

Tribal Energy: Federal Assistance to Support Microgrid Development

GAO-24-106278

Q&A Report to the Ranking Member, Committee on Natural Resources, House of Representatives

July 22, 2024

Why This Matters

Tribes and their citizens may experience difficulties obtaining reliable and affordable electricity or may not be connected to a traditional electricity grid at all.¹ Inadequate electrical infrastructure or severe weather events can leave Tribes and their citizens without power for critical buildings and emergency services.

Microgrids are electricity systems that can operate independently from a traditional electricity grid. Microgrids can help Tribes deliver power to their communities and protect from grid disruptions. However, developing a microgrid can be a costly and complex endeavor that poses financial, technical, and other challenges for Tribes.

The Department of the Interior's Indian Affairs organization, the Department of Energy (DOE), the Department of Homeland Security's Federal Emergency Management Agency (FEMA), the Department of Agriculture (USDA), and the Denali Commission—an independent federal agency designed to provide critical utilities, infrastructure, and support for economic development and training in Alaska—have supported tribal microgrid development.² We were asked to examine tribal microgrid development. This report provides information on the federal programs available to support such efforts, the challenges Tribes face with microgrid development—including unique challenges with microgrids in Alaska—and actions the federal government has taken to address some of these challenges.

Key Takeaways

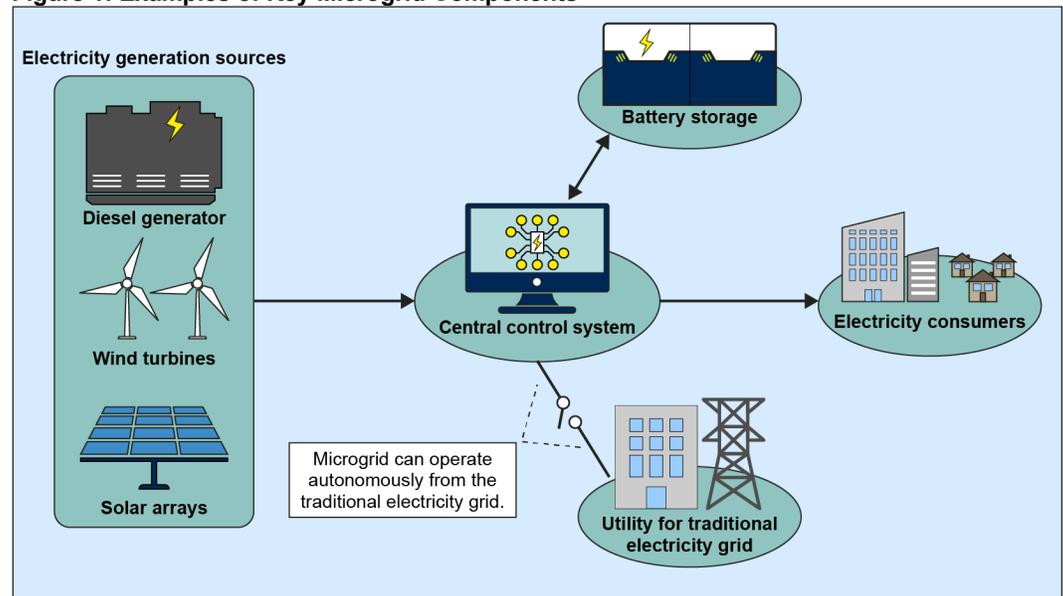
- Several federal agencies and programs offer financial and technical assistance for tribal microgrid development.
- Tribes face long-standing barriers to accessing federal assistance and specific challenges related to microgrid development that may affect their ability to successfully pursue microgrids. For example, Tribes may have difficulties providing matching funds for federal grant awards or may experience challenges with connecting their microgrids to a traditional electricity grid.
- Unique challenges exist to developing a microgrid in Alaska related to geographical and environmental conditions. For example, the lack of road systems and seasonality of barge access to deliver project materials complicates microgrid development in remote Alaskan communities.
- The federal government has taken several actions in recent years that could help address some challenges that Tribes face in developing microgrids. While these actions have significant potential, it is too soon to assess the extent to which they will be successful.

What is a microgrid?

Microgrids are localized electricity systems serving a discrete geographic area that may or may not connect to a traditional electricity grid. When needed, grid-connected microgrids can disconnect and function autonomously in what is known as “island mode.” Microgrids may also be permanently islanded and independently generate all electricity for a discrete area. Microgrids vary in size and involve different levels of complexity, but key components generally include (see fig. 1):

- **Electricity generation sources.** Microgrids generate electricity using renewable and/or conventional energy sources—such as solar or wind, diesel or natural gas, or a combination of both. Bulk fuel storage tanks may be necessary for microgrids that rely on diesel fuel, as is the case in remote Alaskan communities.
- **Battery storage.** Newer microgrids typically use batteries to store energy. The batteries can provide electricity in situations when the traditional grid is disrupted—such as during severe weather events—or when it is less expensive than purchasing electricity from the grid.
- **Central control system.** Microgrids are managed through a central control system that autonomously makes decisions about electricity generation, distribution, and storage. For example, the control system may determine when to use electricity supplied by the traditional grid, the microgrid’s generation source, or the battery.

Figure 1: Examples of Key Microgrid Components



Sources: GAO analysis of Department of Energy documentation; GAO (icons). | GAO-24-106278

How is a microgrid developed?

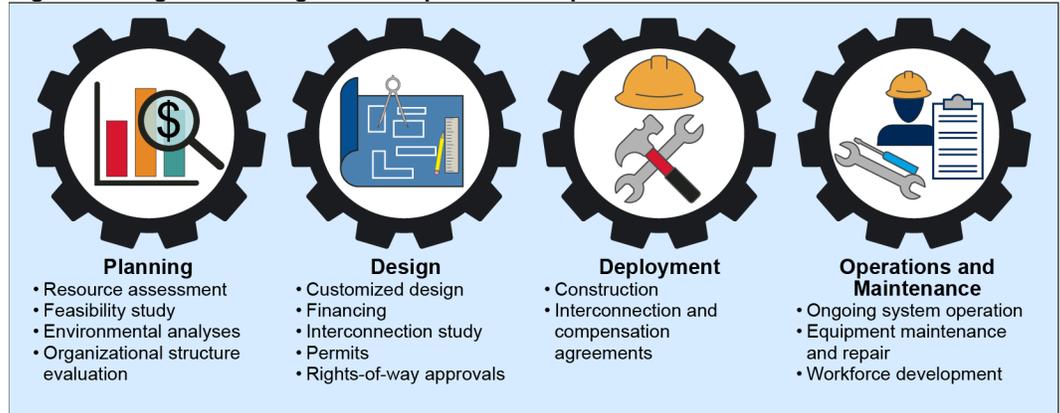
Microgrid development is a complex process, and Tribes may complete a variety of planning and design activities before a system is deployed. Development may continue after a microgrid is in operation if Tribes choose to enhance system technology or infrastructure. Microgrid development can generally be classified according to the stages described below, though development is sometimes iterative and the stages may not occur sequentially (see fig. 2).

- **Planning.** Tribes conduct a variety of planning activities, including feasibility studies and other analyses, to determine if a microgrid is a practical solution to address their energy needs and to establish the technical and economic viability of a system. This stage may include evaluating renewable energy

generation options, optimal microgrid location and sizing based on site-specific historical electricity-use data, project costs, projected savings, potential financing sources, and potential environmental impacts, among other things. Tribes may also evaluate their organizational structure for regulating, managing, and operating a microgrid.

- **Design.** After a microgrid is determined to be feasible, Tribes work with engineers, consultants, and others to design a customized microgrid to meet the Tribe’s specific needs. Depending on the specific plans, Tribes may need to obtain various approvals and permits and conduct additional studies. For example, if the microgrid will connect to a traditional electricity grid, an interconnection study may be needed to demonstrate the safety and reliability of the connection.
- **Deployment.** Microgrid technology is installed and, if applicable, connected to the traditional electricity grid, then tested over a period of time to demonstrate readiness for operation.
- **Operations and maintenance (O&M).** This stage involves ongoing operation of the microgrid system, as well as equipment maintenance, repair, and replacement as needed. Responsibility for funding and performing O&M can vary depending on the system design and ownership structure. Tribes may conduct O&M themselves or they may hire an O&M contractor. Conducting O&M may require technical training, and Tribes may seek opportunities to train tribal members for such responsibilities.

Figure 2: Stages of Microgrid Development and Operation and Select Related Activities



Sources: GAO analysis of Department of Energy and Department of the Interior’s Indian Affairs documentation and interviews; GAO (icons). | GAO-24-106278

Note: Activities listed in the figure are examples and are not comprehensive of all activities that may occur in each stage of microgrid development. Some activities may not be required for all microgrids. Additionally, since microgrid development is sometimes an iterative process, the stages may not occur sequentially.

How many Tribes have or rely on microgrids?

Centralized data are not available on the number of Tribes that have or rely on microgrids. However, we identified dozens of examples of tribal microgrids in the contiguous United States, as well as approximately 200 remote Alaskan communities where microgrids are the sole source of electricity. We identified these tribal microgrids through our analysis of federal grant award data, interviews with relevant federal agencies and stakeholders, and relevant internet and literature searches. Through various tribal outreach efforts, Indian Affairs and DOE have identified additional tribal interest in pursuing microgrids.³

- At least 70 of the 347 federally recognized Tribes in the contiguous United States have pursued a microgrid, though some may not yet be fully deployed. Microgrids in the contiguous United States generally connect to a traditional electricity grid. Increasingly, microgrids across the United States use

renewable energy sources. An example of a tribal microgrid project in the contiguous United States is highlighted in figure 3.

Figure 3: Example of a Tribal Microgrid Project in California



Carport solar panels

San Pasqual Band of Mission Indians Community Solar Project
Project components: Solar carports, propane generator, batteries, and microgrid controls.
Goals: Improve resiliency to power disruptions due to wildfires.
Buildings served: Tribal administration, police and public safety, fire department, schools, and public emergency shelters.
Project cost: \$1.4 million.
Federal assistance: Department of Energy Office of Indian Energy Policy and Programs grant for \$703,716.
Benefit: Project is expected to save approximately \$45,190 annually in electricity costs or \$1.13 million throughout the lifetime of the system. It is also expected to offset energy consumption for the buildings served by 96 percent.

Sources: GAO analysis of Department of Energy and tribal documentation; GAO (image). | GAO-24-106278

- As of 2023, there are approximately 200 remote Alaskan communities that are not connected to a traditional electricity grid, most of which are Alaska Native villages.⁴ Many Alaska Native villages have relied on microgrids for decades to supply electricity to their communities. Alaska Native villages have historically been dependent on diesel generators to power their microgrids, but in recent years, some have enhanced their systems to integrate renewable energy sources and batteries to reduce dependence on expensive diesel fuel and lower overall electricity costs. An example of a tribal microgrid project in an Alaska Native village is highlighted in figure 4.

Figure 4: Example of a Tribal Microgrid Project in Alaska



Battery energy storage system

Village of Chefornak Battery Energy Storage Project
Project components: Battery storage system integrated into existing wind and diesel microgrid.
Goals: Improve energy resiliency by increasing local, renewable energy and lower electricity costs.
Buildings served: Community homes, health clinic, tribal offices, washeteria, and powerhouse.
Project cost: \$949,960.
Federal assistance: Department of Energy Office of Indian Energy Policy and Programs grant for \$854,964.
Benefit: Project is expected to displace approximately 59,000 gallons of diesel fuel each year and save more than \$270,000 annually in electricity costs.

Sources: GAO analysis of Department of Energy and tribal documentation; GAO (image). | GAO-24-106278

What assistance may Tribes need to develop a microgrid?

Tribes may need financial and technical assistance to develop microgrids because such systems can be costly and technically complex.

- **Financial assistance.** Unlike state and local governments, tribal governments typically do not have access to traditional tax bases to fund their operations.⁵ Tribes may not have sufficient capital or revenue to independently fund microgrid development, and obtaining loans from private lenders may be challenging.⁶ As a result, Tribes may need financial assistance from one or more external sources, including the federal government, state governments, non-governmental organizations, and investors. Financial assistance can come in multiple forms, including grants and loans. Tribes may also partner with investors who take partial ownership of a microgrid in exchange for providing capital. Given the high cost of some microgrid projects, Tribes may need multiple forms of financial assistance.
- **Technical assistance.** There are no off-the-shelf options for microgrids—each system must be customized for a Tribe’s specific circumstances, which

complicates development efforts. Certain microgrid development activities—such as feasibility studies, system designs, and interconnection studies—require specific expertise. Tribes may need to hire technical experts and other consultants to complete them, which can be expensive or cost-prohibitive for some Tribes.

What federal financial assistance is available for tribal microgrid development?

Multiple programs within Indian Affairs, DOE, FEMA, USDA, and the Denali Commission offer financial assistance that can support tribal microgrid development, though these programs have broader goals than solely microgrid development, and most programs are not specific to Tribes.⁷ Appendix I describes 20 programs across the five agencies offering various types of financial assistance that could be used for tribal microgrid development. Some of these programs have been in existence for years, while others were created recently by legislation such as the Infrastructure Investment and Jobs Act (IIJA) and the budget reconciliation act commonly known as the Inflation Reduction Act of 2022 (IRA).⁸

The primary types of financial assistance offered by relevant Indian Affairs, DOE, FEMA, USDA, and Denali Commission programs include competitive grants, non-competitive grants, loan guarantees, and direct lending.⁹ Several grant programs across these five agencies have a history of providing funding for tribal microgrid development. However, Tribes have not generally used loan guarantee or direct lending programs for microgrid development.¹⁰

Programs provide financial assistance within the context of their unique missions and have specific eligibility and other program requirements that applicants must meet to qualify. As a result, the types of tribal microgrid development projects that have been or could be supported vary across programs. For example, USDA's High Energy Cost Grant Program has almost exclusively supported projects in remote Alaska due to program eligibility requirements, according to program officials.¹¹ Similarly, the Denali Commission operates exclusively in Alaska with a focus on rural communities.¹² Programs within Indian Affairs, DOE, and FEMA, however, have supported microgrid development in both the contiguous United States and Alaska. The seven programs listed below have a history of providing grant funding for various aspects of tribal microgrid development.

- Indian Affairs' Energy and Mineral Development Program
- Indian Affairs' Tribal Energy Development Capacity Program
- DOE's Office of Indian Energy Policy and Programs
- FEMA's Building Resilient Infrastructure and Communities Program
- FEMA's Pre-Disaster Mitigation Grant Program
- USDA's High Energy Cost Grant Program
- Denali Commission's Energy and Bulk Fuel Program

Below we discuss the types of tribal microgrid development activities each of these seven programs has supported through grant funding. First, we discuss the Indian Affairs, DOE, and FEMA programs, which have supported a variety of tribal microgrid planning, design, and deployment activities in both the contiguous United States and Alaska. Second, we discuss USDA's High Energy Cost Grant Program and the Denali Commission's Energy and Bulk Fuel Program, which have supported a broader range of energy infrastructure improvements in remote Alaskan communities reliant on microgrids for electricity, including many Alaska Native villages.

What do Indian Affairs, DOE, and FEMA grant award data show regarding funding for tribal microgrids?

Indian Affairs, DOE, and FEMA have provided funding for a variety of microgrid planning, design, and deployment activities in the contiguous United States and Alaska as of fiscal year 2023, according to grant award data obtained from relevant programs in each agency. However, programs track grant award and project data in a variety of ways and have provided relevant funding for different durations of time. Therefore, funding amounts reported by each program are estimates, and funding is not comparable across programs.¹³

- **Indian Affairs.** Indian Affairs' Energy and Mineral Development Program reported having awarded approximately \$3.5 million in grants from fiscal year 2013 through 2023 for tribal microgrid planning and design activities for both new and existing tribal microgrids. Examples of funded activities include feasibility studies, renewable energy assessments, and microgrid design. Additionally, the program reported having awarded approximately \$11 million to study energy generation sources capable of supplying electricity on a community scale, which Indian Affairs officials said could be part of a tribal microgrid or support a tribal microgrid in the future.

Indian Affairs' Tribal Energy Development Capacity Program reported having awarded approximately \$5.2 million in grants from fiscal year 2015 through 2023 for activities related to regulating, managing, and operating a tribal microgrid. Examples of funded activities include exploring or establishing a tribal utility authority and building internal organizational capacity.

Indian Affairs officials told us that, on average, the agency is able to fund 30 percent of applications it receives for its Energy and Mineral Development Program and Tribal Energy Development Capacity Program. The officials said that some unfunded applications have been for tribal microgrid development. For example, according to the officials, from fiscal year 2019 through 2023, the Energy and Mineral Development Program was unable to fund four tribal microgrid development applications valued at almost \$825,000.

- **Department of Energy.** DOE's Office of Indian Energy Policy and Programs reported having awarded approximately \$73.3 million in grants from fiscal year 2018 through 2023 for tribal microgrid technology deployment.¹⁴ Examples of funded activities include deployment of full microgrid systems in the contiguous United States and integration of renewable energy sources into existing microgrids in Alaska Native villages. Office of Indian Energy Policy and Programs officials told us that budget limitations have restricted the office's ability to fund microgrid planning and design activities. Furthermore, a 2023 DOE study analyzed available federal funding sources for energy infrastructure projects for Tribes and concluded that few federal sources exist for funding certain design activities prior to deployment, such as interconnection studies, environmental analyses, and rights-of-way agreements and approvals.¹⁵
- **Federal Emergency Management Agency.** FEMA's Building Resilient Infrastructure and Communities Program reported having selected projects totaling approximately \$23.6 million from fiscal year 2020 through 2022 for a variety of tribal microgrid planning, design, and deployment activities.¹⁶ Examples of projects selected include evaluations of microgrid costs and benefits, engineering and environmental studies, and technology deployment. FEMA officials told us that the program has historically been oversubscribed in terms of applications for funding compared to total funding available, and as a result, some viable tribal microgrid development projects may go unfunded in any given year.

Additionally, FEMA's Pre-Disaster Mitigation Grant Program reported having awarded approximately \$1 million in grants in fiscal year 2019 for two tribal microgrid development projects to deploy supporting microgrid infrastructure such as generators and distribution lines. The Pre-Disaster Mitigation Grant Program was replaced by the Building Resilient Infrastructure and Communities Program in fiscal year 2020, but Congress directed spending to the legacy program for fiscal years 2022 and 2023. No tribal microgrid development projects were funded either year.

In addition to the programs described above, programs introduced in recent legislation such as the IIJA and IRA may also have awarded grants for tribal microgrid development. Due to recent program implementation and the emerging nature of grant awards, we did not include these programs in our evaluation of federal grant funding that has been provided for tribal microgrid development as of fiscal year 2023. Because these programs are not specific to microgrids and many do not have dedicated tribal funding, the degree to which they will contribute to tribal microgrid development is unclear.

What do USDA and Denali Commission grant award data show regarding funding for tribal microgrids?

USDA and the Denali Commission have provided funding for energy infrastructure improvements in remote Alaskan communities reliant on microgrids for electricity.¹⁷ While much of this funding likely supports microgrids, it was not possible to identify the specific amount directly supporting tribal microgrids or microgrids in Alaska Native villages.¹⁸

- **Department of Agriculture.** USDA's High Energy Cost Grant Program reported having awarded approximately \$92.4 million in grants from fiscal year 2013 through 2023 for energy infrastructure improvement projects in remote Alaskan communities with microgrids.¹⁹ Of the \$92.4 million, approximately \$22.5 million was awarded to the Denali Commission as an intermediary for carrying out program objectives in Alaska. USDA officials told us that rising material and labor costs limit the number of projects the program can fund in any given year.²⁰
- **Denali Commission.** According to the Denali Commission's Fiscal Year 2023–2027 Strategic Plan, the agency's Energy and Bulk Fuel Program has provided more than \$390 million for energy-related projects, and more than \$275 million for bulk fuel storage projects since the agency's inception in 1998 through July 2023.

Examples of activities funded by these programs include integration of renewable energy sources, battery energy storage systems, and diesel generators into existing microgrids. The programs have also funded activities that may improve the function and reliability of an existing microgrid but may not be considered microgrid development in a traditional sense. For example, the programs have funded bulk fuel storage and power plant upgrades, repair and replacement of distribution lines, energy efficiency improvements, and connection of microgrid infrastructure between nearby communities to improve regional resilience.

What federal programs offer technical assistance for tribal microgrids?

Solar Panels Helping Power a Tribal Microgrid in California



Source: GAO. | GAO-24-106278

Several programs within Indian Affairs, DOE, and FEMA offer technical assistance that can support tribal microgrid development. Examples of relevant technical assistance include:

Tribal energy development programs

Indian Affairs and DOE offer tribal-specific technical assistance for a variety of energy development matters, including microgrid development.

- **Indian Affairs' Division of Energy and Mineral Development.** The division can assist with activities such as energy resource assessments; project planning; assessing microgrid feasibility; and securing contracts, permits, and financing for microgrids.
- **DOE's Office of Indian Energy Policy and Programs.** The office can assist with activities such as evaluating site-specific electricity generation resources, determining appropriate microgrid sizing for the desired level of resilience, conducting technical and financial analyses that may support microgrid feasibility studies, and assisting with interconnection agreements.

General energy development programs

Some DOE programs and national laboratories offer technical assistance to Tribes and others for a variety of energy development matters, including microgrid development. For example, the Office of Electricity's Energy Storage Program offers technical assistance related to integrating battery energy storage systems into microgrids. Additionally, the National Renewable Energy Laboratory provides technical assistance on behalf of several relevant DOE offices, programs, and initiatives, including:

- **DOE's Communities Local Energy Action Program.** This program is designed to help disadvantaged communities access the economic and environmental benefits of a transition to clean energy. It can assist with activities such as evaluating the suitability of and possible technical specifications for a microgrid, and developing plans to leverage governmental and non-governmental funding and financing opportunities.
- **DOE's Energy Transitions Initiative Partnership Project.** This initiative is designed to help remote and island communities transform their energy systems and increase resilience. It can assist with activities such as assessing a community's electricity needs and analyzing microgrid feasibility and potential impacts.

Grant-specific assistance

Some programs offering grants that can support tribal microgrid development also offer technical assistance to program applicants or awardees. Supported activities vary across programs, but the technical assistance generally functions to support development of strong applications or successful implementation of funded projects. Examples of such programs include Indian Affairs' Tribal Electrification Program, DOE's Energy Efficiency and Conservation Block Grant Program, DOE's Energy Improvements in Rural or Remote Areas Program, and FEMA's Building Resilient Infrastructure and Communities Program.

What barriers do Tribes face in accessing federal assistance for microgrid development?

Tribes we interviewed and other sources discussed long-standing barriers to accessing federal assistance related to administrative capacity, costs, and competition. These barriers, which GAO and others have previously identified, may hinder Tribes' ability to access federal assistance for microgrid development.²¹

- **Limited administrative capacity.** Limited administrative capacity and staffing may make it difficult for Tribes to monitor the multitude of federal financial and technical assistance opportunities that might support microgrid development. For example, tribal officials and a non-federal stakeholder who assists Tribes in identifying and applying for available assistance told us it was challenging to keep up with all the available opportunities—particularly with the new funding made available under the IIJA and IRA. In addition, multiple funding sources may be needed for a single project. This can heighten administrative barriers because each source could require a separate application and may introduce additional reporting requirements.

Additionally, Tribes may not have experienced grant writers or in-house technical expertise to develop lengthy and technically complex applications. Tribal officials told us that microgrid applications are particularly complicated, often requiring technical assistance from outside experts or consultants to provide sufficient detail to make them competitive with other applications. Further, Tribes may not have dedicated grant management personnel, so it can be difficult to meet reporting requirements, if awarded. One tribal official we interviewed said that the amount of work required for some grants makes them not worth applying for unless they also include funding for administrative or management resources.

- **Cost-share requirements and upfront costs.** Federal grants may require an awardee to provide matching funds, known as a cost-share. Cost-share requirements can pose barriers for Tribes applying for grants to support microgrid development, particularly if the Tribe does not have a strong revenue base. In our review of federal agency grant award data, we identified several microgrid projects with costs exceeding \$5 million, which would require more than \$500,000 in matching funds at a 10 percent cost-share rate—a sum that could be challenging for many Tribes to meet. For example, one tribal official told us that their Tribe does not apply for certain federal grants because it does not have the financial resources to provide matching funds.

Additionally, tribal officials we interviewed said that even after receiving a grant, Tribes may have to pay for upfront project costs before being reimbursed by federal agencies. For example, one tribal official explained that their Tribe had to make advance project payments of up to \$300,000 before being reimbursed and said most Tribes likely would not have the available capital to cover such upfront costs.

- **Competition from other parties.** It can be difficult for Tribes to compete for federal assistance against other eligible entities such as states, local governments, and other Tribes. For example, grant award selection criteria may consider how many people in a community could benefit from a project. Tribes may serve fewer individuals than cities and states, making their grant applications for energy projects less competitive than those from a large utility that serves more people. Projects in high-cost areas, such as remote Alaska Native villages, may also score poorly when measured against traditional cost-benefit criteria.

What challenges do Tribes face with deploying and operating microgrids?

A Battery Energy Storage System for a Tribal Microgrid in California



Source: GAO. | GAO-24-106278

Tribes we interviewed and other sources discussed challenges with deploying and operating microgrids related to remoteness, supply chain disruptions, legal requirements, and O&M activities.²²

- **Remoteness.** Tribes located in remote areas can experience difficulties acquiring the materials, equipment, and technical expertise necessary for microgrids. An official from an organization that assists Tribes with renewable energy projects said that finding companies willing to install and maintain microgrids in remote areas is challenging. For example, there may not be hotels or other facilities for workers, and it can be costly and logistically complicated to get materials to the site.
- **Supply chain disruptions.** Tribal officials told us supply chain disruptions that started during the COVID-19 pandemic have persisted, resulting in increased costs and implementation time frames for microgrid development projects. For example, one tribal official told us that supply chain disruptions during the pandemic put the Tribe's microgrid project about a year behind schedule and led to cost overruns. Another tribal official stated that the supply chain disruptions have made it difficult to meet timelines specified in a federal grant the Tribe received for its microgrid project.
- **Legal requirements.** Tribes may need to comply with environmental and other laws as they develop their microgrids. For example, the Clean Air Act, as amended, which regulates air quality and emissions from stationary sources, may require a permit for projects that will result in emissions of certain pollutants. Additionally, the National Environmental Policy Act of 1969, as amended (NEPA), and its implementing regulations require federal agencies to consider and disclose potential environmental impacts of a proposed major federal action. Where federal funding or other federal actions are involved in a Tribe's effort to develop a microgrid, a NEPA environmental analysis may be needed.

Requirements imposed by the Clean Air Act, NEPA, and other environmental laws serve important functions. However, navigating these legal requirements and obtaining necessary permits and approvals can be time consuming and, if delays occur, impact Tribes' ability to deploy a microgrid. Additionally, Tribes may not have the administrative capacity or legal proficiency to navigate relevant legal requirements and, depending on the specific nature of the project and related requirements, compliance costs can be high. DOE officials we interviewed said there is little assistance available to Tribes for environmental analyses, permitting, and other legal requirements, and that additional funding for such activities could be beneficial for Tribes.

- **Operations and maintenance.** We have previously reported on the importance of considering O&M for tribal infrastructure projects.²³ An official from an organization that assists Tribes with renewable energy projects emphasized the importance of planning and budgeting for O&M. Because of the technical complexities of microgrids, Tribes may not have the expertise to operate and maintain the system once it is in place and may need to hire specially trained workers, which can be expensive. For example, one tribal official from a remote Alaska Native village told us the Tribe had to fly in a mechanic from Anchorage to repair a generator. The part needed for the repair cost \$600, but flying in and paying the mechanic cost the Tribe \$10,000. Tribes may have limited funds to pay for O&M, and the rates paid by electricity customers may be insufficient to cover these costs. However, one tribal official told us that the Tribe's microgrid resulted in savings for electricity customers, which the Tribe was able to set aside to apply toward future O&M costs.

What challenges do Tribes face with connecting a microgrid to a traditional grid?

Tribes we interviewed and other sources discussed challenges with the process of connecting a microgrid to a traditional electricity grid, and with negotiating compensation for electricity sold to the grid.

- **Utility interconnection process.** Prior to connecting a tribal microgrid to a traditional electricity grid, a Tribe and utility may conduct an interconnection study and complete an interconnection agreement that facilitates the safe and reliable connection and operation of a Tribe's microgrid to the utility's infrastructure.²⁴ However, the interconnection process can affect project timelines, and Tribes may incur costs for the interconnection study. For example, one tribal official told us that their Tribe's interconnection study cost half a million dollars, which is a significant financial burden for many Tribes, and this official noted that it would be helpful if there were additional funding available for such activities. Tribes may encounter additional costs if the interconnection study determines that changes are needed to the microgrid system. For example, one tribal official described transformer upgrades that the utility required before the Tribe could interconnect its microgrid.
- **Compensation for electricity sold to the grid.** A microgrid may generate more electricity than it consumes. For microgrids connected to a traditional grid, the excess electricity can be fed back into the utility's electricity grid. The rate at which the utility compensates the Tribe for its excess electricity can help offset other microgrid project costs. However, if the rate is less than a Tribe is expecting, the Tribe will have less income to offset the system's costs. In addition, the costs of negotiating a compensation agreement with a utility can be high and even prohibitive for some Tribes. One tribal official told us that their Tribe was able to negotiate a compensation agreement with the utility only because it had a dedicated team working on it and that Tribes with less capacity would likely not be as successful.

What unique challenges do Alaska Native villages face related to microgrids?

Tribes we interviewed and other sources discussed geographical and environmental conditions that can make microgrid development particularly challenging and expensive in Alaska Native villages. Nevertheless, microgrids are the only source of electricity for villages not connected to a traditional electricity grid. Specific challenges include:

- **Access to villages.** Most remote Alaska Native villages are not connected to road systems and are only accessible by air or water, so all project materials must be flown or shipped to these villages. Air delivery is expensive and can be cost-prohibitive. Furthermore, barges can deliver materials only during summer months when waters are not frozen, which can introduce project delays. Additionally, small villages may have limited equipment for installing microgrid projects and may have to delay projects until equipment can be transported to the village. One village we visited had a battery ready for installation but no heavy equipment to move it to its permanent location. The barge delivering the battery had the necessary heavy equipment, but due to the shifting tide, had to depart before permanently positioning the battery and instead left it in a temporary storage location.
- **Complex terrain.** Remote Alaska Native villages can have rugged and complex terrain that can complicate microgrid development. For example, tribal officials from one Alaska Native village said the Tribe had to install wind turbines on tundra that was accessible only by tractor. This resulted in the Tribe having to barge in materials for the turbines, use a tractor to pull the materials on a sled to the installation site, and then construct the turbines at the site.

Wind Turbines Supplying Power to a Microgrid in an Alaska Native Village



Source: GAO. | GAO-24-106278

- **Effects of climate change.** About 85 percent of Alaska’s land area is underlain by permafrost, which is thawing due to climate change. As permafrost thaws, it cannot support the weight of the vegetation and soil above it, which can jeopardize infrastructure necessary for microgrids. For example, many of the utility poles in the Alaska Native villages we visited were no longer upright due to instability of the ground caused by thawing permafrost.
- **Dependence on diesel fuel.** Diesel generators are necessary components of microgrids in many Alaska Native villages because of diesel’s portability and the lack of availability of another fuel source.²⁵ For example, solar and wind are intermittent, and their energy potential varies across the state. However, the cost of diesel in Alaska is high, contributing to some remote communities paying up to four times more for electricity than non-remote communities in Alaska, according to the Lawrence Berkeley National Laboratory. Furthermore, because of the harsh winter conditions and seasonality of barge access to villages, most Alaska Native villages must store diesel fuel for their generators in bulk. However, many villages have aging bulk fuel storage infrastructure that needs repair or replacement, thereby adding to the costs of providing electricity in Alaska Native villages.²⁶

Figure 5: Photos of Microgrid Challenges in Alaska Native Villages



a. Aerial view of wind turbines supplying power to a microgrid in a remote Alaska Native village. b. Sled used to pull wind turbine components over the tundra to be assembled for a microgrid in a remote Alaska Native village. c. Base of a wind turbine in a remote Alaska Native village that is no longer flush with the ground due to thawing permafrost. d. Aging bulk fuel storage infrastructure in a remote Alaska Native village.

Source: GAO. | GAO-24-106278

What actions has the federal government taken that could foster tribal microgrid development?

In addition to providing financial and technical assistance, the federal government has taken a number of recent actions that could foster tribal microgrid development. These actions include cross-cutting, strategic initiatives designed to address barriers that Tribes face with accessing federal assistance and challenges with energy development efforts, more broadly. These actions have significant potential, but many were only recently implemented and are not

specific to microgrids. As a result, it is too soon to assess the extent to which these efforts will successfully address the barriers and challenges that Tribes face with microgrid development.

- **Executive Order 14112.** In December 2023, Executive Order 14112, *Reforming Federal Funding and Support for Tribal Nations To Better Embrace Our Trust Responsibilities and Promote the Next Era of Tribal Self-Determination*, directed federal agencies to take certain actions to increase the accessibility, equity, flexibility, and utility of relevant programs.²⁷ For example, where consistent with applicable laws, agencies are to reduce administrative burdens associated with program applications, eliminate cost-share requirements, establish tribal set-asides or other measures to prioritize funding to Tribes, and remove unnecessary limitations on tribal spending—such as limitations on costs associated with administration, personnel, and training. As noted above, we have previously reported on many of the barriers to accessing federal assistance that this order seeks to address.²⁸
- **Indian Affairs initiative to understand unmet tribal energy needs.** In November 2022, Indian Affairs launched its Renewable Energy Accelerated Deployment Initiative for Indian Country to better understand challenges Tribes face with energy development efforts, including microgrids, and how the federal government could better support such efforts. In a February 2024 draft report, Indian Affairs described its findings and recommendations for actions that Indian Affairs and other federal agencies could take to help address identified challenges.²⁹ Draft recommendations include investments and partnerships to strengthen tribal capacity, increased technical assistance and educational opportunities, and enhanced interagency and tribal coordination. As of June 2024, Indian Affairs had not released its final report, but according to the draft report, the agency expects to implement the report's recommendations throughout fiscal year 2024.
- **Program features to reduce financial burdens.** Some programs have features that seek to reduce the financial burden to Tribes pursuing energy development projects, including microgrids. For example, certain programs—such as Indian Affairs' Tribal Electrification Program and DOE's Energy Efficiency and Conservation Block Grant Program—do not require a cost-share. Also, the Secretary of Energy may reduce a Tribe's required cost-share for Office of Indian Energy Policy and Programs grants under certain circumstances.³⁰ Additionally, USDA's Powering Affordable Clean Energy Program will forgive up to 60 percent of loans for projects that, among others, serve areas with tribal populations of 60 percent or greater, or are owned by a tribal government.
- **Tax credit benefits.** The IRA amended the Internal Revenue Code to allow Tribes to monetize the value of certain federal clean energy development tax credits for which Tribes, as tax-exempt entities, were previously ineligible. Specifically, tribal governments may now receive the value of the tax credits for qualifying projects in the form of a direct payment from the Internal Revenue Service. This type of payment can help Tribes offset microgrid project costs and may minimize the need for complicated financing arrangements that were previously necessary to use the credits.
- **Searchable repository of federal assistance opportunities.** The White House Council on Native American Affairs launched an online database to serve as a searchable repository of information for all available federal grants, technical assistance, financing options, and other forms of assistance for which Tribes are eligible. This database is part of the council's larger

Access to Capital in Indian Country initiative aimed at increasing tribal awareness of, access to, and use of federal assistance.

- **Technical assistance for grant applications.** In April 2023, the Environmental Protection Agency—in partnership with DOE—announced award selections for \$177 million in funding to create 16 Environmental Justice Thriving Communities Technical Assistance Centers. These centers provide direct technical assistance, training, and capacity-building support to underserved communities, including Tribes, to advance environmental and energy justice priorities. More specifically, the centers can assist Tribes with navigating federal, state, and private grant application systems; writing strong grant proposals; and effectively managing grant funding, among other services. Centers are scheduled to operate from October 2023 to October 2028.
- **Microgrid research and development.** In July 2023, DOE issued a funding opportunity announcement for research and development aimed at addressing a broad array of challenges that Tribes and underserved populations in remote and electrically islanded communities face with microgrid development. A stated goal of the effort is to decrease microgrid capital costs by 15 percent by 2031 by identifying microgrid technology that can be replicated across remote and islanded communities, according to DOE. Additionally, the effort is investigating ways to grow tribal capacity for developing and operating microgrids, including through education, training, and apprentice programs.

Agency Comments

We provided a draft of this report to Indian Affairs, DOE, FEMA, and USDA for review and comment. DOE and FEMA provided technical comments, which we incorporated, as appropriate.

How GAO Did This Study

To describe federal assistance that is available to support tribal microgrid development, we reviewed relevant statutes and regulations, agency websites, program documentation, and our prior work to identify key agencies, programs, and types of assistance available to Tribes.³¹ We identified Indian Affairs, DOE, FEMA, USDA, and the Denali Commission as the key federal agencies most likely to provide assistance for tribal microgrid development—both historically and as potential future sources of such assistance. We focused on these five agencies because they have programs dedicated to energy development or disaster resilience—a key benefit that microgrids offer—that are available to Tribes in the contiguous United States and Alaska.

We interviewed officials in Indian Affairs, DOE, FEMA, and USDA to learn about the various types of assistance that may be available, including grants, loan support, and technical assistance. Within these four agencies, we identified key programs that have a history of providing funding for tribal microgrid development and obtained information on each program’s relevant grant awards.³² We assessed the reliability of the grant award data by interviewing knowledgeable agency officials and completing manual testing to check for missing values, outliers, or other obvious errors. Based on our assessment, we determined the data were sufficiently reliable for the purposes of describing each agency’s individual contributions to supporting tribal microgrid development. We obtained publicly available data for energy-related projects funded by the Denali Commission and determined the data were also sufficient for those purposes.

In addition to the key energy and disaster resilience programs in Indian Affairs, DOE, FEMA, USDA, and the Denali Commission that have a history of providing funding for tribal microgrid development, we identified other programs in these

and other federal agencies that may support such efforts. For example, we identified a number of relevant energy development programs created by the IIJA and IRA with financial assistance opportunities open to Tribes. Additionally, we identified federal programs with missions other than energy and disaster resilience that may offer relevant assistance, such as those focused on environmental protection or housing development. Examples of such programs include the Environmental Protection Agency's Greenhouse Gas Reduction Fund and the Department of Housing and Urban Development's Indian Community Development Block Grant Program.

To describe challenges that Tribes face with microgrid development—including barriers to accessing federal assistance and other challenges—we conducted interviews with 10 Tribes selected because they were in various locations of the United States and had received some form of relevant assistance from Indian Affairs or DOE.³³ We also interviewed Indian Affairs, DOE, FEMA, and USDA officials and seven non-federal stakeholders.³⁴ We selected this nongeneralizable sample of Tribes and stakeholders to gather a range of views. We based our selection of non-federal stakeholder interviewees on factors such as familiarity with different aspects of tribal microgrids and familiarity with the different regions of the United States.

We also attended the 2022 and 2023 DOE Office of Indian Energy Policy and Programs annual program review where more than a dozen grant recipients presented information about their tribal microgrids. The presentations included challenges the Tribes faced with deploying their microgrids and how they addressed those challenges. We also conducted site visits in Alaska and California, where we met with tribal officials and non-federal stakeholders and observed tribal microgrids in operation and under development. While we cannot generalize our findings, we used information obtained from these interviews, conferences, and site visits to provide illustrative examples about some of the challenges selected Tribes have faced. We also obtained information on challenges by reviewing our prior work and other relevant federal reports and agency documents, and by conducting internet and literature searches.

To describe the steps the federal government has taken to address challenges that Tribes face with microgrid development, we leveraged discussions with federal agency officials to learn about recent efforts that might help address challenges we identified through interviews with selected Tribes and non-federal stakeholders and through other methods. We evaluated certain characteristics of programs created by the IIJA and IRA, as well as other legislation, to determine whether there was potential to address known challenges. We also monitored for large-scale federal actions—such as executive orders—that could be relevant to tribal microgrid development.

To estimate the number of Tribes with microgrids, we reviewed federal grant award data compiled by the key federal agencies and interviewed relevant federal agencies and stakeholders. We also conducted internet and literature searches.

We conducted this performance audit from October 2022 through July 2024 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

List of Addressees

The Honorable Raúl M. Grijalva
Ranking Member
Committee on Natural Resources
House of Representatives

We are sending copies of this report to the appropriate congressional committee, the Secretary of Agriculture, Secretary of Energy, Secretary of Homeland Security, and Secretary of the Interior. In addition, the report is available at no charge on the GAO website at <https://www.gao.gov>.

GAO Contact Information

For more information, contact: Anna Maria Ortiz, Director, Natural Resources and Environment, OrtizA@gao.gov, (202) 512-3841.

Sarah Kaczmarek, Acting Managing Director, Public Affairs, KaczmarekS@gao.gov, (202) 512-4800.

A. Nicole Clowers, Managing Director, Congressional Relations, ClowersA@gao.gov, (202) 512-4400.

Staff Acknowledgments: Paige Gilbreath (Assistant Director), Breanna Trexler (Analyst-in-Charge), and Grace Haskin made key contributions to this report. Also contributing to the report were Adrian Apodaca, Claudia Becker, Estelle Bowman, Colleen Candrl, Jean Cook, John Delicath, George Depaoli, Elizabeth Dretsch, Philip Farah, Claudia Hadjigeorgiou, Susan Irving, Rebecca Sero, and Jack Wang.

Connect with GAO on [Facebook](#), [Flickr](#), [Twitter](#), and [YouTube](#). Subscribe to our [RSS Feeds](#) or [Email Updates](#). Listen to our [Podcasts](#).

Visit GAO on the web at <https://www.gao.gov>.

This work of the United States may include copyrighted material, details at <https://www.gao.gov/copyright>.

Appendix I

Table 1: Selected Financial Assistance Opportunities Offered by the Department of the Interior’s Indian Affairs, Department of Energy (DOE), Federal Emergency Management Agency (FEMA), Department of Agriculture (USDA), and Denali Commission That Could Support Tribal Microgrid Development

Program	Type of assistance ^a	Program description and examples of tribal microgrid development activities that could be supported ^b
Indian Affairs’ Energy and Mineral Development Program ♦	<i>Competitive grants</i>	Pre-existing program designed to help Tribes and tribal energy development organizations evaluate the energy and mineral resource potential on Indian lands. Could fund microgrid planning and design activities such as feasibility studies.
Indian Affairs’ Tribal Energy Development Capacity Program ♦	<i>Competitive grants</i>	Pre-existing program designed to help Tribes and tribal energy development organizations increase their technical capacity to manage and regulate their energy resources. Could fund activities to explore the regulation, management, and operation of a microgrid.
Indian Affairs’ Indian Loan Guarantee and Insurance Program ♦	<i>Loan guarantees</i>	Pre-existing program designed to help Tribes, their members, and certain businesses owned by Tribes and their members overcome challenges to obtaining conventional financing and secure reasonable interest rates. Could fund microgrid technology deployment.
Indian Affairs’ Tribal Electrification Program ♦	<i>Competitive grants</i>	New program created in the IRA to help Tribes and certain tribal organizations bring zero-emissions power to unelectrified and electrified tribal homes. Could fund microgrid planning and technology deployment. The IRA appropriated \$145.5 million in funding for the program to remain available until September 30, 2031.

DOE's Office of Indian Energy Policy and Programs ♦	<i>Competitive grants</i>	Pre-existing program designed to, among other things, promote tribal energy development, efficiency, and use; reduce or stabilize tribal energy costs; and enhance tribal energy infrastructure. The program offers annual funding opportunities for various topics such as clean energy technology deployment on tribal lands and powering unelectrified tribal buildings. Could fund microgrid technology deployment.
DOE's Energy Efficiency and Conservation Block Grant Program	<i>Competitive and non-competitive grants</i>	Pre-existing program expanded in the IIJA that seeks to reduce energy use and fossil fuel emissions and improve energy efficiency. Could fund microgrid technology deployment. The IIJA appropriated \$550 million in funding for the program beginning in 2022 to remain available until expended.
DOE's Energy Improvement in Rural and Remote Areas Program	<i>Competitive grants</i>	New program created in the IIJA to improve energy resilience, safety, reliability, and availability in rural and remote areas, as well as environmental protection from adverse impacts of energy generation. Could fund microgrid technology deployment. The IIJA appropriated \$1 billion in funding for the program across 5 years.
DOE's Grid Resilience State/Tribal Formula Grant Program ♦	<i>Non-competitive grants</i>	New program created in the IIJA to improve resilience of the electricity grid to disruptive events, such as extreme weather and wildfires. The program distributes funds by formula to states and Tribes, which can then make grants to eligible entities, such as electric grid operators or electricity generators. Could fund activities such as microgrid feasibility studies or technology deployment. The IIJA appropriated \$2.5 billion in funding for the program across 5 years.
DOE's Grid Resilience and Innovation Partnerships Program	<i>Competitive grants</i>	Program includes two new programs created in the IIJA and one pre-existing program expanded in the IIJA that together seek to enhance grid flexibility and improve resilience and reliability, among other things. Could fund microgrid technology deployment. The IIJA collectively appropriated \$13 billion in funding for the three separate programs across 5 years.
DOE's Tribal Energy Finance Program ♦	<i>Loan guarantees and direct lending</i>	Program includes one pre-existing program—the Tribal Energy Loan Guarantee Program—and one new program—the Tribal Energy Loan Program—designed to support Tribes and tribal energy development organizations with energy development efforts. Could fund microgrid technology deployment.
FEMA's Building Resilient Infrastructure and Communities ♦	<i>Competitive grants</i>	Pre-existing program that seeks to assist in the implementation of cost-effective pre-disaster hazard mitigation measures designed to reduce injuries, loss of life, and damage and destruction of property. Could fund activities such as microgrid design and deployment. The IIJA appropriated \$1 billion in funding for this program over 5 years. For fiscal year 2023, FEMA set aside \$50 million of available funding for Tribes.
FEMA's Hazard Mitigation Grant Program	<i>Non-competitive grants</i>	Pre-existing program that seeks to reduce the risk of, or increase resilience to, future damage, hardship, loss, or suffering in any area affected by a major disaster. Funding is available after a presidentially declared disaster or Fire Management Assistance Grant declaration and could fund activities such as purchasing and installing backup generators and other microgrid components.
FEMA's Pre-Disaster Mitigation Grant Program ^c	<i>Non-competitive grants</i>	Pre-existing program that makes federal funds available to assist in the implementation of cost-effective pre-disaster hazard mitigation measures designed to reduce injuries, loss of life, and damage and destruction of property. As of fiscal year 2023, program funding was available only for specific projects identified by Congress. Microgrids are a potential project to which Congress could direct funding.
FEMA's Safeguarding Tomorrow Revolving Loan Fund Program	<i>Capitalization grants</i>	New program created by the STORM Act and funded by the IIJA that awards capitalization grants to eligible entities to establish revolving loan funds that can provide funding assistance to local governments to carry out certain projects to reduce disaster risks. States, and tribal governments that have received a major disaster declaration, are eligible for this funding. Could fund activities such as microgrid design and deployment. The IIJA appropriated \$500 million in funding for the program over 5 years.
USDA's High Energy Cost Grant Program	<i>Competitive grants</i>	Pre-existing program to assure access to adequate and reliable energy services for people in extremely high energy cost communities with average home energy costs over 275 percent of the national average. Could fund activities such as replacing generators or integrating renewable energy sources into existing microgrids in Alaska.
USDA's Electric Infrastructure Loan and Loan Guarantee Program	<i>Loan guarantees and direct lending</i>	Pre-existing program that seeks to finance the construction of electric distribution, transmission, and generation facilities and improve electric service in rural areas. Could fund activities such as microgrid technology deployment, including enhancements to existing microgrids.

USDA's Empowering Rural America Program	<i>Competitive grants and direct lending</i>	New program created by the IRA that seeks to support the long-term resiliency, reliability, and affordability of rural electric systems and transition to clean energy. Could fund activities such as microgrid technology deployment. The IRA appropriated \$9.7 billion in funding for this program, which is to be disbursed no later than September 30, 2031. Program officials said that all available funds will be awarded based on applications received in the initial application period that closed September 2023.
USDA's Powering Affordable Clean Energy Program	<i>Direct lending</i>	New program created by the IRA that provides loans for electric generation from renewable energy resources for resale to rural and nonrural residents. The program offers partial loan forgiveness under certain circumstances. Could fund activities such as microgrid feasibility studies, design and engineering, interconnection, and technology deployment. The IRA appropriated \$1 billion in funding for this program, which is to be disbursed no later than September 30, 2031. Program officials said that all available funds will be awarded based on applications received in the initial application period that closed September 2023.
USDA's Rural Energy Pilot Program	<i>Competitive grants</i>	New program created by the Consolidated Appropriations Act, 2021 to provide financial assistance for rural communities to further develop renewable energy. ^d Tribes are eligible recipients if part of an eligible rural energy community partnership. Could fund microgrid planning and technology deployment. The act appropriated \$10 million in funding for this program to remain available until expended. Program officials said that all available funds have been awarded.
Denali Commission's Energy and Bulk Fuel Program	<i>Competitive grants</i>	Pre-existing program that seeks to improve the affordability, safety, and reliability of fuel storage and energy production in Alaska. Could fund activities such as integrating renewable energy generation sources into existing microgrids and upgrading bulk fuel storage facilities. The IJJA appropriated \$75 million in funding to the Denali Commission and the Commission determined it would allocate \$1 million per year for five years towards energy-related projects.

Source: GAO analysis of laws, regulations, and Indian Affairs, DOE, FEMA, USDA, and Denali Commission documentation and interviews. | GAO-24-106278

Legend:

◆ = Program is specifically designed to assist Tribes, their members, and/or other tribal entities, or includes dedicated, set-aside funding for tribal entities. For our purposes here, tribal entities include federally recognized Tribes and, depending on the program, may also include entities such as tribally owned nonprofits and businesses, tribal energy development organizations, and Alaska Native regional and village corporations, among others. IRA = An Act to provide for reconciliation pursuant to Title I of S. Con. Res. 14, Pub. L. No. 117-169, 136 Stat. 1818 (2022), commonly known as the Inflation Reduction Act of 2022.

IJJA = Infrastructure Investment and Jobs Act, Pub. L. No. 117-58, 135 Stat. 429 (2021).

STORM Act = Safeguarding Tomorrow through Ongoing Risk Mitigation Act, Pub. L. 116-284, 134 Stat. 4869 (2021).

Note: We define "tribal microgrids" as microgrids that are developed by or on behalf of a Tribe. For the purposes of this report, we use the term "Tribes" to refer to federally recognized Indian Tribes. Tribal microgrid development includes relevant planning, design, and deployment activities for implementing new microgrids or enhancing existing microgrids.

^aWe include the types of financial assistance offered by a program that we determined were most likely to be relevant to tribal microgrid development. This may not include all forms of financial assistance offered by a program.

^bProgram descriptions are meant to be illustrative and do not include all activities supported or program criteria. Each program has specific eligibility and other requirements that applicants must meet to qualify for the program, not all of which are reflected above. Pre-existing programs are those that were created prior to 2021, whereas new programs are those that were created in 2021 or thereafter.

^cFEMA's Building Resilient Infrastructure and Communities Program replaced the Pre-Disaster Mitigation Grant Program in fiscal year 2020.

^dConsolidated Appropriations Act, 2021, Pub. L. No. 116-260, 134 Stat. 1182 (2020).

Endnotes

¹For the purposes of this report, we use the term "Tribes" to refer to federally recognized Indian Tribes. Tribes use a variety of terms when referring to themselves, such as band, pueblo, and Native village. Federally recognized Tribes have a government-to-government relationship with the United States and are eligible to receive certain protections, services, and benefits by virtue of their status as Indian Tribes. The Secretary of the Interior is required by law to annually publish a list of all Tribes recognized by the Secretary. As of January 8, 2024, there were 574 federally recognized Tribes in the contiguous United States and Alaska. 89 Fed. Reg. 944 (Jan. 8, 2024). Those individuals who are enrolled in a Tribe are typically referred to as members or citizens.

²For the purposes of this report, we define "tribal microgrids" as microgrids that are developed by or on behalf of a federally recognized Tribe. As described in this report, tribal microgrid development includes relevant planning, design, and deployment activities for implementing new microgrids or enhancing existing microgrids. A microgrid need not be fully implemented to be considered a tribal microgrid for our purposes. The number of tribal microgrids presented in this report is an estimate based on our review of federal grant award information and other sources. The actual number of Tribes with or pursuing microgrids may be larger than our estimate.

³For example, a February 2024 draft Indian Affairs report documenting tribal outreach efforts identified a moderate level of interest among Tribes for pursuing microgrid development. Additionally, an August 2023 DOE report noted that the agency's Office of Indian Energy Policy and Programs has seen an increase in grant applications for tribal microgrid development. Furthermore, in an August 2020 survey conducted by the Indian Country Energy and Infrastructure Working

Group—which is composed of tribal leaders and works collaboratively with DOE’s Office of Indian Energy Policy and Programs to inform the office’s program and policy initiatives—45 to 59 percent of survey respondents indicated a desire to pursue microgrids.

⁴For the purposes of this report, we use the term “Alaska Native village” to refer to Alaskan communities that are home to at least one federally recognized Tribe. As of January 2024, there were 227 federally recognized Tribes within the state of Alaska. 89 Fed. Reg. 944 (Jan. 8, 2024). Most of the Tribes are located in remote communities. Some communities are home to more than one federally recognized Tribe.

⁵GAO, *Tribal Economic Development: Action Is Needed to Better Understand the Extent of Federal Support*, GAO-22-105215 (Washington, D.C.: Aug. 30, 2022).

⁶See GAO-22-105215. Loans may be difficult to obtain because, for example, a Tribe may not have established relationships with commercial lenders or the Tribe’s revenue base may be regarded as insufficient to repay the loan. Additionally, some lenders may be reluctant to finance microgrids because some include relatively new technology and may be seen as a risky investment.

⁷See the “How GAO Did This Study” section for how we identified the programs discussed in this report.

⁸Infrastructure Investment and Jobs Act, Pub. L. No. 117-58, 135 Stat. 429 (2021); An Act to provide for reconciliation pursuant to Title I of S. Con. Res. 14, Pub. L. No. 117-169, 136 Stat. 1818 (2022), commonly known as the Inflation Reduction Act of 2022, or IRA.

⁹Federal loan guarantees are loans or other advances of credit made to a borrower by a participating lending institution where the U.S. government guarantees payment of all or part of the principal amount of the loan, and often interest, in the event the borrower defaults.

¹⁰Indian Affairs, DOE, and USDA have loan guarantee or direct lending programs that could be used for tribal microgrid development. Indian Affairs officials told us that, as of May 2024, its Indian Loan Guarantee and Insurance Program had not been used for such activities. DOE’s Tribal Energy Finance Program announced a conditional loan guarantee approval for the program’s first tribal microgrid development project in March 2024, but as of June 2024, the loan had not met conditions for closing and loan funds had not been disbursed, according to program officials. USDA’s Electric Infrastructure Loan and Loan Guarantee Program has financed energy infrastructure projects to deliver traditional electric service to tribal communities, but has not generally funded modern tribal microgrids powered by renewable energy sources as of May 2024, according to USDA officials.

¹¹Eligible communities under USDA’s High Energy Cost Grant Program are those where the average home energy costs exceed 275 percent of the national average under specified benchmarks. While this does not exclusively pertain to remote Alaskan communities, program officials told us that, as a practical matter, that is where the majority of funding is deployed.

¹²The Denali Commission Act of 1998 established the Denali Commission as a federal agency with the statutory purpose of providing to rural areas of Alaska job training and economic development services, power generation and transmission facilities, modern communication systems, water and sewer systems, and other infrastructure. Denali Commission Act of 1998, Pub. L. No. 105-277, div. C, tit. III, 112 Stat. 2681.

¹³Because of the breadth of activities associated with microgrid development and unique program missions, agencies track and report projects in a variety of ways, and program officials said they used professional judgment in identifying projects that relate to tribal microgrid development. We provide as much federal grant award data as were available from fiscal years 2013 through 2023, as reported by the relevant programs.

¹⁴As of April 2024, approximately \$35.9 million of the \$73.3 million reported by DOE was for awards under negotiation. According to DOE officials, the \$35.9 million value represents the total amount of requested funding, which may differ from the actual amount awarded after negotiations are complete.

¹⁵Department of Energy, *Tribal Electricity Access and Reliability*, EXEC-2023-000952, (Washington, D.C.: Aug. 2023).

¹⁶According to program officials, fiscal year 2023 projects were still under review as of June 2024, with selections expected to take place later in 2024. According to FEMA, selected projects have met the basic eligibility requirements for the program and entered the next phase of the awards review process, which includes programmatic reviews before final funding decisions are made. As of April 2024, approximately \$12.6 million of the \$23.6 million was still under review with the agency and had not yet been awarded. Approximately \$11 million had been awarded.

¹⁷We obtained federal grant award data from USDA for fiscal years 2013 through 2023. USDA officials told us they used professional judgment in identifying projects that relate to tribal microgrid development. For the Denali Commission, we obtained publicly available funding data for the agency’s Energy and Bulk Fuel Program, which were available in summary form since the program’s inception in 1998 and could not be broken out by fiscal year.

¹⁸Some of the funding was provided to intermediary organizations serving remote Alaskan communities with microgrids.

¹⁹Additionally, the program reported having funded one tribal microgrid project in the contiguous United States and one tribal microgrid project in the Federated States of Micronesia, totaling approximately \$3.2 million.

²⁰USDA's High Energy Cost Grant Program's annual appropriation was \$10 million for fiscal years 2014 through 2023 and \$8 million for fiscal year 2024.

²¹GAO, *Justice40: Additional Efforts Needed to Improve Tribal Applicants' Access to Federal Programs Under Environmental Justice Initiative*, [GAO-24-106511](#) (Washington, D.C.: Apr. 10, 2024); *COVID-19 Relief Funds: Lessons Learned Could Improve Future Distribution of Federal Emergency Relief to Tribal Recipients*, [GAO-23-105473](#) (Washington, D.C.: Dec. 15, 2022); *Tribal Funding: Actions Needed to Improve Information on Federal Funds That Benefit Native Americans*, [GAO-22-104602](#) (Washington, D.C.: May 19, 2022); *Alaska Native Issues: Federal Agencies Could Enhance Support for Native Village Efforts to Address Environmental Threats*, [GAO-22-104241](#) (Washington, D.C.: May 18, 2022); *EPA Grants to Tribes: Additional Actions Needed to Effectively Address Tribal Environmental Concerns*, [GAO-21-150](#) (Washington, D.C.: Oct. 20, 2020).

²²We interviewed officials from 10 Tribes, four federal agencies, and seven non-federal stakeholder organizations (e.g., microgrid consultants and project managers working with Tribes). We used a semi-structured interview approach, which did not allow us to count the number of interviewees reporting a given challenge.

²³GAO, *Drinking Water and Wastewater Infrastructure: Opportunities Exist to Enhance Federal Agency Needs Assessment and Coordination on Tribal Projects*, [GAO-18-309](#) (Washington, D.C.: May 15, 2018).

²⁴Challenges with interconnection primarily affect Tribes in the contiguous United States because most microgrids in Alaska Native villages are islanded, meaning they are not connected to a utility grid.

²⁵Alaska Native villages rely on diesel generators for their microgrids due to their remote locations, challenging terrain, harsh weather conditions, and limited access to alternative energy sources.

²⁶Many of Alaska's microgrids are aging, with components—such as diesel generators, bulk fuel storage, and distribution infrastructure—in need of repair or replacement. Additionally, systems that use older technology may not be sophisticated enough to allow for renewable integration, which can make enhancement of these microgrids more challenging and costly.

²⁷Exec. Order No. 14112, *Reforming Federal Funding and Support for Tribal Nations To Better Embrace Our Trust Responsibilities and Promote the Next Era of Tribal Self-Determination*, 88 Fed Reg. 86021 (Dec. 6, 2023).

²⁸See [GAO-24-106511](#); [GAO-23-105473](#); [GAO-22-104602](#); [GAO-22-104241](#); [GAO-21-150](#).

²⁹Department of the Interior, Bureau of Indian Affairs, *Draft Renewable Energy Accelerated Deployment Initiative for Indian Country*, IA00014504, (Washington, D.C.: Feb. 2024)

³⁰The Energy Act of 2020 authorized the Secretary of Energy to reduce any applicable cost share required of a Tribe, intertribal organization, or tribal energy development organization to receive a grant made available by the Office of Indian Energy Policy and Programs to not less than 10 percent if certain criteria are met, including financial need.

³¹See [GAO-22-105215](#).

³²The Indian Affairs, DOE, FEMA, and USDA programs that have a history of providing funding for tribal microgrid development include (1) Indian Affairs' Energy and Mineral Development Program, (2) Indian Affairs' Tribal Energy Development Capacity Program, (3) DOE's Office of Indian Energy Policy and Programs, (4) FEMA's Building Resilient Infrastructure and Communities Program, (5) FEMA's Pre-Disaster Mitigation Grant Program, and (6) USDA's High Energy Cost Grant Program.

³³Specifically, we interviewed the following Tribes: (1) Bad River Band of Lake Superior Tribe of Chippewa Indians, (2) Native Village of Kipnuk, (3) Organized Village of Kwethluk, (4) Pala Band of Mission Indians, (5) Pechanga Band of Indians, (6) Rincon Band of Luiseño Indians, (7) Rosebud Sioux Tribe, (8) San Pasqual Band of Mission Indians, (9) Seminole Tribe of Florida, and (10) Village of Chefornak.

³⁴Specifically, we interviewed the following non-federal stakeholders: (1) Alaska Energy Authority, (2) Alaska Village Electric Cooperative, (3) FESCO Energy, (4) GRID Alternatives, (5) Nuvista Light and Electric Cooperative, (6) Prosper Sustainably, and (7) San Diego Gas & Electric Company.