet Infrastructure Needs of Tribal Communities and Alaska Native Villages in Process of Relocating to Higher Ground as a Result of Climate Change*. U.S. Dept. of the Interior, Bureau of Indian Affairs, Office of Trust Services, Tribal Climate Resilience Program. www.bia.gov.TribalTribal

[157] Note: This is based on idealized allocation and spending models and includes funding for the vulnerability assessments noted below. It also assumes that projects can be implemented as pre-disaster mitigation projects prior to disaster events requiring emergency response.

[158] Tribal Climate Resilience Program. (2020). *The Unmet Infrastructure Needs of Tribal Communities and Alaska Native Villages in Process of Relocating to Higher Ground as a Result of Climate Change*. U.S. Dept. of the Interior, Bureau of Indian Affairs, Office of Trust Services, Tribal Climate Resilience Program. www.bia.gov.

> electric grid. Many of these homes need to be wired to receive electric service. The estimated cost for wiring a house is $7,000 which equates to $98.44 million. Extending power lines to homes also requires extending and upgrading the electric utility transmission and distribution systems and building or expanding existing electric substations, this cost is estimated to be an additional $400 million. **Therefore, the total estimated cost to electrify 14,063 Navajo homes is about $1 billion**. [Emphasis added] [159]

These reports and case study highlight the magnitude of needed investments on Tribal lands. Unmet needs based solely on these examples results in tens of billions of dollars.

Federal Energy Infrastructure Funding Gaps

The U.S. Government Accounting Office (GAO) has developed graphics that detail the various roles Federal agencies have in the development of Indian energy resources (Figure 32). [160]

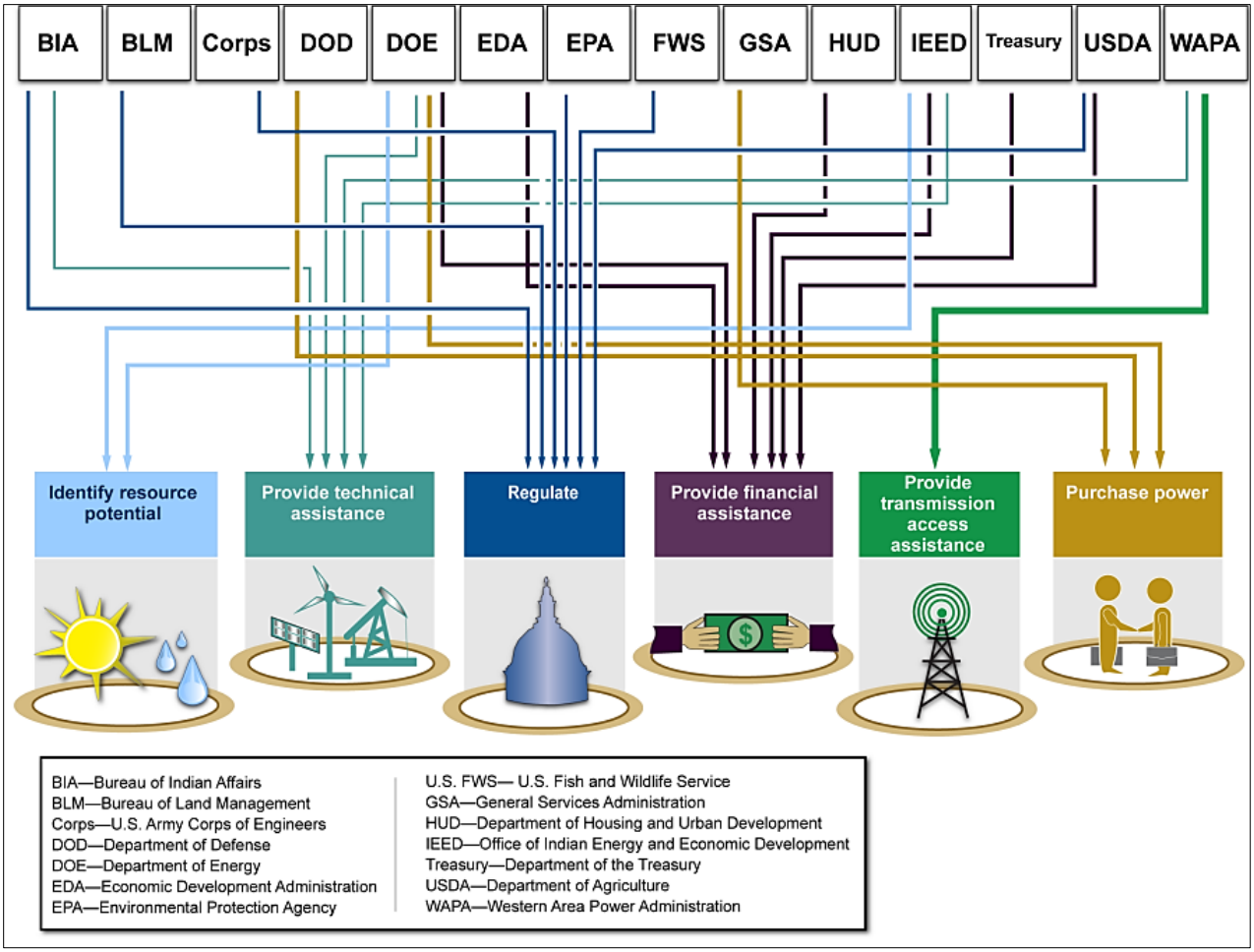
As indicated in Figure 32, several entities aid in identifying resources or determining feasibility, such as the Office of Indian Energy and the DOI Division of Energy and Mineral Development, or provide funding or financing for the installation of energy systems, such as the DOE, DOI, USDA, U.S. Economic Development Administration, HUD, and U.S. Department of Treasury. Further, Federal incentives are usually provided in the form of tax incentives; because Indian Tribes are non-taxable entities, however, they may not be directly eligible to receive such incentives, thereby limiting financing options. [161]

[159] Infrastructure in Indigenous Communities: Priorities for the American Jobs Plan, U.S. House of Representatives Committee on Natural Resources, Subcommittee on Indigenous Peoples of the United States. (2021) (testimony of Walter W. Haase). www.congress.gov.

[160] United States Government Accountability Office (2016, Nov.). *Indian Energy Development: Additional Actions by Federal Agencies Are Needed to Overcome Factors Hindering Development*. www.gao.gov.

[161] Shahinian, M. (2007). *The Tax Man Cometh Not: How the Non-Transferability of Tax Credits Harms Indian Tribes*. American Indian Law Review.

Figure 32: Roles of Federal Agencies in the Development of Indian Energy Resources



Sources: GAO analysis of Federal documentation (GAO (images) GAO 17-43

Based on a review of Federal funding available for energy infrastructure projects for Indian Tribes, those sources of funds seem to be predominantly for early resource identification or feasibility studies or for actual hardware installation. Few Federal funding sources were identified that provide funds for project development, which includes those costs between assessing the feasibility and having a project and business plan sufficient for project installation funding or financing (e.g., environmental assessment, rights-of-way and permitting, power purchase and interconnection agreements). For larger projects, these development costs can be significant. As such, costs for project development seems to be a significant gap in Federal energy infrastructure funding for Indian Tribes, thereby potentially limiting large-scale Tribal energy development.

Although there are some limited Federal funding sources available for organizational development, such as the Office of Indian Energy's planning grants and the DOI Division of

Energy and Mineral Development's Tribal Energy Development Capacity grants, funds for organizational development should be explored as a Federal funding gap. [162]

B. Conclusion

American Indian and Alaska Native communities have historically experienced a gamut of internal and external factors that have resulted in their current energy outlook. Historical and contemporary Federal, state, and local policies have influenced development in various ways, many times to the detriment of Tribal energy development. Many American Indian and Alaska Native communities experience higher-than-the-national-average energy burden, electricity costs, numbers of unelectrified homes, and reliability issues as a result of those policies.

Compounding this history, or as a direct result, American Indian and Alaska Native communities face higher-than-average social disparities. These realities and unmet needs correlate with the vast untapped potential of the energy resources that exist on Tribal lands. Tellingly, Tribal interest and action in developing these resources has increased in recent decades. Like any community in the United States, American Indian and Alaska Native communities are working toward strengthening community economies and increasing community well-being, and energy development is a foundational element to achieving these goals.

Supporting these efforts, the Office of Indian Energy works as a Federal partner to help alleviate barriers and support respective Tribal community energy visions. The Office of Indian Energy's three-pronged approach of technical assistance, financial assistance, and education and capacity building have focused on addressing the energy development disparities prevalent throughout Indian Country. Findings detailed in this report indicate that Office of Indian Energy financial investments have contributed to building equity among energy solutions for Tribal communities.

The Office of Indian Energy's investments continue to be utilized by American Indian and Alaska Native communities across the Nation. Annually and cumulatively, there is growing unmet need for project grant funding and technical expertise to address the wide range of challenges to energy development in Indian Country. There is also a stark increase in education and outreach participation and the need for building internal capacity by Indian Tribes. American Indian Tribes and Alaska Native villages have different human capacity and financial capabilities for energy development, and the services provided by the Office of Indian Energy respect and strive to meet those diverse needs. Ensuring that a wide range of opportunities are available to meet those needs, regardless of financial, geographic, or demographic position, is how the office can best serve Indian Country and Alaska.

[162] Division of Energy and Mineral Development. (2023). *Tribal Energy Development Capacity Grant*. U.S. Dept. of the Interior, Bureau of Indian Affairs, Division of Energy and Mineral Development. www.bia.gov.

In evaluating Office of Indian Energy investments and the current state of Tribal energy access and reliability, the following key insights emerge, as detailed throughout this report:

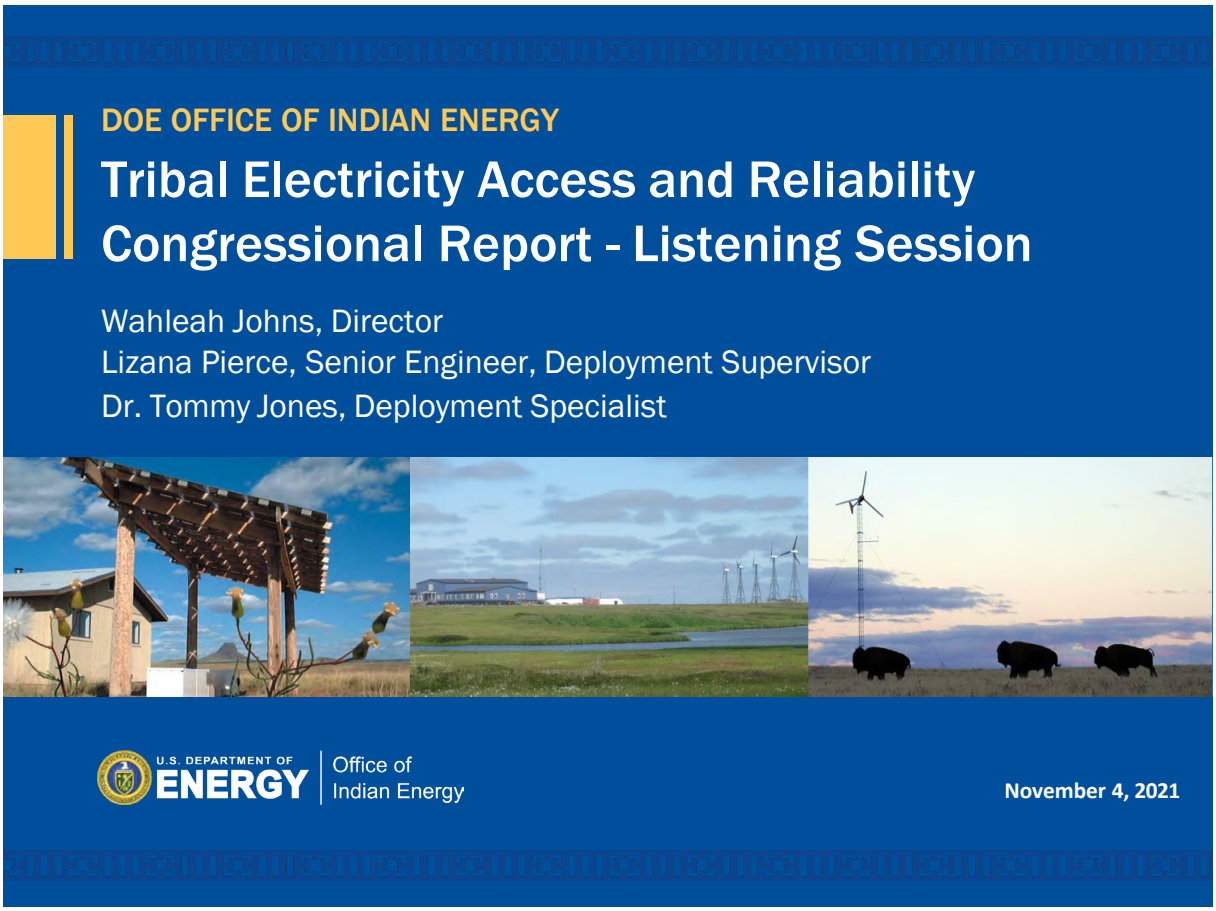
- DOE and DOE's Office of Indian Energy investments to these historically underserved Tribal communities, albeit limited, are having tangible impacts in Indian Country;
- Indian Country contains vast untapped energy resources;
- Significant need, interest, and potential exists for Indian Tribes to implement energy efficiency and renewable energy technologies in Indian Country, develop their energy resources, stabilize energy costs, spur local economic development, and provide jobs for Tribal members;
- Federal Indian law and jurisdictional uncertainties and complexities limit private investment and impede energy development on Tribal lands;
- Significant financial, infrastructure, and human capacity barriers exist that hinder Tribal energy development;
- Lack of data prevents quantification of the current energy state in Indian Country and hampers justification of additional resources;
- Increasing vulnerabilities from climate change have resulted in a rising demand for clean energy; and
- Complicated Federal application processes and funding gaps limit access by American Indian and Alaska Native communities.

These factors demonstrate that continued investments into Indian Country are needed to build greater equity among United States citizens.

Appendices

Appendix A: 1st Listening Session Presentation

Note: To view presentation, double click on slide and it will open up the PowerPoint.



Appendix B: 1st Listening Session Report

Note: To view document, double click on it and the pdf will open.

Department of Energy
Washington, DC 20585

Listening Session Metrics Report
Tribal Electricity Access and Reliability Listening Session
November 4, 2021

The Office of Indian Energy held a listening session on November 4th, 2021 titled *Tribal Electricity Access and Reliability Listening Session*. The listening session responds to legislative language set forth in the Energy Act of 2020, Sec. 8014 Report on Electricity and Reliability pages 1200 - 1203, wherein it is stated:

> *(a) ASSESSMENT.—The Secretary of Energy shall conduct an assessment of the status of access to electricity by households residing in Tribal communities or on Indian land, and the reliability of electric service available to households residing in Tribal communities or on Indian land, as compared to the status of access to and reliability of electricity within neighboring States or within the State in which Indian land is located.*
> *(b) CONSULTATION.—The Secretary of Energy shall consult with Indian Tribes, Tribal organizations, the North American Electricity Reliability Corporation, and the Federal Energy Regulatory Commission in the development and conduct of the assessment under subsection(a). Indian Tribes and Tribal organizations shall have the opportunity to review and make recommendations regarding the development of the assessment and the findings of the assessment, prior to the submission of the report under subsection (c).*
> *(c) REPORT.—Not later than 18 months after the date of enactment of this Act, the Secretary of Energy shall submit to the Committee on Energy and Commerce of the House of Representatives and the Committee on Energy and Natural Resources of the Senate a report on the results of the assessment conducted under subsection (a), which shall include—(1) a description of generation, transmission, and distribution assets available to provide electricity to households residing in Tribal communities or on Indian land; (2) a survey of the retail and wholesale prices of electricity available to households residing in Tribal communities or on Indian land; (3) a description of participation of Tribal members in the electric utility workforce, including the workforce for construction and maintenance of renewable energy resources and distributed energy resources; (4) the percentage of households residing in Tribal communities or on Indian land that do not have access to electricity; (5) the potential of distributed energy resources to provide electricity to households residing in Tribal communities or on Indian land; (6) the potential for tribally-owned electric utilities or electric utility assets to participate in or benefit from regional electricity markets; (7) a description of the barriers to providing access to electric service to households residing in Tribal communities or on Indian land; and (8) recommendations to improve access to and reliability of electric service for households residing in Tribal communities or on Indian land.*
> (d) DEFINITIONS.—In this section: (1) TRIBAL MEMBER.—The term "Tribal member" means

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Appendix C: 2nd Listening Session Presentation

Note: To view presentation, double click on slide and it will open up the PowerPoint.