A Study of Technical Assistance on Alaska Energy Projects

1990-2021

Author:

Rich Stromberg, restromberg@alaska.edu

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Acronyms

ACEP   *Alaska Center for Energy and Power*
AEA   *Alaska Energy Authority*
ANCSA   *Alaska Native Claims Settlement Act*
ANTHC   *Alaska Native Tribal Health Consortium*
AP&T   *Alaska Power and Telephone*
ARUC   *Alaska Rural Utility Collaborative*
AVEC   *Alaska Village Electric Cooperative*
AVTEC   *Alaska Vocational Technical Center*
DCRA   *Division of Community and Regional Affairs*
DOE   *U.S. Dept. of Energy*
ETIPP   *Energy Transitions Initiative Partnership Project*
NREL   *National Renewable Energy Laboratory*
NANA   *NANA Regional Corporation*
O&M   *Operations and maintenance*
PCE   *Power Cost Equalization program*
RACEE   *Remote Alaska Communities Energy Efficiency Competition*
REAP   *Renewable Energy Alaska Project or USDA Rural Energy for America Program*
RUBA   *Rural Utility Business Advisor Program*
RurAlCAP   *Rural Alaska Community Action Program*
START   *Strategic Technical Assistance Response Team*
SWAMC   *Southwest Alaska Municipal Conference*
TA   *Technical assistance*
USDA   *U.S. Dept. of Agriculture*
Y-K   *Yukon-Kuskokwim*

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Executive Summary

This study is a compilation of one-on-one interviews with people who have been involved in energy projects across the state over the past three decades. The interviewees are composed of funders, technical providers and recipients of technical assistance on those projects. The intended audience for this study are those familiar with Alaska energy systems who influence funding, policy and implementation of technical assistance programs at the federal, state and institutional levels whether they do so internally within these organizations or as potential beneficiaries of these programs.

Demographics
While many of the interviewees reside in southcentral Alaska, residents of 18 communities across the state are represented in this study. One third of respondents are female and four respondents identify as Alaska Native. The respondents from 30 different organizations and were involved in technical assistance projects in at least 49 Alaskan communities.

Defining Technical Assistance
The exact definition of what is and is not technical assistance has been left up to the interviewees. While some focus on the engineering, design and technology related to energy systems, others concentrate on energy literacy, local capacity to operate and maintain equipment, administration and governance of local utilities, energy efficiency and energy planning. The term "technical" in these contexts refers to both the equipment technology of energy systems as well as the technicalities of specific roles and responsibilities needed to support these systems in each community.

Capacity building and ongoing support
Capacity building is needed on a broad array of skills, from maintenance on power generating equipment, HVAC systems in public buildings and water/wastewater infrastructure to administrative, clerical and governance experience at utilities, school districts and village governments. Administrative and clerical assistance is commonly needed with in-person or live online coaching for QuickBooks and PCE reporting. Additional coaching to help communities maximize PCE benefits is also an area of focus. Technical assistance providers also mention the need for utility boards to learn basic oversight responsibilities and finance options.
Strategic energy planning is also a key function of early engagement with weatherization projects being a typical second step. Respondents commented that the success of these early steps is highly dependent on the presence of dedicated project managers at the TA-providing agency as well as one or more local champions to put these programs into action in each community.

Funding and varying programs

Funding levels for technical assistance programs have produced many successful projects but even higher levels of funding could be put to effective use. Consistency of funding levels and programs is an issue raised by many who state that widely varying funding levels from year to year make it difficult to plan projects that can take years to develop. Similarly, having consistent programs and agency staffing is preferred to cycling through a series of changing programs and provider agencies that creates challenges for applicant communities to navigate. While many programs focus on funding for public projects, many interviewees want to see funding that directly aids individual homeowners. Another key point brought up by interview respondents is that some programs allocate larger sums of money to pay agency personnel than the amount that is actually spent on local community improvements. Some funding programs are very specific in their approach while more general funds without restrictions can be helpful for communities that have broad needs for assistance. The Denali Commission's role in the state and their ability to preserve funding from a variety of sources is a highlight mentioned by almost every interviewee without prompting.

One suggestion was made for a hotline or a staffed web site where anyone could ask questions about basic assistance and get guidance on how to initiate technical assistance with a range of agencies. In an environment with a succession of differing state and federal programs and funding levels, having a consistent initial point of contact that is up to date on current offerings could be very helpful for communities seeking technical assistance.

Agency leadership

Leadership is needed in all agencies providing or influencing technical assistance. Policies need to be well articulated at each agency describing what they provide and how they will execute on those policies. Agencies need to be staffed up to support and leverage the large amounts of state and federal dollars available.

Bridging the cultural gaps

A gap this research identified is the technical knowledge, familiarity and language of national labs and academic-focused experts versus the perspective and knowledge of local leaders and stakeholders which is centered on local constraints and needs. Time and personal effort are needed to bridge this gap in both directions. Sufficient time is needed to capture and understand local needs. We may show up ready to talk about the local microgrid when water security might be a more urgent concern for the community. In some cases, visiting experts would do best to recognize local concerns and priorities and help identify alternate resources for that community when appropriate.

Learning how to communicate science to non-science stakeholders is a critical skill for TA providers. Also critical is a first-hand understanding of life in remote villages and how sustainability must include compatibility with the individual local practices and customs in a subsistence culture. Cultural training is recommended for technical assistance providers whether they be in-state private contractors, university researchers or national lab employees.

Policy

Multiple respondents believe that Alaska needs a more comprehensive energy policy articulated around energy efficiency, affordability, security and renewables. Building codes that require greater efficiency are seen as helping homeowners and renters to achieve energy savings. Policies that promote local hiring on energy projects would create greater value for communities. Such policies need to identify specific target skills and funding for training and certifications.

One respondent raised the question of how we as a state value the continued existence of traditional and subsistence lifestyles. Making funding decisions with cost-benefit methods exclusive to metrics that we know how to assign costs ignores important intangibles. The respondent also challenged our varying cost of energy across the state compared with Canada's approach of charging the same rate to all communities across provinces regardless of whether they have access to hydroelectric power, coal plants or diesel generators.

Strengths Weaknesses Opportunities & Threats

Strength
S
- Denali Commission
- DOE Indian Energy TA
- USDA Rural Energy
- State Funding
- In-state experienced resources

Weakness
W
- Continuous need for funding
- High costs
- Inconsistent funding year to year
- Changing priorities with new administrations
- Stretched capacity of TA providers

Opportunity
O
- Replicate best practices from water/sewer programs
- Expand local training and jobs
- Regionalize O&M
- Broadband improvements enable better monitoring and training

Threat
T
- Highly dependent on world commodity
- Political cycles
- Solutions that reduce local jobs
- Providers who think they have the only solution
- Fuel deliveries up smaller rivers
- Private profits over community priorities

What TA Is and Is Not

At the end of the interview, respondents summed up their views on technical assistance. Generally, the emphasis is on local needs and capabilities. The approach should be in the form of a partnership rather than sage and student. There should be collaboration that includes a thorough hand-off – delivery and receipt of that assistance. The end result should be increased local capacity to support and maintain systems. There are concerns that much of the funding for technical assistance can go to consultants or agencies and their well-paid staffs while local communities only see a small portion of funds to actually implement energy-saving solutions.

Common Themes Mentioned by interviewees
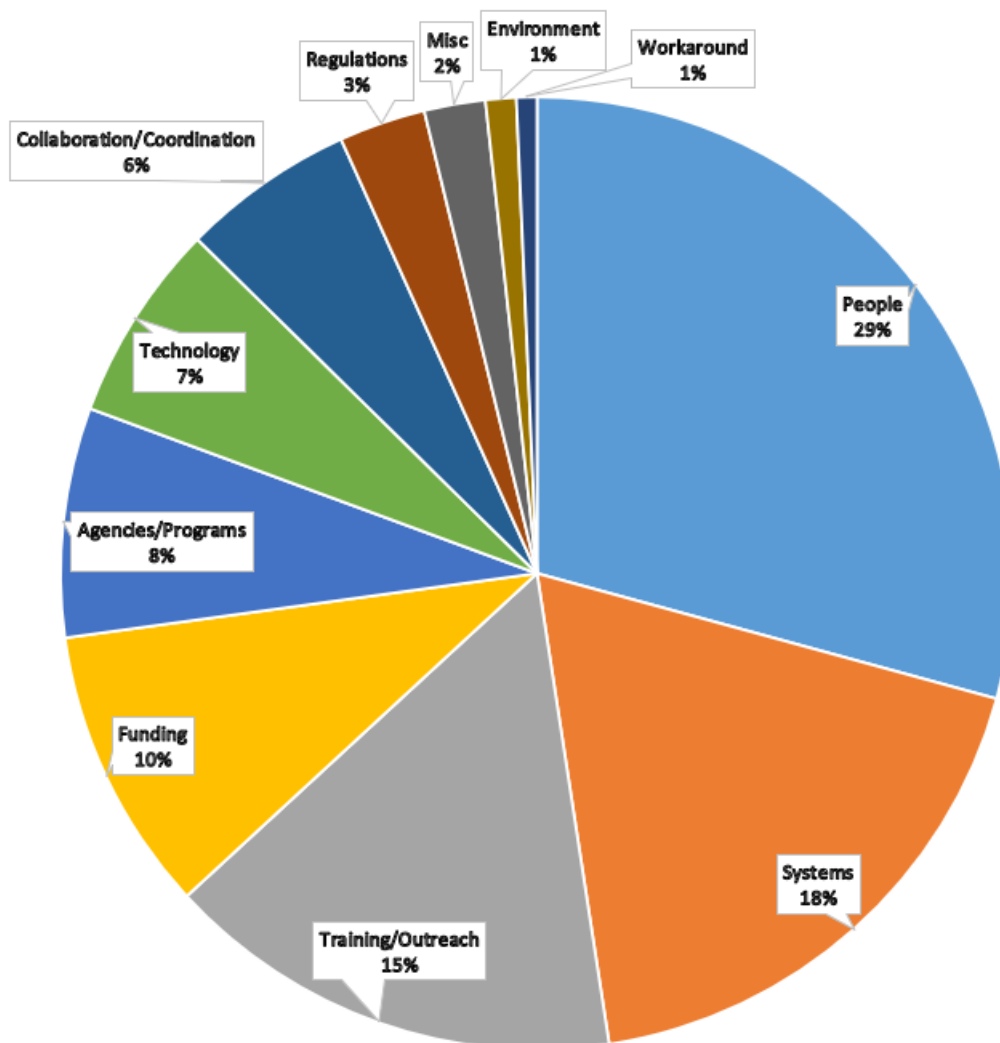
Recommendations

Greater funding for and continued leverage of the Denali Commission as a partner to preserve funds and provide non-federal match. Create a collaborative effort to monitor all available funding opportunities and maximize Alaska's applications to those programs – leave no money on the table. Expand broad local training opportunities that include community buy in to create and fund these jobs for the long term. Expand on the success of regional approaches to support

local power plants and energy efficiency systems. Increase funding for continual support of business skills, including administrative reporting and local governance. Continue and expand resources to assist communities in grant writing.

Recognize that successful energy systems require not only the initial design and construction costs but perpetual training of local and regional workforces in operation, maintenance and overall utility management. Adapt best practices like the RUBA Program to develop administration and oversight skills and sharing of best practices. Identify long-term workforce needs across the states to plan and develop workforce training that provides the specific skills necessary to maximize local and regional hire on energy projects. Invest in greater broadband infrastructure with the lowest possible costs to facilitate remote energy training programs and improved system monitoring and troubleshooting.

1. Introduction/Background

Alaska has been a testbed for energy applications and solutions dating back to at least the 1960s when the federal government explored the use of atomic energy weapons [1] and public benefit applications [2]. In the 1980s, funding from the oil boom known as "Project 80s" installed up to 140 small wind turbines across the state along with many other infrastructure projects, large and small. By the mid to late 1990s, NREL was involved in the earliest community-scale wind projects in Kotzebue and Wales. [3] This collaboration was one of the first of new collaborations with local communities to address challenges with operating remote, islanded power generation systems.

Renewable Energy Alaska Project (REAP) organized the first Alaska Renewable Energy Fair in 2005 and by 2008, the nationwide energy crisis had fed a sense of urgency apparent at the state Rural Energy Conference held in Girdwood. During that conference, the state legislature unanimously approved the creation of the Renewable Energy Fund that would appropriate more than $270 million over the next 10 years. [4] Since then, other funds have been made available through direct appropriation by the state legislature as well as federal funds from agency budgets and congressional earmarks.

Many, but not all, projects have brought reduced or stabilized energy costs to remote villages and hub communities as well as road and Railbelt cities and towns. This report is a compilation

of interviews with key people involved in many of those projects over the past two-plus decades. While some projects did not perform as intended over time, this project will not focus on those unrealized expectations. Learning can be gained through studying all projects, regardless of the level of success.

It is with intention that this study will not single out projects or related communities where the desired results were not achieved. The target audience is already aware of these projects and it would be counterproductive to the parties involved to criticize actions that were taken with good intentions and based on the best information and options available at the time. It is only with the benefit of hindsight that we speculate on alternatives that may or may not have resulted in improved outcomes.

2. Methods

Respondents were interviewed via phone or Zoom video conferencing software with the sessions typically lasting between 1 and 2 hours. In most cases, an audio transcript was generated from the recorded interview. Those wishing to not be recorded had their responses captured via real-time note taking during the interview. This latter method resulted in a somewhat reduced level of detail as the author was summarizing interview responses and could not ensure accurate wording for direct quotations.

Before the interview began, each respondent was informed that *"It is okay to pass on any question. This interview is technology and discipline agnostic. It can include fossil fuel or renewable energy generation. It can include any aspect of energy, whether it be generation, conservation, efficiency or other contexts. Technical assistance is however you personally define it."* The respondent was offered several options of confidentiality with respect to attribution of their statements. Most chose Chatham House Rule [5] with any specific attribution, if needed, getting their prior approval to ensure their intended meaning is correctly conveyed. The specific questions asked during the interviews can be found in Appendix I. While most interviewees were asked each question, some respondents chose to pass on a few questions. Some questions were occasionally skipped due to time limitations.

Following each interview, the audio transcript was downloaded from Zoom and then edited while listening to the audio recording to correct transcript errors (e.g., "*New to make what*" corrected from the transcription to Nunam Iqua, "*Embarrassing Streets*" corrected to "*In Bering Straits*"), remove superfluous "*um*" and "*you know*" occurrences, annotate statements that were made off-the-record and edit stream-of-consciousness speech into complete sentences where needed. Once the audio transcript was cleaned up for a particular interviewee, the

document was then analyzed to identify key topics raised by the speaker and instances of common themes occurring in other interviews within this study.

Contextual analysis of interviewee responses generated a set of key themes and areas of emphasis that were captured in a spreadsheet. If an interviewee brought up a new topic that had not been mentioned by previous interviewees, a new column for this topic was added to the spreadsheet.[1] For each interviewee, the number of times that a particular topic came up is noted in the spreadsheet ("3" in that row (interviewee) and column (topic) if the topic is brought up in three distinct instances). If a respondent brings up a topic multiple times in an answer to a single question, the notation would remain a "1". If the respondent included more than one distinct example in answering a particular question and repeated that key topic, the notation would be "2". If the topic was brought up in response to four different questions, the notation would be "4".

Results of contextual analysis are presented both in the raw number of times a topic is mentioned as well as the number of respondents who mentioned that topic at least one time.

Simultaneous with the capturing of key themes in a spreadsheet, notable passages were copied from the transcript into a main Word™ document delineated by each of the interview questions. This main document was then winnowed down to create the section narratives in this study.

The final step in analyzing each respondent's transcript (which ranged in size from 4,000 to almost 9,000 words each) involved using a text analysis tool at https://www.online-utility.org/text/analyzer.jsp to calculate which phrases and words were most commonly mentioned, sorted in descending order of frequency. Phrases pulled from this Web tool excluded those deemed to be immaterial such as "*I think that there is*" or "*and it would be*" as well as terms that are prompted by the mere scope of the interview questions such as "Alaska", "*technical*", "*assistance*" or "*energy*".

After completing all interviews, key topic descriptors were reviewed to determine whether they should be combined with other similar responses. When this occurred, the original topic descriptor might have been modified to best describe the combined columns of data. Regardless, the combined columns of data were added together for each respondent row.

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[1] Previously analyzed transcripts were also checked to ensure "new" key topics/themes had not been brought up in earlier interviews. If so, the spreadsheet was updated to reflect those topics in that respondent's row of the spreadsheet.

Key topics were also grouped together into broader categories where this distinction makes sense. Broad categories that describe key topics respondents brought up include: Agencies/Programs, Collaboration/Coordination, Environment, Funding, People, Regulations, Systems, Technology and Training/Outreach

Highlights for each narrative section or interview topic in this study were selected in two ways: 1) those topics most frequently mentioned by the collective of interviewees and 2) topics that might have been discussed by only one or two interviewees but resonated in describing problems or solutions in unique or thought-provoking ways.

3. Demographics

Respondents have or continue to reside in 18 distinct communities across the State of Alaska. Numerous respondents have lived in more than one community. These communities are shown in Figure 1. Two-thirds of interviewees were male while one-third were female. Most interviewees reported no tribal affiliation but the interviewee pool included two people who identify as Yup'ik, one person who is Alutiiq, one who is Iñupiaq and one who is Tlingit.
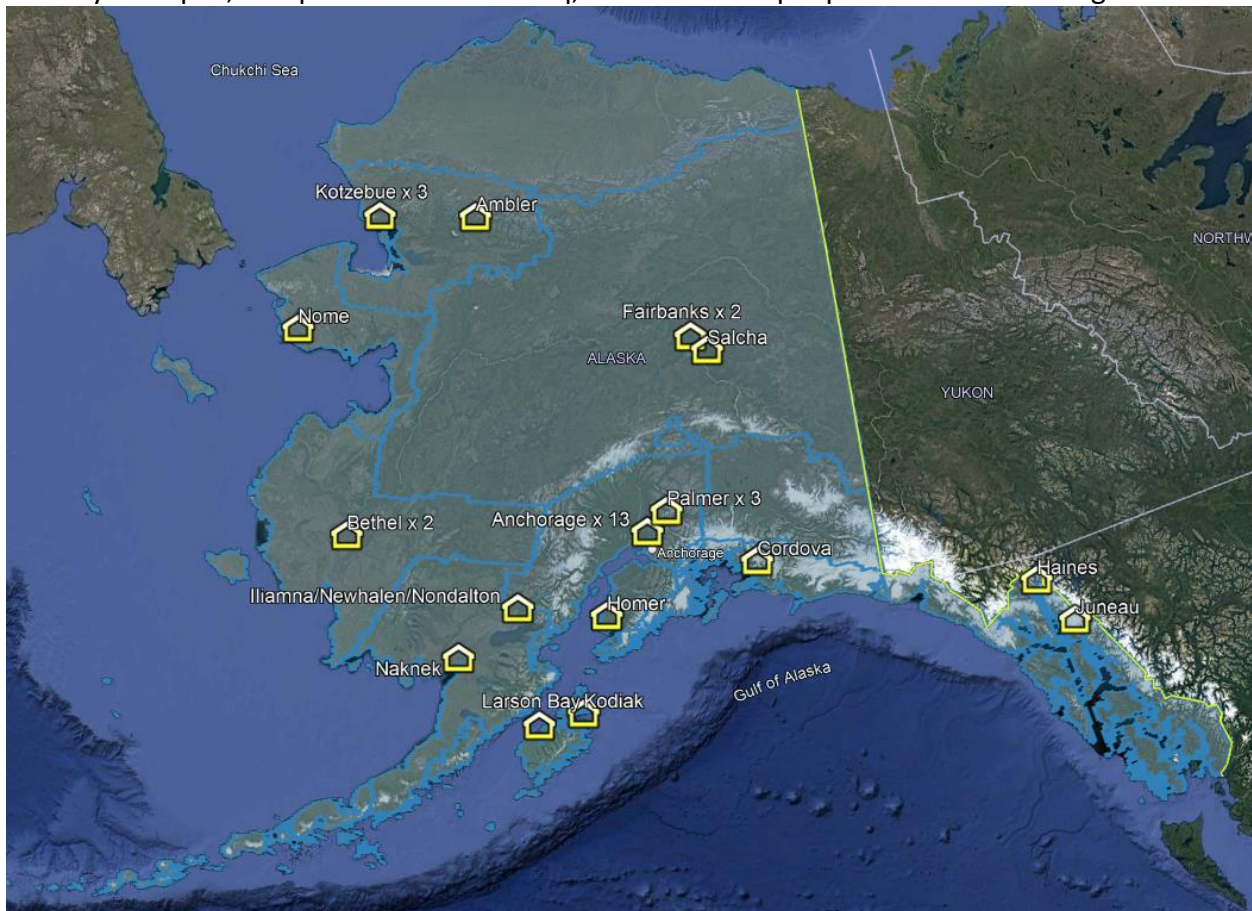

Fig. 1: *Home communities of interviewees.*

Respondents have worked for 30 different organizations in the state shown in Table 1. Their responses reflect experiences working on technical assistance projects in at least 49 communities shown in Figure 2. Each of these communities were specifically mentioned during interviews while some references were made to the broader Y-K and NANA regions.

The first question asked in each interview, "Share some background on your past involvement with delivering or receiving technical assistance on energy projects in Alaska" was intended to refresh and anchor the interviewee into their personal experiences with technical assistance and to add context to the types of communities and projects where technical assistance was applied.

Some interviewees responded in the context of community energy planning while others were involved in specific energy-generation projects in the pre-planning, design, construction and ongoing operation phases. Other interviewees responded in the context of representing a funding agency or providing training support for a community to operate a project or utility on an ongoing basis. Administrative, clerical and governance scopes were also the focus of several respondents. The development of and necessity for interpersonal relationships in successful technical assistance initiatives was also present in many of these conversations.

Table 1: *Interviewee Employers[2]*

Alaska Energy Authority	3	Inside Passage Electrical Cooperatve	1
Alaska Housing Finance Corp.	1	Intelligent Energy Systems	1
Alaska Power Authority	1	Kotzebue Electric Association	1
Alaska Village Electric Co-Op	2	NANA Regional Corp	2
Anchorage ML&P	1	NREL	2
ANTHC	1	Nuvista Light and Electric Co-Op	1
Arctic Energy Office	1	NW Actic Borough	1
Bering Straits Native Corp	1	REAP	3
City of Ambler	1	Renewable Energy Alaska Project	1
Cordova Electric Co-Op	1	RuralCAP	1
Deerstone	1	Southeast Conference	1
Denali Commission	2	SWAMC	1
DOE Office of Indian Energy Policy and Programs	1	Tanana Chiefs Conference	1
Information Insights	1	USDA	2
INN Electric Co-op	1	Yukon River Inter-Tribal Watershed Council	1

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[2] Past and present. Some interviewees have worked for more than one employer.

Fig. 2: Technical Assistance Recipient Communities

Whereas many technical assistance activities are initiated by requests from a particular community, others have been born out of interest from outside agencies and institutions due to the unique and novel energy systems in Alaska, especially with remote microgrids. A key reflection from one respondent puts this in context:

> *The biggest barrier to success is often folks coming in from outside and spending most of their time just getting up to speed. And so, it feels the value of what they're getting out of it is almost more than what the communities or what the project is getting out of it. They're getting to look at this unique and interesting problems set because Alaska has power systems that are different than the rest of the country and climate zones that are different than the rest of the country and so there's a lot of really smart and intellectually curious people. But it has at times felt the benefit is feeding their curiosity and informing them and increasing their knowledge and also increasing their status by letting them be affiliated with something that is interesting and unique, more than it is actually adding value to the project.*

The need for cultural awareness, for both Indigenous ways of life as well as remote/off-grid lifestyles, was raised – not only for people outside of Alaska but also technical assistance providers who reside in major population centers of Alaska with minimal understanding of living off the road system or the importance of indigenous ways grounded in millennia of existence in a beautiful but unforgiving landscape. Training offered by the First Alaskans Institute covering ANCSA and the broader Alaska Native history was recommended as a prerequisite for TA providers who are new to working with a particular community or region.

One derivative from traditional project-specific technical assistance brought up in some interviews is one of general energy literacy within a community. As village energy systems become more complex, the need for energy knowledge increases on a spectrum that ranges from basic knowledge of energy generation and use with the general public and in K-12 education up to knowledge and skills needed to build and maintain local capacity to support these systems. This knowledge extends to the nuts and bolts of operating and maintaining the equipment and infrastructure as well as the skills needed to govern and manage utilities and infrastructure.

A key observation from the pool of interviewees is that responses predominantly dealt with rural or remote Alaskan communities, although some covered projects serving larger population areas on the Railbelt and southeast Alaska. Key community needs discussed include: basic maintenance of diesel generators, distribution and line loss, heat recovery, biomass, wind energy, hydroelectric generation and interties, solar energy, energy efficiency, PCE reporting, accounting and utility management, electrical and thermal storage systems, community energy planning, grant application assistance and DOE's START/ReSTART, ETIPP and USDA's rural energy initiatives.

4. Interview Narratives

This section covers key themes and highlights of individual responses specific to the questions listed in Appendix I. Cross-cutting themes and takeaways are covered in *Section 5: Common Themes and Analysis of Text.*

4.1 What key assistance was provided, including scope/skill set?

Many communities require assistance navigating the grant application or other funding processes. Some of these approaches require detailed knowledge of multiple funding agency requirements and constraints, which can be challenging for a small community that might seek this assistance only once every decade or two. The Denali Commission was frequently mentioned by both providers and receivers of technical assistance as key in assisting communities in navigating processes to apply for federal funding. Similarly, funding agencies such as AEA and USDA dedicate resources to assist communities in developing successful grant proposals. Some of these proposals require knowledge of and collaboration with multiple funding sources.

Capacity building is needed on a broad array of skills, from maintenance on power generating equipment, HVAC systems in public buildings and water/wastewater infrastructure to administrative, clerical and governance experience at utilities, school districts and village governments. One facilitator of technical assistance described their process as follows:

> *"The first layer of capacity building technical assistance goes to the individual making sure they've got the skill sets that they need for the project at hand. Then we ratchet that up to technical assistance and capacity building at the organizational level. We will take that capacity building and technical assistance up one more notch at a community level. When I go into a small village community, we go in there not just for the project proponents and we put them into the context of Community where we'll invite the municipality, the tribe, the utility, the corporation, the school board, because we have to have Community-based solutions or we don't have a solution at all."*

Some technical assistance engagement has been almost entirely focused on equipment technology, such as assisting a utility in proper verification methods to qualify a wind turbine according to IEC standards. It can also come in the form of providing or developing procedures for the installation of solar thermal systems, heat pumps, biomass systems and combined heat and power. Lastly, the traditional engineering design of new technology solutions and the

required integration with existing village infrastructure remains a foundation of provided technical assistance.

Even after technology is installed, technical assistance can be needed to operate and maintain new systems. One community in the Y-K region wasn't seeing the expected performance from their electric thermal stoves, so Nuvista Light and Power brought in an expert from a neighboring village to provide specific training and public outreach.

Administrative and clerical assistance is commonly needed with in-person or live online coaching for QuickBooks and PCE reporting. Additional coaching to help communities maximize PCE benefits is also an area of focus. Technical assistance providers also mention the need for utility boards to learn basic oversight responsibilities and finance options.

Strategic energy planning is also a key function of early engagement with weatherization projects being a typical second step. Respondents commented that the success of these early steps is highly dependent on the presence of dedicated project managers at the TA providing agency as well as one or more local champions to put these programs into action in each community.

4.2 Which stages of project development were involved?

Technical assistance spans the entire spectrum of project development from building the initial grant application, negotiating with contractors, building the project, commissioning and post commissioning. It includes the planning, execution, operations and maintenance and monitoring/reporting for projects and systems. Still, much of the focus of technical assistance is on the early stages as summed up by a TA provider:

> *"The front is where all the risk is as where all the uncertainties are. It's where all the passion, the dreams and the most far out assumptions are made. So ground truthing, finding scale…it's not just technical assistance - it's the economic feasibility that often*

eludes because with this day and age, with all the information of the world at your fingertips, you can click on to some amazing projects that technically are valid, but they have no economy of scale, no economic feasibility and no business being in Alaska so those front end pieces are where we find the most need to make sure that the technologies and projects are appropriately sized, scaled, purpose built and have economic viability. Because if we're not lowering the cost of energy at the end of the day, we've not helped them at all." – Robert Venables, Southeast Conference

The front end of technical assistance involves community energy planning, which when done successfully, involves all local stakeholders to create a common vision for the community. Some communities require mediation to achieve buy-in. This mediation can be between a city and a tribe or the utility. The community may also need mediation between itself and a state or federal funding agency. Community buy in is also important to ensure that plans are executed rather than just sitting in a binder on a shelf. It is also important to commit resources for long-term operations, maintenance and training support within the community.

> *"If you don't have a community that's unified before a project gets built it's often the case that something's going to happen and you regret the fact that you didn't have people aligned." – Chris Rose, REAP*

Site control is an often-overlooked step that can be complex in a relatively young state with a history of Native American reservations, Dawes Act allotments, Native land and subsistence claims and other Indigenous rights codified by ANCSA. Brent Petrie, who worked at Alaska Energy/Power Authority and Alaska Village Electric Cooperative, had this to say:

"A project might take three or four years to get off the ground and a lot of times that involved dealing with the institutions in a village getting land set aside. As federal money became available, it became much more important to do environmental assessments and environmental reviews and make sure that a project had appropriate site control. Because some of these situations that happen in the 1970s and 1980s, the power plant was there, it wasn't clear who owned the land. And then, when you want it to expand you had to produce the documents that show that you had permission to be there. In some cases, the documents didn't exist."

Technical assistance is also important when navigating the long timelines from conception to commissioning and beyond, further complicated by the varying lifetimes of other related infrastructure within a community. Heat recovery projects were mentioned in two key examples. The first was a project that was designed 4 years ago (including COVID delays) and by time it was ready to be built, a renewable energy project was funded and built that greatly reduced the waste heat output from the diesel generators. The second was a heat recovery project planned for a village that will likely relocate due to climate change.

A factor that was raised for the project planning phase is taking an objective look at the capabilities of a particular community to fine tune and tweak a system during its operational life. Some communities possess considerable local capacity to troubleshoot and operate these systems. But for communities that lack critical operational skills, other solutions should be adopted.

Broadband infrastructure is a key requirement in operating newer systems as it allows for remote monitoring, troubleshooting and even faster communication between key components within a community. A wind and electric thermal heat system in the Y-K region required the addition of fiber optic lines because the local broadband at the time was too slow for the system to react quickly enough to control the grid frequency. In a broader sense, broadband infrastructure is a foundation for the local knowledge base, remote training and energy literacy across the community. Sufficient broadband infrastructure is also a prerequisite for prepaid meter systems and for remote meter reading. Multiple cases have been reported of meter readings with a missed multiplier that resulted in abnormally low bills for a community or school district building (at the expense of the utility and other ratepayers) that could have been caught by remote audits.

4.3 How was the TA funded and what amount was needed?

Some of the earlier energy projects, prior to the 2009 Renewable Energy Fund, were funded through direct appropriations sponsored by Alaska's congressional delegation. These construction projects ran several million dollars with the most expensive one mentioned at $23 million. Early wind turbine installation and performance validation projects cost around $6 million with the technical assistance for power curve testing costing around $500,000.

Many early 2000s technical assistance projects funded by USDA were for less than $50,000. Multi-year projects such as regional biomass, algae kelp and aquaculture could be hundreds of thousands of dollars. Current USDA REAP grant awards have been in the $100,000 range. USDA funds are primarily targeted for agriculture and small business requests and this results in most of those monies being spent on the Alaska road system rather than in small villages.

Early state funding from the Alaska legislature in the mid-80s was on the order of $200,000 for an annual appropriation to cover the whole state. Later, the state legislature began funding entire energy projects for communities with technical assistance and education money included in the total allocation. More recently, the state allocated $130,000 to contract for regional energy planning. The Renewable Energy Fund has also been a source of feasibility and engineering funding that can run $100,000 to $150,000 per community. Senator Lyman Hoffman also funded two positions to assist western Alaska communities with project development and grant proposals.

The Office of Indian Energy Policy and Programs has funded up to $500,000 for the Makushin Volcano project but most awards for technical assistance are much smaller. Alaska tribes get a sizeable percentage of the annual congressional allocation to Indian Energy projects but much of that is for work beyond the scope of technical assistance. Over time, the Office of Indian Energy has separated technical assistance activities out from other funding priorities. This has helped to promote technical assistance without the risk of competing construction projects. Originally, a tribe was limited to 40 hours of technical assistance but this limit has been lifted and today the Indian Energy technical assistance program is well received by recipients.

Some communities have the benefit of funding from Alaska Native Corporations. These monies can be allocated quickly and are in alignment with local needs/priorities. Recipients of these ANC funds report greater success in developing proposals for larger state and federal funding awards.

The Denali Commission Act was expanded to allow for the Commission to accept funding from other federal agencies. [6] This has been extremely beneficial for Alaska as once the funds are transferred to the Commission, they do not expire until funds are completely expended. Funding sources that expire at the end of a fiscal year can easily be lost if weather or logistical delays push out project timelines. Denali Commission's role in preserving funds was commonly mentioned as critical to Alaska communities.

At times, BIA's Energy and Mineral Development Program has provided funding for energy projects such as a wind resource study for Ahtna Inc, a heating assessment for Chitina Native Corp. and design of a diesel hybrid storage system for Port Heiden. Most of this agency's funding goes toward mineral development on tribal lands.

One shortcoming mentioned is that there are funding sources for technical assistance and construction projects for tribal and village initiatives but not much help for individual homeowners. Given the structure of the Power Cost Equalization program, energy efficiency

improvements and even rooftop power generation would create a far greater benefit if these projects focused on individual homes rather than community buildings. Another shortcoming is that there is more technical assistance funding at the front end of projects but very little for operations and maintenance and system optimization.

START and ReSTART funding provides $62,000 to be spent directly in communities but the impression of recipients is that the agencies and contractors involved receive far greater amounts of funding in order to implement the lesser ($62,000) local funds. This is perceived as an inequitable allocation with the communities' desire for the greatest portion of funds to be spent in the village. DOE funding allocations to Alaska Native Corporations who then have latitude on how to best spend that money in their region is looked upon favorably as it avoids conflict when agency funding goals do not overlap well with community needs. A suggestion was made by one respondent that funding directed towards organizations with higher levels of Alaska Native employment would be viewed favorably.

Lack of consistency in funding programs was mentioned by several respondents. When agencies fund technical assistance in fits and starts, it is difficult for villages to staff initiatives and even to spin up staff to pursue grant awards that are one-time endeavors[3] or that vary greatly in funding levels from one year to the next. Some technical assistance programs prioritize funding for their own agency personnel either exclusively or preferentially over what some recipients consider to be equally capable in-state technical resources that might be available for a lower cost. Alaskan technical assistance providers can feel excluded from competition for local services. From the perspective of the granting agency, however, this can be a way to provide more consistent levels of technical assistance and stability/retention in their workforce. Still, agencies that follow this practice should at least be aware of the public perception.

Ad hoc technical assistance was brought up as a benefit not always considered in a formal sense. Guidance from agency personnel on how to navigate funding systems, encouraging applications that a village might initially deem too expensive and training or troubleshooting over the phone or internet provide real assistance to communities even though these informal systems may not be officially tabulated.

4.4 Was TA required through multiple project phases?

Technical assistance is not just needed at the front end of a project but also through post-construction phases, including post-commissioning, operations and maintenance and long-term monitoring. While agencies providing technical assistance have experience in the needed skills through continual engagement with communities across the state and country, for many villages this might be the only energy project over a 10- to 20-year timespan. They cannot be expected to independently develop or maintain all the required key skills for such a low frequency occurrence.

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[3] From the perspective of the village.

In many small communities, one or two people may have experience in rate setting, equipment depreciation, repair and replacement planning or complex project management. If they leave, communities are without those skills. Some places lose their young, up-and-coming residents to scholarships and outside opportunities, despite their intentions of returning to support the community.

Meera Kohler speaks of local pride and the desire to build local capacity and skills, and notes that there can be distrust of outsiders. AVEC relies on a community liaison to build trust over time and serve as a conduit for effective communication.

Biomass energy in Tok has been an example of vertical integration, community-wide planning and implementation. Besides the biomass systems themselves, workforce development was required, as were harvesting plans that addressed the need for fire breaks around town. The original school biomass project was expanded to include a greenhouse with additional work leading to agricultural cultivation. Beyond the local heat needs, what opportunities exist for export and sales of pellets?

> *"There's very few people that can be an expert in everything so there's always technical assistance type questions at each phase of the project." – Jessie Huff, USDA RD state energy coordinator*

Even larger organizations such as AVEC see the challenges with managing multiple, large projects that require detailed accounting and reporting to the grant agency. Individual communities need one-on-one training to develop these skills.

The design and construction phases don't require much technical assistance as Alaska has plenty of local resources who are experienced in Arctic design and construction. According to Matt Bergan with Kotzebue Electric it is the early and late phases that require more assistance, "it's more of the planning and design stages kind of going into the project and then performance verification or performance monitoring after the project is built."

Ingemar Mathiasson with the Northwest Arctic Borough mentioned the Shungnak solar battery box, which is functioning well, but he sees excess heat in the system and is now looking for valued places to divert that heat such as the community water loop. Along these lines, Nome Joint Utility Systems has the benefit of managing both the electric and water systems and has

used this to the town's advantage by dumping excess diesel and wind energy into the city water system. The result is that residents have warmer water entering their homes and use less energy when they need to heat that water.

4.5 What areas of technical assistance are needed but not available?

While all forms of technical assistance may be available within the state, not every community is aware of what is available and how to tap into it. Complicating factors include inconsistent funding year to year and changing programs from a range of state and federal providers.

Leadership is needed in all agencies providing or influencing technical assistance. Policies need to be well articulated at each agency describing what they provide and how they will execute on those policies. Agencies need to be staffed up to support and leverage the large amounts of federal dollars available. Overall, a broad state policy on energy is needed that articulates technical assistance and expands upon energy literacy, not only in public schools but for the Alaska's adult population.

> *"Most of the need on quote-unquote technical assistance is at the left side of the spectrum - understanding what energy is, understanding how your community plans for it, understanding how to align yourself with other entities in your community and funders." – Chris Rose*

Climate change is a major issue in Alaska but it is not clear that we collectively understand how to deal with it. How will we organize around the many villages that need to relocate over the coming decades?

Some respondents would like to build on existing technical assistance to fund and conduct more pre-feasibility and feasibility studies as well as completing system designs to make them

ready for construction. They would also like assistance in identifying funding opportunities focused on construction. Others see an ever-growing need to address more complex system integration as we introduce new technologies to legacy power plants.

A gap this research identified is the technical knowledge, familiarity and language of national labs and academic-focused experts versus the perspective and knowledge of local leaders and stakeholders that is centered on local constraints and needs. Time and personal effort are needed to bridge this gap in both directions. Grassroots approaches in energy solutions are as essential as beach grass and cotton grass are to traditional subsistence ways. Sufficient time is needed to capture and understand local needs. We may show up ready to talk about the local microgrid when water security might be a more urgent concern for the community.[4] In some cases, visiting experts would do best to recognize local concerns and priorities and help identify alternate resources when appropriate. Communities want the time to come up the learning curve and become acquainted with technologies being proposed.

> *"There's a pretty substantial gap and our reliance on outside service providers to come into a community and say here's what we think you need. And a lot of times the community just sort of follows in line." – Natalie Hanson*

From a funding perspective, more general funds without restrictions can be helpful for communities that have broad needs for assistance. These needs could be in the form of energy efficiency assistance that can be used for any building type - tribal, local government, commercial or residential – instead of current program restrictions. Segmenting various programs and funds is challenging for town councils and tribes that need a community-wide approach. If segmented/targeted programs are going to be successful, they need consistent funding levels with sufficient staffing and outreach so that communities readily know how to participate to the fullest extent.

One suggestion was made for a hotline or a staffed web site where anyone could ask questions about basic assistance and get guidance on how to initiate technical assistance with a range of agencies. In an environment with a succession of differing state and federal programs and funding levels, having a consistent initial point of contact that is up to date on current offerings could be very helpful for communities seeking technical assistance.

Building on local community/utility capacity, Cady Lister recommends:
> *"Consistent, long term technical assistance on the sort of business management, money management, navigating government systems side of the house and finding and evaluating contractors. How do you write an RFI or a request for a bid - what's the language that should be in it? Once you get it, what should you be looking for? Who should you be checking with? How many [bids] should you get? How do you even begin*

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[4] The study author frequently cautions against jumping to the solutions phase. Many people come with a solution in search of a problem rather than spending time to define the problem(s) and conduct extensive root cause analyses that will ultimately result in a more effective approach.

to navigate that process? Where do you send that? Where you advertise it? Finding contractors."

Several respondents mentioned broadband infrastructure as a gap in successful energy systems. The reasons include better ongoing energy system monitoring, more accurate environmental and power system data with which to model energy options and most basically, the means by which remote communities can build capacity through energy literacy and training for management and technical staff.

4.6 To what degree is the provided TA focused on engineering and technology versus other disciplines?

Engineering and technology focus are important for energy systems but excluding other disciplines is problematic for a variety of reasons. Community engagement and buy-in are critical to success as these are the people who ultimately will need to provide long-term support for installed systems. Technology and engineering are critical to identify what is and is not possible but the final informed choice must come from the community.

Operating and maintaining a functional powerplant is the foundation of successful energy projects and some communities need guidance and training on how to maintain equipment, set rates, read meters, follow standard accounting practices, provide board oversight and provide reporting for Power Cost Equalization. Local capacity building is a common theme among interviewees. Turnover should be expected, so training systems are needed to ensure seamless support across all communities.

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Technical assistance providers need additional skills beyond math, engineering, controls and data communications. Learning how to communicate science to non-science stakeholders is a critical skill. Also critical is a first-hand understanding of life in remote villages and how sustainability must include compatibility with the individual local practices and customs in a subsistence culture. Some regions of the state have the financial resources and personnel to fill the cultural and social gap but others could use assistance, possibly even the ability to contract with organizations that have been successful in these matters on other projects.

Funding agencies can have a bias about which disciplines are funded, especially in an environment of limited budgets. This can lead to a focus on engineering and technology while excluding many other necessary disciplines. The result is a completed design and installed equipment but other support is needed for sustainable projects that deliver the desired benefit.

A recent example of addressing cultural and social concerns before diving into technical considerations is the approach being taken with regards to small scale nuclear technology. ACEP is providing both outreach and engaging with the public to facilitate discussion and encourage feedback. While working on a biomass project for community heating needs in Gakona, marketing analysis was also done to explore a potential wood pellet project that would export to other communities.

Even on the Railbelt grid, working to create an electric reliability organization and integrated resource planning that make the entire grid more efficient is a needed area of technical assistance. Exploring alternative approaches to economic dispatch and shared spinning reserve could result in cost savings for many in the state. Policy and technology are partners in successful solutions.

4.7 Where do you see gaps in the types of training you would like to see or like to provide?

In the past, the Denali Commission had a training program that allowed AVEC to develop local skills in welding, heavy equipment operation, carpentry and other skills so that local residents could be hired for construction jobs on energy projects. This also established people in the region with skills to support other nearby projects and long-term need.

With the recent increase in federal funding, it behooves stakeholders to conduct pre-feasibility analysis of what additional staffing is needed for funding agencies, technical assistance providers, and construction contractors. This pre-feasibility analysis would then be used to develop roadmaps for capacity building and workforce development to hire and train these new employees in preparation for the projected demand.

In remote communities, there is a need for people with broad and general skills to maintain and repair diesel engines, wind turbines, solar arrays, IT and communications systems so that they

can troubleshoot issues in a safe manner. Matt Bergan at Kotzebue Electric calls these ideal employees "power generation technicians" or "community energy technicians".

Respondents see the need for training as ongoing rather than something that takes place the first week after installing a new system. Robert Bensin recommends that some skills require a certification with refresher courses.

> *"That also gives [people] a sense of ownership of that certificate and makes them feel more responsible for their daily duties."*

Cultural training is recommended for technical assistance providers whether they be in-state private contractors, university researchers or national lab employees. The Bering Straits region requires new hospital workers and teachers to complete a two-day orientation to understand the history, culture, and even foods that are essential to local ways of life. Partnering with ANSEP and Native Corporations was mentioned as an option for engineering firms engaging with rural communities.

AVTEC and other training centers were praised and also seen as potential organizations well-suited to expand regional training. Great value is seen in hands-on training as well as trainers who can come to each community and conduct training that is tailored to the exact configuration of local power generation and distribution systems.

A barrier brought up by many is that even when money is available to pay for people's training away from their home community, these trainees are not able to collect their regular paycheck and their home community is without that needed worker.

Training for bookkeeping, governance and PCE reporting is a continual need. This has been done in the past but needs to be consistent. One-on-one work with QuickBooks and PCE reporting is needed monthly until new employees are fully proficient. Improved broadband capacity in remote villages would make this more feasible. Boards and councils need to hear from other communities how sufficient budgeting for employee wages and benefits ultimately saves money through retention. Rate setting needs to account for these costs.

Shared services are enjoyed by organizations such as ANTHC, AVEC and TCC. Copying this model or even contracting with these successful organizations could benefit other communities.

Anna Sattler summed up the overarching goals for training:

> *"At some point we need to get to a level where we're sustaining ourselves, that we're not looking to the housing authority to fix our homes, that we're not looking to everybody else to do things for us. That we start empowering everybody in rural Alaska to be more sustainable themselves and that's not an easy conversation to have. But I think that is part of delivering technical assistance training and it should be included in whatever curriculum or conversations that we're having with communities."*

4.8 Are there policies at local/state/federal levels that promote/hinder needed technical assistance?

Multiple respondents believe that Alaska needs a more comprehensive energy policy articulated around energy efficiency, affordability, security and renewables. Building codes that require greater efficiency are seen as helping homeowners and renters to achieve energy savings.

Policies that promote local hiring on energy projects would create greater value for communities. Such policies would need to identify specific target skills and funding for training and certifications.

The Denali Commission and Alaska Energy Authority have supported training for power plant operators and bulk fuel operators. These programs help to ensure local personnel who can operate systems. Creating similar programs to train maintenance personnel could result in systems that run more efficiently and sustainably. The Denali Commission's ability to receive monies from other agencies and protect those funds from expiration is a commonly mentioned benefit.

Small communities or first-time inquiries into technical assistance need a program to help them navigate the various federal, state and local options available along with public and private contractors. They also require help in identifying which specific types of technical assistance they need to seek out. Because programs and providers come and go, it can be daunting to even begin the process of requesting technical assistance.

One suggestion is to study how energy flows through each region of the state to understand from a physics, a logistical, a carbon and a cost point of view to optimize for greater efficiency. Another suggestion is a forward-looking study on how climate change will impact infrastructure across the state whether it is roads, airports, public buildings, fuel tank farms, wind turbines, homes or entire villages. In 50 years, what will Kotzebue and the rest of the Northwest Arctic Borough be experiencing? Identify likely risks and begin plans to mitigate and adapt to future conditions.

One respondent raised the question of how we as a state value the continued existence of traditional and subsistence lifestyles. Making funding decisions with cost-benefit methods exclusive to metrics that we know how to assign costs ignores important intangibles. The respondent also challenged our varying cost of energy across the state compared with Canada's approach of charging the same rate to all communities across provinces regardless of whether they have access to hydroelectric power, coal plants or diesel generators. Adopting such an approach would allow Alaska to site power generation where it makes the most sense and sharing the energy savings with everyone. It might be the best decision that some remote communities remain on diesel power plants even as the entire world moves to renewable energy sources. But those communities shouldn't shoulder the burden of expensive fossil fuels – they should pay the same energy cost per unit as the rest of the state.

One hindrance mentioned is that Alaska's STEP grant which allocates ~$5,000 in training funds can be difficult for applicants from remote communities because it requires a driver's license to set up an account. Does the applicant need a fax machine or computer to use the system and how is money transferred to cover payments? Some Native Corporations have programs in place to manage the paperwork and bureaucracy of this system but other organizations and communities need this assistance. Another need identified is the ability to extend apprenticeship programs across multiple rural communities to increase the pool of electricians and other trades people in each region.

In the past, the circuit rider program at AEA has been extremely helpful to power plants across the state. Respondents and this study's author would like to see increased and consistent funding and staffing for this very effective program.

4.9 To what degree do you see the need for multiple TA providers to collaborate on projects? Are there barriers to this collaboration?

Each respondent agreed that more collaboration is better. At a minimum, greater communication is needed so that different agencies and contractors don't accidentally interfere with other projects such as digging up a district heat loop because a new contractor wasn't aware of its existence/location. A technical assistance provider thinking they alone have all the solutions creates problems. Providers who collaborate, with their client communities, with other agencies, with laboratories and universities, and even with other technical assistance providers are more successful and defining problems and finding effective solutions.

It is important for any type of project, regardless of scope, that impacts a local energy system to coordinate with those who manage and operate those energy systems. A wastewater lift system is a significant energy load and powerplant operators need to know when pumps and grinders are scheduled to turn on so that they can dispatch generators capable of handling sudden load surges. Port operations and fish processors need to communicate with electrical utilities in a similar manner.

Many agencies including AEA, AHFC, ANTHC, Denali Commission, DOE, USDA and others are tasked with aiding communities across the state. Collaboration among these agencies can ensure maximum benefit while avoiding unintended interference. While "dig once – build once" is a worthy goal on infrastructure projects, it is not always possible. Missing these opportunities when they are possible should be a priority.

Greater collaboration brings more eyes to the project and thus greater accountability. Even after a project is built, there is value in each community keeping a log of all technicians

traveling to a community to support their individual systems. Are multiple electricians or other trades flying in to support their separate systems when a single person could be contracted? Does maintenance on one system impact another? This study's author witnessed a valve that had been turned off in a water treatment plant during maintenance that was not turned back. This resulted in almost a year of heating oil consumption instead of using waste heat from the adjacent power plant.

There are barriers to collaboration. Training and retention of our workforces is critical. So is recognition that institutional knowledge is essential. Sharing of this knowledge should be fostered throughout an organization and with partner organizations. Kotzebue Electric found their battery to be very beneficial in daily diesel operations – others who design and fund power plants should incorporate KEA's learning into new power plants and upgrades.

Other barriers exist because of competition for limited funds or turf competition over which provider lays claim to which utility partners. One respondent used the term organizational ego which describes the desire to be the premier, if not sole expert in a given field but to the detriment of others. Healthy forms of ego can exist where people take ownership and pride in a well-executed project. Some barriers are related to funding from a particular agency that only allocates funds to that agency's personnel when there may be experts from other organizations or private contractors who would provide better service to the end customer/community.

Limited funding can also be a barrier when it prevents providers or system operators from traveling for planning and shared learning or allocating staff time to support other larger initiatives.

> *"One of the problems that we do have, and it's not just Alaska, is that there is no funding to allow for the collaborators to collaborate. And so, I've certainly been one to try and push conferences and meetings that bring in the collaborators, because I think personal relations and personal engagement overcome a lot of those barriers that that you see around turf wars and funding wars, and all of that kind of stuff. It's much easier to get beyond that when you know the players and you already collaborate with folks. Having resources to be able to have the technical assistance providers collaborate is one of the things that really does need to happen to be successful."* – Ian Baring-Gould

4.10 SWOT Analysis

The Strengths-Weaknesses-Opportunities-Threats (SWOT) analysis method dates back to 1950s/60s corporate America as a tool for critiquing an organization that can be used to help plan future direction and goals. [7] For this study, respondents were asked to identify the main factors under each prompt after having most of the interview to discuss their experiences. Their responses were, as a general trend, intended to be summarizing rather than exhaustive.

STRENGTHS

- Denali Commission
- TA providers very good at what they do
- Alaska as a learning laboratory
- Indian Energy TA
- USDA Rural Energy
- Many creative thinkers in Alaska
- Support and interest from national labs

- Getting things done rather than just talking
- Provides pros and cons for communities to make decisions
- Many experienced resources in the state
- State funding
- ACEP

Alaska benefits from in-state industry professionals, state agencies, the university system as well as funding and other support from the US Dept. of Energy and various national laboratories. The US Dept. of Agriculture allocates funds and loans to rural and high-cost-energy communities[5] and the Office of Indian Energy Policy and Programs provides no-cost early technical assistance to tribal governments. The Denali Commission's ability to protect funds from expiration and provide non-federal matching dollars was mentioned by almost every respondent. State funding, especially the Renewable Energy Fund, is seen as effective in helping communities to explore their options for energy cost reduction and security.

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[5] Although some feel that this benefits Railbelt communities more than remote Alaska.

WEAKNESSES

- Continuous need for funding

- Can be high costs

- Assumption that outside experts have all the answers

- Stretched capacity of providers when funding is abundant

- Diverse Alaska environments and resources limit one-size fits all solutions

- Local economic barriers

- Inconsistent funding from year to year

- Changing priorities with new administration

- Communities must compete for limited funds/resources

- Can be done poorly

- Recognize bias – be technology agnostic

Despite past and current levels of funding, more financial support is needed than is presently available. Depending on the situation, some technical assistance can be costly. There can be (but not always) an assumption that national laboratories and industry professionals have all the answers – this can be from the technical assistance providers as well as some communities. There is a greater need for technical assistance than the current pool of providers can serve. In addition, providers need to be open about their biases and work harder to be technology-agnostic in recommendations to client communities.

Competition for a limited availability of funds and providers can be especially difficult for small communities who must compete against regions that have surplus economic resources to self-fund energy projects. Organizations that serve communities across a spectrum of geographies and environments (e.g., AVEC, AP&T, TCC) can be challenged with diverging solutions for each community that conflict with the need to standardize solutions and ongoing support across their support base. Communities with energy challenges may also have to weigh their bandwidth to address energy issues versus other economic barriers such as affordable housing and employment.

The most common weakness brought up by interviewees is the variability of funding levels from one year to the next. This is often a result of changing priorities with new administrations and legislative political agendas. Lastly, while technical assistance has been mostly positive in the state, when done poorly it can create lasting negative impressions within a community.

OPPORTUNITIES

- Changing climate creates a need
- Public-private partnerships
- 5-year funding plans
- Expand to local training and jobs
- Partner with entities that can take advantage of tax incentives
- $2.6 billion IRA funds to Alaska

- Attract emerging technology companies to Alaska
- Replicate water/sewer training systems to village utilities
- Local workforces that can be trained in new skills
- Regionalization of O&M
- Broadband – for monitoring and training

Our changing climate ensures a long-term need for technical assistance as we transition to newer systems. Inclusion of public (government, laboratories and academic) and in-state private specialists can provide more Alaska-specific expertise for analysis and proposed solutions. Because projects can take longer than 2-year budget cycles and competition for a small pool of providers can increase wait times, moving to 5-year (or longer) funding sources can avoid expiration on funds and help providers to staff their organizations with less uncertainty.

Expanding the role of technical assistance into long-term operations and maintenance training can optimize the benefit of energy projects while also providing needed local employment. Water and wastewater utilities in the state benefit from state training programs for both operators and utility managers. These programs can serve as blueprints for similar programs on the energy side. Better broadband infrastructure can be the platform for training programs while also improving the ability to remotely monitor systems. An unexpected upside from the COVID-19 pandemic was increasing people's comfort level with using Zoom and other digital platforms for communication.

As energy systems are upgraded with newer technology, establishing regional operations and maintenance support can ensure successful long-term performance. Lastly, the business structure of village governments and utility cooperatives negate financial incentives such as tax credits and asset depreciation. Partnering with Native Corporations and other private entities can improve the economic benefit of projects and keep more investment dollars in the state. Replication of the independent power producer model used in the Northwest Arctic Borough can create measurable energy cost reduction for local ratepayers rather than just reducing the state's Power Cost Equalization expenditures.

THREATS

- Providers who think they are "the one" who sell pipe dreams

- Broadband issues

- Fuel delivery up smaller rivers or with aging airframes

- Arctic Energy Office needs base budget

- Private profits over community priorities

- Need greater energy literacy – local and state

- Highly dependent on world commodity – no local discount

- High energy costs discourage investment

- Political cycles

- TA without commitment to the outcome

- Solutions that reduce local jobs

- Poor TA can turn a community off

Providers who believe that theirs is the only solution and/or come to a community with unproven technology can lead to failure. Poorly executed technical assistance can negatively impact communities for many years. Another threat is technical assistance prioritized as continued employment for the providers with less focus on a successful outcome for the community.

Political cycles at state and federal levels can slow momentum of these programs, both in the benefit to communities and an agency's ability to retain institutional knowledge and experience. Establishing the Arctic Energy Office is seen as positive but needs its own budget rather than operating with personnel based in other agencies. Climate change is already impacting fuel deliveries barged upriver. As the fleet of fuel tanker airframes age, these current and more expensive alternatives could be at risk of disappearing as altogether.

Despite being an in-state resource, oil and gas are priced as a world commodity with no discounts for Alaskan communities. These high energy costs discourage outside corporate investments across Alaska.[6] [9] While better than other states, Alaska communities need an even greater level of energy literacy in the future. Also, our solutions need to protect and hopefully expand local jobs.

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[6] The Area Development Corporate Survey on Site Selection Factors ranks "energy availability and costs" as the third most important factor in both 2020 and 2021 when deciding where to build new facilities. More than 85 percent of respondents listed this as an important factor. As a corollary, 75 percent of respondents listed access to renewable sources of energy a factor in their site selection decisions. [8]

4.11 How would you define what TA is and is not?

At the end of the interview, respondents summed up their views on technical assistance. Generally, the emphasis is on local needs and capabilities. The approach should be in the form of a partnership rather than sage and student. There should be collaboration that includes a thorough hand-off – delivery and receipt of that assistance. The end result should be increased local capacity to support and maintain systems.

One critique that is not being attributed to any particular respondent is the concern that much of the funding for technical assistance can go to consultants or agencies and their well-paid staffs while local communities only see a small portion of funds to actually implement energy-saving solutions along with a 4-inch binder of plans that sits on a shelf.

"TA is fixing all the things that don't fit into anything else. Should be open ended, non-restricted funding to fix all this that falls between the cracks." – Meera Kohler

"Technical assistance is not writing a check. Technical assistance is enabling champions with information and processes that are not readily or inherently available. Technical assistance is as broad as the definition as economic development, but at the end of the day, we've got to train the trainers, we've got to get the next generation engaged and impassionate about sustainable communities which begins with sustainable systems, which is transportation, which is energy." – Robert Venables

"Technical assistance is providing the knowledge you need to make a decision - sort of helping look at all the options, answer questions to help make a decision about whether to do something or not do something. It's sort of that guidance and counseling towards making the right decision. Technical assistance is not building something and hoping it works. It's more of helping somebody make the right decision to go forward and build it." – Matt Bergan

"Technical assistance would be showing people how to do things and, in some cases, learning from them and being able to embed some of their experiences into your technical [assistance]. It's not just a one-way street, they the user has something to offer off as well in many cases. Technical assistance is probably not [just] building something. Building something and walking away from it is not good technical assistance. You need to embed ability to operate during the development of the project so it can continue." – Brent Petrie

"A reliable, knowledgeable person or a group of people that is consistently available to help guide a project from concept (or even inquiry) to completion and then maintain it over time. It's not a one off." – Jessie Huff

"I think of it more like a partnership with a community because we're not just doing a thing and then delivering it. It's delivered as a partnership. Here's how we got to this solution and

we're working hand in hand, rather than a technical service provider just kind of developing something and handing it over." – Natalie Hanson

"It is not analysis for the use of other people studying what's going on in Alaska. Technical assistance should have the outcome that is requested by the entity that's asking for the technical assistance." Ingemar Mathiasson

"Sometimes technical assistance comes in there and make suggestions and they just need to know that they are folks providing suggestions. We should think of them more as suggestions and less 'I'm providing <u>the</u> answer', but more, 'I'm providing <u>an</u> answer. It might not be the answer you choose and that is okay.'" – Cady Lister

"Technical assistance is the gap. What is preventing you taking the next step? In order to move a public project, you must have stakeholders. You need to have the right support networks and if the project isn't moving forward, it's because at least partially, you don't have the right support. It is not throwing good money at unthought ideas. The Denali Commission is especially good at identifying and filling gaps." – Erik O'Brien

"Technical assistance is increasing the capacity of the people who are closest to the infrastructure in the Community. No matter what that infrastructure is, it's increasing their capacity, so it could be training, it could be emergency advice, it could be overall practices of maintaining tools. What it is not is doing any sort of maintenance repair update without a community member aware of it, then I don't think you're assisting anybody anymore. There has to be some component of communication or contact with people in the community." – Chris McConnell

"It's the ability to grow and learn alternative energy. It's also a game changer. It's the methodical approach to put steel in the ground projects to stabilize your energy costs, lower your energy costs, keep money in the villages, and help villages thrive. Technical assistance is the key to promoting energy, development, and energy justice. It's not going to be successful If you don't have a joint solution involving everybody. You need the Native Corporation, the tribe, the feds, the state, the energy industry, all working together in order for the technical assistance to bring about these projects." – Sonny Adams

"It is providing information that the community might not have readily available to help support decisions that the community feels it needs to make. Technical assistance doesn't give you solutions. It provides you with the information to allow you to make decisions." - Ian Baring-Gould

5. Common Themes and Analysis of Text

Compiling the common themes from all the interviews reflects factors that respondents most commonly mention, whether in a positive or a negative light. In some cases, a particular subcategory will denote positive or negative connotation. The narrative sections above provide greater context as to which factors facilitate effective technical assistance versus which factors are barriers.
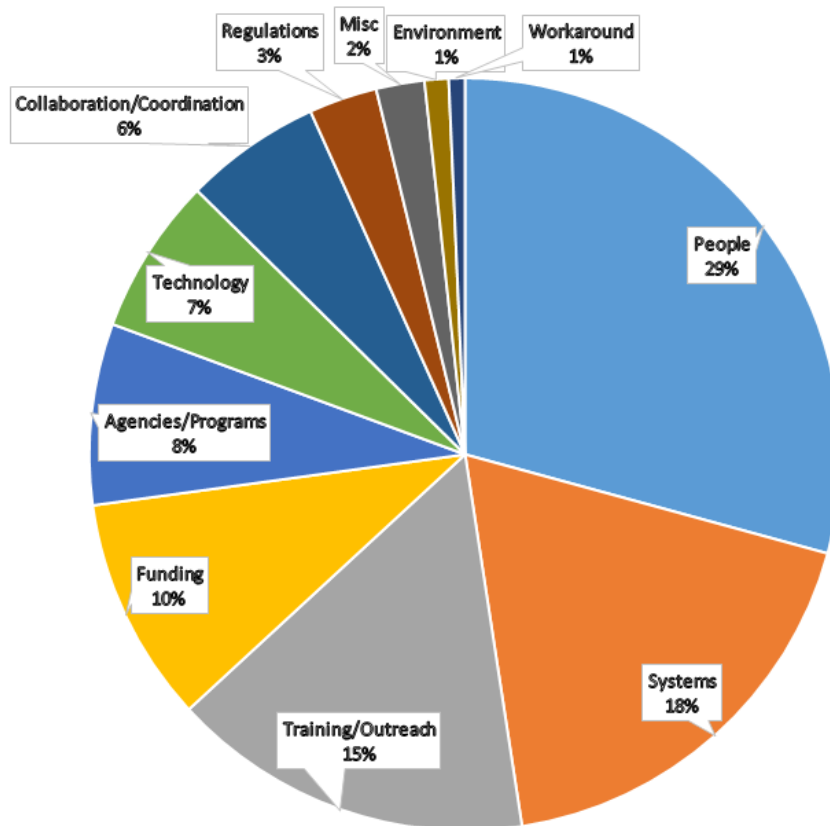
Fig. 3: *Main categories of common themes mentioned by respondents.*

Each theme was assigned to a broader category descriptor. Figure 3 shows the ranked order of these categories. A key takeaway from this high-level view is that despite the overriding subject of Technical Assistance, technology ranks only 7th highest at six percent of the total themes discussed by respondents. People-related themes were most commonly mentioned at nearly one-third of the total. Even Funding, a common issue dealing with the need for more, only ranks fourth behind Systems and Training/Outreach. Combined, Funding and Technology only account for 16 percent of total mentions. This may be either because the other factors have a greater

impact on the success of technical assistance programs or it could be that the technology and funding are fairly robust and not as much of a concern as other factors.

People

The top themes for the People category are shown in Table 2. Leadership is mentioned in two contexts. Good organizational leadership radiates throughout an organization through vision, focus on the mission and allocation of financial and human resources to meet client needs. Lack of leadership is apparent in some organizations, even when front-line workers are providing exemplary customer service. A comment from one respondent that reflects the opinion of others was that they "enjoy working with almost every person there but the culture at the top down has their eye on a different ball." In some cases, agency personnel in the field are seen in very favorable terms but the change desired is simply for leadership to allocate

Table 2: Key themes related to People	
Theme	**# of Mentions**
Capacity building	15
Agency leadership needed / Poor Agency Leadership	14
Cultural awareness / training vs insensitivities	11
Trusted Partner	11
Regional expertise/skills	11
Utility Management Skills or Lack	10
Local skill sets to hire local	9
Community support - cultural and social	8
Workforce development	8
Understanding and Trust	7
Fed agency goals vs community needs	6
Local Champion	6
Turnover/Retention	6
Personal relationships	5
Community Liason	4
Contractors don't always capture full/accurate community input	4
One Person Dependent	4
Organizational ego	3

more money and staffing for those resources. Leadership is also critical in elected officials at the federal, state and local levels to allocate consistent funding on programs and be present in communities to understand their specific needs.

Capacity building in the community is critical, both for people operating and maintaining equipment (power plants, building environmental systems, communications systems and water/sewer infrastructure) as well as the administrative, clerical and governance skills needed to sustain organizations. Local and regional champions are needed for self-sufficiency. Investment in local skills and certifications can make a huge difference when it comes to local hiring for major projects.

Lack of cultural awareness is a commonly raised issue. This occurs with people coming from out of state but also from service providers based in Alaska's main population centers. Cultural insensitivities can prevent successful partnerships and lack of cultural knowledge can result in solutions that only address technical factors and ignore local factors that may be part of the root cause and/or must be included for a tailored, holistic solution.

Agency goals are not always aligned with community needs. [example needed] This can be related to the agency charter and mission and it can be related to federal and state policy makers who create programs lacking sufficient input from Alaskan community members.

One respondent used the term "organizational ego" where construction and engineering providers become protective of their perceived "turf". Part of this is laying claim to future revenue streams with a community. Another part is simply an organization, or even a funding agency, that develops a vested interest through allocation of their own money and personnel and wants to feel good about a successful project. Strong state and agency leadership could promote greater collaboration to ensure that egos operate in healthy ways with confidence or pride and avoid arrogance, defensiveness or self-centering.

Systems

Much discussion was made around the critical importance of community energy planning. Working with local communities on education and outreach to inform viable energy solution paths with local input and support is essential for long term solutions that will be maintained and effective in addressing local-specific challenges. After a community energy roadmap is developed, planning and implementation of

Table 3: Key themes related to Systems	
Theme	**# of Mentions**
Community/energy planning	20
Planning and implementation	11
O&M and Optimization	9
Long term support	6
Complex and proprietary system integration	5
Data Acquisition and Analysis	5
Lack of / Poor Maintenance	4
Performance Verification	4
Community flexibility to contract out what they need	4
Communication status or need	3
Fuel logistics	3
TA that leads to next step - Not a document that sits on a shelf	3
Commissioning and post	3
Holistic approach	3
Regional/community focus vs Statewide	3
Very long term sustainability	3

specific projects is a high priority, followed by the ability to operate and maintain those projects. Optimization beyond initial commissioning is necessary as solutions might not immediately achieve the expected benefits. Reiterating the importance of a focus on operations and maintenance, the long-term benefits of a project are necessary for sustainable community energy systems. The comments made about a community's ability to communicate current status and need has links to local energy literacy and knowing how to navigate the agencies, programs and key contacts that offer technical assistance.

One technical assistance provider has this to say about energy planning: "*We do not want a document that sits on a shelf. We want specific task masters. We want to identify who is responsible for taking this report to the next level, meaning if it's building a project, you,*

whoever "you" is, are going to apply for this funding opportunity. And this is how you're going to get the resources to do that. And so, it's specific and pointed to be an action document, not a plan for the sake of planning."

Training and Outreach
This category highlights how receivers and providers of *technical assistance* define that term well beyond the scope of technology. In many cases, the term *technical* refers to the technicality of systems. The roles, responsibilities and task-specific training surrounding the operation and management of an electrical or water/sewer utility requires local trained capacity in governance and bookkeeping. Management and board members must be knowledgeable on funding, hiring, training and retention of the local workforce. One TA provider commented how "power plant operators go to AVTEC but management doesn't have training." RUBA [10] at the Alaska Department of Commerce, Community, and Economic Development and ARUC [11] at Alaska Native Tribal Health Consortium were both mentioned by multiple respondents as examples of water and sewer utility management training and support.

Hands-on (over the shoulder or Zoom) training for PCE reporting and the local optimization of PCE payments was mentioned as very helpful for communities that have received it. Funding for continued and expanded PCE support was requested. All of the topics mentioned in this section are anchored in the need for more literacy in energy systems, finance, project development across the myriad of funding programs and technical assistance processes. The options available are so varied that a small community that might seek this assistance once or twice a decade can find themselves learning through trial and error if direct guidance is not made available. Senator Lyman Hoffman's funding for two positions to assist Western Alaska communities in writing Renewable Energy Fund proposals was mentioned as a positive example of such guidance.

Table 4: Key themes related to Training and Outreach	
Theme	# of Mentions
Governance and Bookkeeping	12
PCE Support	10
Education about the funding and TA process	10
Technical training	10
Need for more literacy in energy, finance and project development	8
Need generalist training	7
Education and outreach - public	7
Grant application assistance or RFPs	7
AVTech/ Seward Skill Center	6
Over-the-shoulder / In-person training / Shadow TA	5

In addition to the above, the need for generalist training was brought up due to the wide range of skills needed to maintain critical infrastructure in small communities where there likely is not enough demand to justify a full-time job as a diesel mechanic at the power plant.

Funding

Although the Funding category was less prevalent than others, most comments on this subject dealt with the need for higher levels and more consistent funding. Funding levels that change from one administration to another create gaps in the level of support that agencies can provide and make it harder for communities to plan for the long term. Funding programs with short deadlines to spend funds (e.g.,

Table 5: Key themes related to Funding	
Theme	# of Mentions
Room for more Funding & consistent funding	14
Need more training funds	7
Not Paid While Away at Training	5
Don't consider other agency programs in funding/solutions	4
Need for General Funds	4
Need more staff to manage 3-5X federal money	3
Design $ needed	3
Funding all to agency personnel	3
DOE tribal 5-yr grant	2
Matching funds	2
More infrastructure $$ available	2
Organizations with limited budgets	2
Residential - high need but low funding	2

within a specific fiscal year) are problematic for communities that must deal with weather related logistics and projects that simply don't fall within a 12-month timeframe. DOE 5-year grants for tribes and the Denali Commission's ability to accept/rollover funds that might expire were examples of successful alternatives.

There has been a recent increase in the availability of federal funding but this brings the challenge of how existing agency staff can effectively administer these programs. Leadership needs to recognize that more employees who are trained up on these programs are needed to get the money where it can be put to use in communities.

More training funds are needed, especially once funded projects are built. The ongoing support of these projects is required to reap the benefits of the original design and construction investment. Several people brought up the issue that while training scholarships and lodging are available for some programs, trainees are typically foregoing their regular paycheck because they are away from their home communities, not there to perform their regular job. Another issue raised is when much of a program's funds go towards agency personnel rather than being spent in the community. Others raise a similar concern in the balance needed between contractor profits and community benefits.

Agencies/Programs

The US Dept. of Energy Office of Indian Energy Policy and Programs has been a major provider of funding for energy projects on tribal lands. Their increased support for technical assistance helps tribes to incubate energy ideas that have better chances of getting funded. The Denali Commission is the other agency with high popularity due to their assistance with developing proposals and being a conduit for funding that does not expire until spent.

Table 6: Key themes related to Agencies/Programs	
Theme	# of Mentions
Circuit Rider / Remote Maintenance Worker	10
Office of Indian Energy	9
Water & Sewer	9
START	5
ARUC/RUBA	3
RuralCAP Energy Wise	2
RAMP - Rural Assistance Maintenance Partnership	1
AVEC	1
CCHRC	1
RACEE	1

Water and sewer systems were mentioned as examples where both ANTHC and DCRA's RUBA and remote maintenance worker programs are successful models of utility management and operations that could serve as blueprints for electrical utility management and operations. Alaska Energy Authority's circuit rider program was frequently mentioned as a critical program with the caveat that all respondents mentioning the program believe that it needs significantly higher levels of funding and staffing that are consistent over time. Denali Commission's Rural Alaska Maintenance Partnership [12] is also a model for general facilities maintenance skills training that could be adapted to develop local capacity specifically for energy maintenance skills.

DOE's START program is seen as effective but recipients want a higher percentage of total program funds spent directly in the communities. RurAlCAP is seen as a program that gets things done in communities with a limited budget.

Technology

This category was dominated by responses about energy efficiency and weatherization needs and initiatives, followed by comments about insufficient broadband and Wi-Fi infrastructure needed to monitor and optimize systems with remote technical experts. Integrating new solutions into legacy power plants is also an area that challenges remote communities and utilities.

Table 7: Key themes related to Technology	# of Mentions
Energy Efficiency / Weatherization	14
Broadband / Wifi challenges	8
New and old infrastructure	3
Heat recovery considerations of RE and inverters	3
Technical details	3
Line Loss	2
Battery Storage	2

5.1 Common Words and Phrase

Text frequency analysis tabulates the most common phrases and words in each respondent's transcript. Each common phrase or word is noted but not its frequency, regardless of if it was mentioned 5 times or 15 times, The most commonly occurring words across all interviews are "community" and "*funding*". Combined with "*money*", these related words represent 6.1 percent of all common words from the collective pool of responses. "*Training*" also ranked high, followed by "*Denali Commission*" and "*ANTHC (Alaska Native Tribal Health Consortium)*", both of which were mentioned favorably by nearly every respondent even if they did not appear in that respondent's common phrases or words. Figure 4 shows the top 13 common phrases and words, each of which was a common word for at least three respondents. Appendix II provides a complete list of common phrases and words.
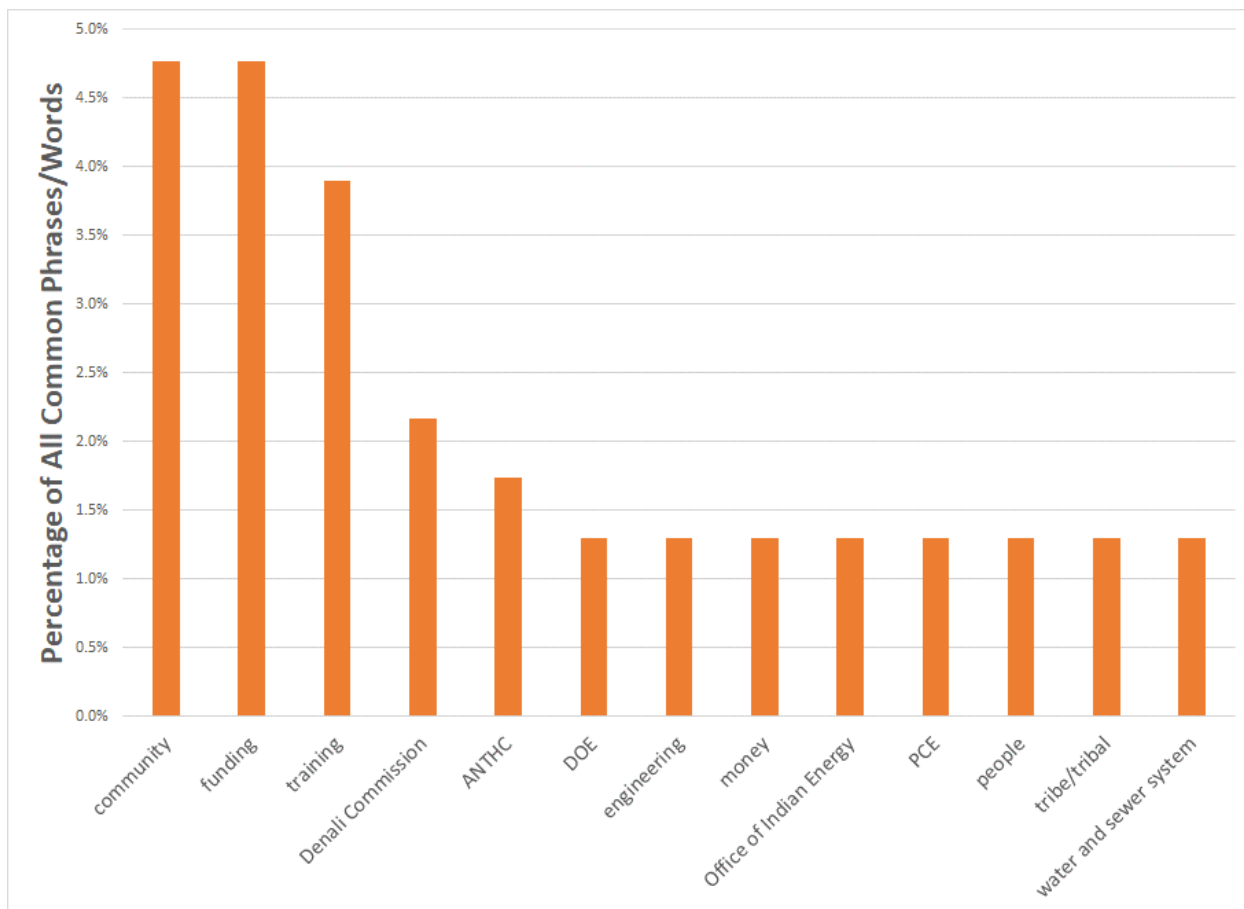
Fig. 4: *Top 20 common phrases and words from text frequency analysis of each individual respondent.*

6. Recommendations

Many great ideas were offered by each respondent to the question *"If you had the unrestricted ability to allocate several million dollars toward a TA program in the state, to which organizations would you allocate and for what purposes?"* Highlights are provided here with the complete list of respondent recommendations provided in Appendix IV.

6.1 If you had the unrestricted ability to allocate several million dollars toward a TA program in the state, to which organizations would you allocate and for what purposes?

The Denali Commission was frequently brought up as a trusted organization that manages effective programs, serves as a conduit for a variety of funding sources and has comparatively stable leadership regardless of changes in political party control at state and federal levels. The Commission has a reputation of focusing on coordination and working well with multiple state agencies and technical assistance providers. Conversely, organizations that are subject to

funding and priority fluctuation from changing administrations were not recommended as stability and consistency are highly valued for long-term planning and operations.

Organizations with lower administrative overhead are preferred unless there is a specific set of expertise not available form lower-cost providers. Another preference is for providers who are organized for rapid response to technical assistance, especially for projects and systems already in operation. Partnerships are also key such that organizations that are successful in building partnerships are seen as more sustainable than simply choosing the smartest person or organization in the state. ACEP, REAP and USDA Rural Development were mentioned as examples of partnership-centric organizations.

A general suggestion from several respondents is to create a collaborative effort to ensure that no money is left on the table for the myriad of funding opportunities available to Alaskan communities. Chad Stovall described such an organization in this manner:

> *""Have the Denali Commission lead a public private partnership with statewide organizations like the Alaska Municipal League and our university system. Every month or quarter meet to monitor funding available for everything from subsistence rights, energy, and climate change. Catalog the funding and how that money can be accessed. Create a support group of federal, state, and nonprofits to become vehicles/applicants, building dialogue throughout the process. This process could help us better understand questions like: Where is Alaska uniquely competitive? How can we do better than our competitors? How to build sustainable customer service platforms that build capacity at each level?*

Denali Commission has the benefit of providing non-federal match dollars for grants. The Commission also has a reputation of less red tape or bureaucracy.

Matt Bergan with Kotzebue Electric Association would like to see funding for more energy storage projects along with a broad-skills training program so that power plants can have renewable energy technicians that include IT and renewable-diesel integration skills. Others have suggested duplicating the remote maintenance worker program for energy specialists. Another training suggestion was to allow for more traveling trainers from AVTEC and other providers to conduct in-person training within a village on that particular village system. Broad energy education was also suggested through regional organizations such as Southeast Conference, SWAMC, TCC, Northwest Arctic Borough and Nuvista.

One caveat to the proposal for more local training is the need for community buy in to ensure they will create and sufficiently fund these needed positions to build a workforce that wants to be doing the same job 10, 20 or 30 years from now. Create jobs in the energy sphere, especially in rural Alaska that people are proud of, fairly compensated for and want to do on a daily basis. Turnover is a huge problem in rural Alaska as well as the Railbelt. Less money would be needed for training if employee retention rates were higher and local experience levels would grow over time.

Alaska Housing Finance Corporation is seen as having a successful approach to building energy efficient housing that requires less energy to maintain. Housing is an area where individual families are most likely to see measurable benefits.

Creating more regional utilities or regional support for local utilities was suggested by multiple respondents. The success of AP&T and AVEC demonstrate how local power plants can function more effectively by using regional expertise to train local people in the administrative and technical skills needed for sustainable energy systems. In addition to skills training and support, these organizations can serve as cooperatives for fuel purchasing and maintenance of bulk fuel storage facilities. One suggestion was to fund a study to evaluate the efficacy of such regionalization.

Another regional suggestion was to create tribal and nontribal regional energy leads similar to the EPA Region 10 IGAP program. [13] Specific mention was made of the effectiveness of people like Dave Pelunis-Messier, Ingemar Mathiasson, Tyler Kornelis as well as present and past AEA circuit riders and AEA's former regional energy coordinators.

Several respondents made suggestions to create a pool of known providers whether it be for boiler systems, water/wastewater, housing, administrative services/training and establish fixed rates for the providers of common needed services. This would require accountability and

oversight to ensure that communities are receiving the needed assistance with respect to quality and price.

Increased funding for utility business skills is recommended. These would include on-going over-the-shoulder training for QuickBooks and PCE reporting. Local utility boards need training and refreshers on roles and responsibilities and how to provide oversight and direction. Utility management needs training on how to organize day-to-day activities, organizational structure, rate setting, scheduled maintenance and employee compensation. This could be administered by or modeled after the DCRA local government specialist or RUBA programs but the demand is likely such that more providers are needed to conduct training with each of the communities. Live remote training is possible however this is dependent upon improved local broadband service at affordable rates.

Using existing models and systems from ANTHC, ARUC, RUBA and other programs as a starting point, solutions could be developed so that local communities gain the necessary skills to govern and operate all of their programs and utilities.

The RUBA approach to assisting communities

- **Present eight management courses. Click here to see more course information.**
- Identify communities with sanitation management issues;
- Visit community for fact-finding;
- Create an assessment identifying strengths and weaknesses;
- Develop a proposed work plan;
- Present the assessment and work plan to the community;
- Finalize the work plan with the community's council and agree on responsibilities;
- Provide technical assistance on-site;
- Assess progress and adjust work plan if necessary;

Source: Alaska Department of Commerce, Community, and Economic Development, Division of Community and Regional Affairs

6.2 Overall recommendations from the author based on the entirety of responses.

Alaska is unique compared with the rest of the United States in that tribal and village council members need to be much more energy literate and skilled than their lower-48 counterparts. This is a heavy burden not shared by local leaders in the contiguous United States where national and regional electric grids serve communities with energy generated by large utilities

and power producers. To ensure reliable and affordable energy infrastructure across the Alaska, we must provide the necessary resources in training and staffing for each community. This requires the recognition that turnover is inherent in elected offices and in support organizations. As such, outreach, training, support and funding must be continual and consistent to meet the needs. Ideally, it begins with energy education and outreach in the local schools and expands to the adult population. Energy literacy, utility management, billing and PCE reporting, power plant operator and diesel-solar-wind technicians are just as important in communities as knowing how to hunt, fish and maintain a snowmobile, a four-wheeler and an outboard engine.

Equipment alone is not an energy solution. Funding agencies need to recognize that energy generation and controls must be accompanied by sufficient ongoing training to operate and maintain the integrated system for decades. The system must operate within the larger structure of a local utility trained in management and technology. Alaska already has a successful blueprint for training water and wastewater utility management (RUBA Program) [10]. This approach can easily be adapted for electrical utilities to develop administration and oversight skills and sharing of best practices.

Building on the concept of perpetual programs, encouraging energy savvy Alaskans builds a strong local pool of applicants when hiring people to maintain these systems. Increasing the rate of local and regional hiring promotes economic security with stable jobs rather than bringing in outside contractors. Whether it is building a new energy project or maintaining existing infrastructure, it is critical to understand which specific skills are needed, where they are needed and when they are needed. This will help to identify gaps in local and regional workforces and allow for training and certification of workers to meet the need. The overriding goal should be "Don't miss any opportunity to hire local/regional." While there will likely be highly specialized tasks that require outside help, we all need to regularly assess our assumptions and break through barriers to maximize local and regional employment.

Don't leave any money on the table. There is a wide range of funding opportunities that are applicable to Alaska communities. Funding sources can include numerous federal agencies, state legislative appropriations and philanthropic sources. It can be challenging to stay informed on all current opportunities, especially for a small community that may only seek funding a few times each decade. Funding programs sunset or may be supplanted. Writing successful grant applications is a skill that takes time to develop. Alaska could use a collective of partners who know and monitor the myriad of funding opportunities and help to align communities with their most promising funding sources. This collective could also assign coaches to assist in developing grant proposals. The overall goal would be to ensure that Alaskan communities have access to every possible funding opportunity.

Another way to ensure money isn't left on the table is to develop partnerships with in-state corporations who can benefit from tax credits and asset depreciation that has no measurable value to local governments, federally-recognized tribes or energy cooperatives. The Minnesota Flip Model [14] was developed in the mid-2000s to allow corporate partners to work with community-owned wind energy projects in which an equity investor would own controlling interest (up to 99 percent) of the project for the first 10 years to utilize all of the tax credits and accelerated depreciation. After 10 years, controlling interest flips to the community. Partnering with Alaska-based companies can help keep more money within the state, benefiting communities and regions with the increased circulation of cash and potentially, greater in-state investment.

Broadband infrastructure is critical to improve local capacity and remote monitoring. As power systems advance across the state, there is a greater need for robust communication to operate and maintain these systems. High bandwidth is critical for live monitoring of system health as well as troubleshooting problems remotely so that the proper spare parts and skilled personnel can be sent to correct the problems in a single visit versus flying out technicians to troubleshoot and then a second visit with the correct parts and supplies. Each of these trips can be impacted by weather delays, further impacting the local power plant as well as other sites that could benefit from the presence of those same traveling technicians. Improved broadband is also a prerequisite to delivering timely, more frequent and efficient training programs, whether to power plant administrators, operators, technicians or clerical staff.

Partner with communities through sharing knowledge of their lived experiences with the current power systems as well as existing technology options. Use this as the foundation to lead a Socratic seminar approach to consider options/pathways from which the community will eventually select, including "none of the above". Socratic questioning includes:

- Clarifying concepts.
- Probing assumptions.
- Probing rationale, reasons and evidence.
- Questioning viewpoints and perspectives.
- Probing implications and consequences.
- Questioning the original question.

Replicate regional support strategies that have been successfully implemented. Can we replicate regional power plant support methods used by AVEC in other communities? Might there be an opportunity for AVEC to offer these services outside of their network? Follow a similar approach based on the success of energy efficiency implementation by RurAlCAP and Tanana Chiefs Conference.

Provide and require ANCSA-focused cultural training for all people providing consultation and support services across Alaska. This can even be beneficial for people who are well versed in their own regional culture but have spent little time in other diverse parts of the state.

As a former employee of Alaska Energy Authority, this author recognizes the feedback from interviewees on the critical need and essential benefit of the circuit rider program. I would greatly increase the budget to hire more staff and include a training component where circuit riders would also have time to engage in over-the-shoulder training of local personnel. While we focus on technology, people are the critical component to operating and maintaining that technology.

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Appendix I – Interview Questions

- Share some background on your past involvement with delivering or receiving technical assistance on energy projects in Alaska.
- Which key projects come to mind (community and scope/technology)?
- What key assistance was provided (including scope/skill set)?
- Which stages of project development were involved?
- How was the TA funded and what amount was needed?
- Was TA required through multiple project phases?
- What areas of technical assistance are needed but not available?
- To what degree is the provided TA focused on engineering and technology versus other disciplines (financial, organizational, cultural/social, policy, O&M, training)?
- Where do you see gaps in the types of training you would like to see or like to provide?
- Are there policies at local/state/fed level that promote needed technical assistance? (Describe)
- Are there policies at local/state/fed level that hinder needed technical assistance? (Describe)
- To what degree do you see the need for multiple TA providers to collaborate on projects?
- Are there barriers to this collaboration? (Funding allocation, turf competition, boundaries/limitations in charter/mission?)
- SWOT analysis of TA in general?
- If you had the unrestricted ability to allocate several million dollars toward a TA program in the state, to which organizations would you allocate and for what purposes?
- Given all that we have discussed, how would you define what TA is and is not?

Appendix II – Complete list of common phrases and words

5-year	disaster declarations	just jobs for DOE	remote maintenance worker program
62 Thousand	do justice	kids	renewable
ability	DOE	knowledge	Renewable Energy Fund
access	duties	knowledge base	research
Alaska Energy Authority	dynamic	leadership	resources
Alaska Power and Telephone	effective	learning laboratory	rural Alaska
align resources	efficiency	lights	school
analysis	electric vehicle	local capacity	school district
ANTHC	energy	Lower-48	sense
applications	energy efficiency	management	service
approach	energy flows	money	Seward skill center
Arctic Energy Office	energy planning	NREL	skill sets
AVEC	energy policy	objectives	social
battery	energy storage	Office of Indian Energy	solar
benefit	engineering	operations and maintenance	solution
biomass	ETIPP	opportunities	START Program
bookkeeping	experience	options analysis	state
broad	expertise	organizations	stem education
broadband	feasibility study	our workforce	strategic energy plan
business side	federal	partnership	sustainability
buy in from the community	financial	PCE	Systems
capacity	flexibility	people	tank farm
capacity building	for the community	permafrost	technical assistance is the gap
challenges	forest service	perspective	technical support
champions	funding	phenomenal	Ted Stevens
climate	general power technician	planning	that one person
climate change	generator	policy	the challenge you face
Cold Climate Housing Research	go from village to village and work	power plant	training
collaboration	governance	power plant operator	transient population
community	grant making	pre-COVID	tribe/tribal
community energy plan	hands-on	private industry	understanding
community needs	have university	program	USDA rural development
conduit	heat pump	projects	utility
consistent	heat recovery	provide/providers	water and sewer system
coordination	high energy cost grants	provided in the community	wind for schools
cost of energy	hire who they…	quality of life	wind turbines
dedicated to	huge opportunity	rail belt	wood energy
Denali Commission	implementation	regional	workforce
development	in the community/village	regional training centers	workforce development
diesel	infrastructure	regional/community energy planning	YK Delta

Appendix III – Themes Ranked by Category

Category	Theme	# of Mentions
People	Capacity building	15
People	Agency leadership needed / Poor Agency Leadership	14
People	Cultural awareness / training vs insensitivities	11
People	Trusted Partner	11
People	Regional expertise/skills	11
People	Utility Management Skills or Lack	10
People	Local skill sets to hire local	9
People	Community support - cultural and social	8
People	Workforce development	8
People	Understanding and Trust	7
People	Fed agency goals vs community needs	6
People	Local Champion	6
People	Turnover/Retention	6
People	Personal relationships	5
People	Community Liason	4
People	Contractors don't always capture full/accurate community ir	4
People	One Person Dependent	4
People	Organizational ego	3
People	Believes they have all the solutions	2
People	Community context	2
People	Cultural/social trauma	2
People	Interim CEO - Foraker	2
People	Local resistance and pride	2
People	Shortage of trainers	2
People	Familiarity with AK systems and practices	2
People	Infighting vs shared common goals	2
People	Risk averse vs taking orgs	2
People	Burn Out	1
People	Commitment level of community	1
People	Community labels, reputation, self-fulfilling prophecy, nonsp	1
People	Higher value to researchers than communities - AK project pi	1
People	Indian Energy leadership presence in Alaska or lack	1
People	Local control	1
People	Private Partner	1
People	Understaffed to focus on renewables at utility	1
People	Work Ethic	1

Category	Theme	# of Mentions
Systems	Community/energy planning	20
Systems	Planning and implementation	11
Systems	O&M and Optimization	9
Systems	Long term support	6
Systems	Complex and proprietary system integration	5
Systems	Data Acquisition and Analysis	5
Systems	Lack of / Poor Maintenance	4
Systems	Performance Verification	4
Systems	Community flexibility to contract out what they need	4
Systems	Communication status or need	3
Systems	Fuel logistics	3
Systems	TA that leads to next step - Not a document that sits on a shelf	3
Systems	Commissioning and post	3
Systems	Holistic approach	3
Systems	Regional/community focus vs Statewide	3
Systems	Very long term sustainability	3
Systems	Long wait for site visit/unavailable to travel	2
Systems	Need a statewide energy plan	2
Systems	Differentiation of segmented TA options	2
Systems	Dynamic thinking vs. varying goals	2
Systems	Home energy surveys	2
Systems	Dig once, build once	1
Systems	Dual reporting channels	1
Systems	Food Security	1
Systems	Integrated Resource Plan	1
Systems	Jobs to support need for training	1
Systems	Logistics	1
Systems	Site Control	1

Category	Theme	# of Mentions
Training/Outreach	Governance and Bookkeeping	12
Training/Outreach	PCE Support	10
Training/Outreach	Education about the funding and TA process	10
Training/Outreach	Technical training	10
Training/Outreach	Need for more literacy in energy, finance and project development	8
Training/Outreach	Need generalist training	7
Training/Outreach	Education and outreach - public	7
Training/Outreach	Grant application assistance or RFPs	7
Training/Outreach	AVTech/ Seward Skill Center	6
Training/Outreach	Over-the-shoulder / In-person training / Shadow TA	5
Training/Outreach	STEM Education	2
Training/Outreach	Documentation and Training Material	2
Training/Outreach	Basic expectations vs ideal technician/mechanic	1
Training/Outreach	Safety/Hazwoper Training	1
Training/Outreach	Training schedule vs subsistence	1
Training/Outreach	Wind for Schools	1

Category	Theme	# of Mentions
Funding	Room for more Funding & consistent funding	14
Funding	Need more training funds	7
Funding	Not Paid While Away at Training	5
Funding	Don't consider other agency programs in funding/sol	4
Funding	Need for General Funds	4
Funding	Need more staff to manage 3-5X federal money	3
Funding	Design $ needed	3
Funding	Funding all to agency personnel	3
Funding	DOE tribal 5-yr grant	2
Funding	Matching funds	2
Funding	More infrastructure $$ available	2
Funding	Organizations with limited budgets	2
Funding	Residential - high need but low funding	2
Funding	Expensive to travel	1
Funding	Need more $ up front	1
Funding	TA funding for larger projects is harder to get	1

Category	Theme	# of Mentions
Agencies/Programs	Circuit Rider / Remote Maintenance Worker	10
Agencies/Programs	Office of Indian Energy	9
Agencies/Programs	Water & Sewer	9
Agencies/Programs	START	5
Agencies/Programs	ARUC/RUBA	3
Agencies/Programs	RuralCAP Energy Wise	2
Agencies/Programs	RAMP - Rural Assistance Maintenance Partnership	1
Agencies/Programs	AVEC	1
Agencies/Programs	CCHRC	1
Agencies/Programs	RACEE	1

Category	Theme	# of Mentions
Collaboration/Coordination	Profit motive vs. Community benefit	8
Collaboration/Coordination	Coordination	6
Collaboration/Coordination	Bring Community Together - Alignment	4
Collaboration/Coordination	Alignment between multiple agencies	4
Collaboration/Coordination	Save $ through combined projects	3
Collaboration/Coordination	Coordinate to apply for all federal $ - leave nothing on the table	3
Collaboration/Coordination	Analysis/understanding over a broader context and timeframe	3
Collaboration/Coordination	Shared services for O&M	3
Collaboration/Coordination	Utility not included in meetings with the tribe	1

Category	Theme	# of Mentions
Technology	Energy Efficiency / Weatherization	14
Technology	Broadband / Wifi challenges	8
Technology	New and old infrastructure	3
Technology	Heat recovery considerations of RE and inverters	3
Technology	Technical details	3
Technology	Line Loss	2
Technology	Battery Storage	2
Technology	Success with existing diesel plant first	1
Technology	Village Electrification	1
Technology	Solar	1
Technology	Diesel off	1

Category	Theme	# of Mentions
Environment	Climate Change	4
Environment	Environmental Review	1
Environment	Sea level rise and permafrost loss	1

Category	Theme	# of Mentions
Misc	Assistance across the spectrum	3
Misc	Front end risk	2
Misc	Benefit from Sustainable Design without knowing	1
Misc	Chasing rabbit holes	1
Misc	DC unaware of solar working in Alaska	1
Misc	Energy flows through Alaska	1
Misc	Organizational level	1
Misc	Powerplant Fires	1
Misc	Systemic/generational change	1
Misc	Logging/firebreaks	1
Misc	Develop Matrix with tiers	1
Misc	Heat pump rate setting	1
Misc	Pie in the sky. Setting expectations too high. Not realistic.	1

Category	Theme	# of Mentions
Regulations	Denali rollover funds	4
Regulations	2 CFR 200	2
Regulations	No state policy	3
Regulations	EE building codes	1
Regulations	Narrow/segmented eligibility Reqmnts	2
Regulations	Renewable Portfolio Standard	1
Regulations	Resource inventory and availability of public/private land	2
Regulations	STEP grant barriers to training funds	1
Regulations	USDA RDA did more for grid than villages	1
Regulations	Co-ops not eligible for Indian Energy programs	1
Regulations	Rejected for project not located on tribal lans	1
Regulations	Rejected for letter from tribe instead of a resolution	1

Category	Theme	# of Mentions
Workaround	Ad hoc TA (pro bono)	2
Workaround	Self-funded TA	2
Workaround	IPP to offset PCE losses	1
Workaround	Modeling to verify vendors	1