DOE Office of Indian Energy – Final Report

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1.0 - Executive Summary

The Calista Energy Management Assistance Initiative (CEMAI) provided technical assistance and capacity building for 56 Tribal communities in the Calista Region of Alaska as an effort to reduce costs, improve operational efficiency, enhance human capacity, and job opportunities. CEMAI catalyzed and guided numerous efforts into a consolidated and effective initiative that brought rural energy best practices, economies of scale, operational efficiencies, human capacity, and economic development to the forefront.

Calista Corporation (Calista) is one of thirteen Alaska Native Regional Corporations created under the Alaska Native Claims Settlement Act of 1971 (ANCSA) in the settlement of aboriginal land claims. Calista was incorporated in Alaska on June 12, 1972. The Calista Region covers Alaska's Bethel and Kusilvak (formerly Wade Hampton) Census areas and includes 56 communities.

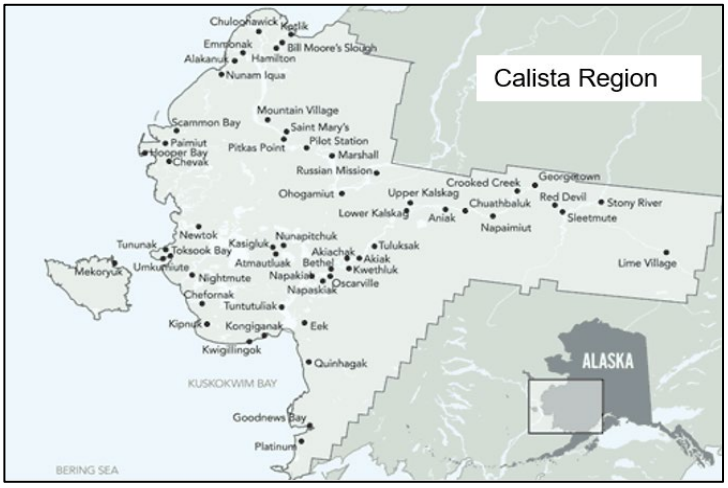

Figure 1: Calista Corporation - ANC Region

Calista partnered with Nuvista Light and Electric Cooperative (Nuvista) on the Department of Energy, Office of Indian Energy (DOE-OIE), CEMAI project. Nuvista is a non-profit that seeks to reduce energy costs and provide renewable sources of energy to the people of western Alaska. It is founded and led by a non-profit, Tribe, Native Corporations (including Calista), energy organizations, and Alaska Native stakeholders in the Yukon-Kuskokwim Delta (YK-D) Region; covering the same service boundaries and communities served by Calista. This partnership allowed Calista to direct the project work with local energy experts to respond to community needs. In this arrangement, Calista added credibility and regional accountability while Nuvista added energy-specific expertise and skill set in project management.

The delivery of the CEMAI Workplan included short-term or on-demand responses to specific technical assistance requests from communities in addition to longer-term strategically directed activities such as workshops, coordinated training, and capacity development efforts across the region. CEMAI's Workplan aimed to enhance communities' readiness for establishing renewable energy projects and implementing energy efficiency initiatives.

The CEMAI objectives included:

- Identifying common operational needs and improvement opportunities for entities with an energy interest or responsibility.
- Providing access to multi-level expertise to address existing challenges.
- Developing specialized training programs to build local capacity and community readiness.
- Nurturing the creation of regional support networks.
- Increasing access to regional, state, and federal energy initiatives, funding, and expertise.
- Improving technical skills, provide livable wages, and job opportunities.

2.0 - Project Objectives

The CEMAI program had three distinct but related tracks to direct overall efforts in completing the project objectives: 1) Training and Capacity Building, 2) Data Collection and Analysis, and 3) Project Execution.

1) Training and Capacity Building:
Through regional, community, and distance delivered workshops our team provided training, skill-building, information sharing, and relevant contact information to serve communities and energy champions. The workshops improved their ability to respond to the community's energy challenges and opportunities.

2) Data Collection and Analysis:
CEMAI collected energy-based information while collaborating with energy champions to support the effort and define priorities using conventional tools such as energy audits, feasibility studies, inventories, PCE data analysis, and home energy surveys.

3) Project Execution:
Following community developed energy plans and priorities, the CEMAI team was able to execute meaningful energy projects that included community energy planning for resiliency and energy security, real savings with PCE optimization, energy efficiency planning and realization in homes, increased local energy expertise and capacity, technical reports, and cost estimates to get projects through the development phase of planning. Several clean energy projects were advanced and built because of CEMAI's technical assistance support.

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3.0 - Description of Activities Performed

The CEMAI team was very active with village outreach, Tribal leader and citizen education, and training for power plant operators and utility clerks. The team provided support for project development and implementation for individual communities, coordinating and networking with outside agencies to leverage additional resources into the region, and provided strategic direction for regional energy improvements. Some individual activity highlights include the following:

3.1 - Association of Village Council of Presidents Economic Development Summit (Fall 2016)

George Owletuck, previous Calista Director of Government Relations, made a presentation at the AVCP Economic Development Summit. The gathering of regional leaders and community participants was a good opportunity for Calista to prime regional players on the upcoming opportunities and objectives of the CEMAI project. AVCP is the non-profit regional community support organization formed pursuant to the Alaska Native Claims Settlement Act for the Calista region and later, as described in this report, served as a valuable partner to CEMAI for training and workforce development initiatives.

3.2 - CEMAI Energy Summit & Workshop (April 2017)

Over 70 people from the region as well as outside experts—including DOE-OIE's Director and Deputy Director at the time—shared their knowledge and observations to make better use of limited resources, increase confidence, and build upon local skills. The two-day workshop aimed to develop a network of regional leaders and local champions to expand institutional support networks. The outcome of the event was increased awareness of the DOE-funded CEMAI project. The Workshop also provided several requests for targeted community technical assistance, formal partnerships with energy organizations such as the Renewable Energy Alaska Project (REAP) and the Alaska Center for Energy and Power (ACEP), engagement from the Denali Commission and other federal agencies. The team continued to support local champions that attended and received training, they have proven to be a conduit for their community.

The Summit included approximately 45 attendees from around the region along with participants from agencies and energy industry professionals from around the state and country. The event was free to attend and provided a foundation for relationship building, exposure to the DOE-OIE technical assistance support grant and CEMAI team. The Summit was an opportunity to share lessons learned from the region and far beyond, including high penetration wind-diesel projects, extremely energy-efficient building design and construction, energy use in community facilities and energy savings strategies, introduction to the energy agency support network within Alaska and nationally for federally recognized Tribes, and information exchange among communities. An exercise was developed and conducted to help village participants evaluate their power plants and utility structures on several metrics to advance toward renewables readiness and utility improvements. A copy of the agenda is included in the attachments file for this report. Broadly, the Summit & Workshop provided examples of community energy champions and encouraged Tribal community participants to discuss how to succeed in energy project development and implementation with limited resources. There was a focus on building confidence and local skills, developing a network of regional leaders and local champions, and expanding institutional support networks.

3.3 - Community Profile and Ranking System Developed and Implemented (2017)

This process was intended to help Tribal communities and our CEMAI team better understand individual communities' readiness and capacity for various energy projects. Our experience was that every community wanted to install renewable energy such as wind turbines and solar panels, but the reality was that more cost savings could be achieved through energy efficiency. Many communities' power plants were not ready for integrating high penetration renewables, which is a prerequisite for meaningful fuel and cost savings. As well, high penetration renewable energy systems, especially ones that included batteries and attempts to perform in diesel-off mode, required significant staff training and regional support to keep the complex systems performing optimally to achieve the promised fuel savings. This was a very tall order that required thoughtful evaluation and preparation, so a system was developed to help communities understand what was required and to help the CEMAI team properly focus resources and support. Often, we found that basic energy efficiency measures along with power plant and utility financial management improvements were necessary before renewable projects could be successfully implemented. These community profiles could lead to additional targeted technical assistance that would start with energy efficiency improvements, local capacity building and job training, power plant evaluations, and then renewable energy development plans.

3.4 - Teaming Agreement with Nuvista (September 2017)

Calista formalized a Teaming Agreement with Nuvista to help implement the project, coordinate the regional stakeholders with the CEMAI team, and provide an additional connection to the program through the lens of an energy-focused non-profit organization rooted in the YK region during the first grant year. Many of the objectives that the CEMAI program focused on were well-aligned with Nuvista's initiatives. The partnership was an ideal opportunity to leverage resources and capacity. Through the Teaming Agreement, Nuvista and CEMAI split the cost of many program expenses, including the Energy Program Coordinator's salary, and delineated responsibilities of each party. The Teaming Agreement was reviewed and renewed annually to ensure relevance and accuracy.

3.5 - CEMAI Website

The CEMAI team maintained a website that was used to house relevant documents, relevant links to energy-related sites, communicate financial opportunities (grants, loans, etc.), provide a calendar of CEMAI and regional energy-related events, and contact information for the CEMAI team.

The website was very helpful in acting as a clearinghouse of information and a communication tool to communities that were interested in reaching out to the team for energy-related support or questions.

The following section landing pages existed on the website:

- About CEMAI
- Resources – Documents, Relevant Energy Links, Financing Opportunities
- Calendar of Events & Activities
- Contact Information

3.6 - Hired the Energy Program Coordinator (February 2018)

One of the intentions under the CEMAI project was to hire an Energy Program Coordinator that was from the region, had previously worked with the communities, and would strengthen engagement with community representatives.

Bertha Prince was the candidate ultimately selected and hired into the Energy Program Coordinator position. Ms. Prince was born in Bethel and raised in St. Mary's, AK. She speaks the Yup'ik language, is a Calista shareholder, and has a deep bench experience with Tribal community economic development. She earned her Bachelor of Arts degree from the University of Alaska Fairbanks in Rural Development.

Bertha worked for the Alaska Native Tribal Health Consortium in the environmental health and engineering division for eight years. Ms. Prince has an insight into the infrastructure deficiencies and needs in the YK region. As the Energy Program Coordinator, Bertha has worked to increase her technical knowledge around rural energy issues. She attended Certified Energy Manager training and completed the UAF Sustainable Energy Occupational Endorsement program while working for Nuvista and supporting this DOE-OIE program. This is a significant accomplishment for Bertha and our team overall and is a direct outcome of the DOE-OIE Technical Assistance program.

Ms. Prince has played an integral role in the successful implementation of the CEMAI project. She built strong relationships with communities, worked closely with community energy champions to build capacity, and implemented many activities that have strengthened an understanding of energy opportunities for Tribal communities throughout the region. The capacity that has been built through the CEMAI project and Bertha's connections in the region will undoubtedly continue to help YK communities develop and implement energy savings projects for many years to come.

3.7 - Aniak Community Energy Action Plan Coordination (May 2018)

Aniak Traditional Council (aka Village of Aniak) was a grant recipient for the FY18 DOE-IE, First Step toward Developing Renewable Energy and Energy Efficiency on Tribal Lands grant project. The Cold Climate Housing Research Center (CCHRC) was working closely with Aniak in completing the scope of the grant-funded project.

The CEMAI team initiated a working group to facilitate and enhance this effort by establishing regular planning meetings with the community, CCHRC, Alaska Native Tribal Health Consortium (ANTHC), and the Alaska Energy Authority (AEA). The eventual outcomes of this effort included a community energy workshop for Aniak in September of 2018 along with energy audits for several community buildings and home energy surveys for any households that chose to participate, which was most of the community.

The close coordination between AEA, ANTHC, CCHRC, and CEMAI led to meaningful planning efforts that also yielded a Community Energy Action Plan for Aniak. The deliverable provided to the Aniak Traditional Council is included in the attachments file. Additionally, CEMAI developed relationships with the Tribe and continued to provide technical assistance regarding their interest in potentially purchasing the local power plant which is detailed more below. The potential sale and purchase are still in progress, but the deliverable is important because it may lead to the creation of a new Tribal Utility in the region.

3.8 - Home Energy Surveys & Community Energy Action Plans (Spring to Fall 2018, 2020)

CEMAI worked closely with Intelligent Energy Systems to develop an application on a tablet that would allow local village laborers to conduct simple home energy surveys that would result in a Home Energy Assessment. The primary goal of the home energy surveys was to identify simple energy savings measures that the homeowner could complete themselves or with limited assistance to realize immediate energy savings in their home. The secondary goal of the project was to build local capacity by educating and training 16 Tribal community members in four communities to assess the homes using the app-based survey tools. This provided the surveyors with basic energy efficiency background and an understanding of what measures could be easily taken by homeowners to reduce energy in their homes.

Figure 2: Local home surveyors in Akiachak

Most of the participating communities also received direct support from the Cold Climate Housing Research Center under a separate DOE-funded project to complete community energy action plans (CEAPs). The objective of the CEAPs were to produce a roadmap for reducing and stabilizing energy costs in Tribal buildings by setting energy efficiency improvement goals, providing direction for future retrofit projects.

CEMAI, AEA, and CCHRC met regularly during the community energy planning period to coordinate efforts and ensure the best end products for the communities.

CEMAI's final deliverables were 280 home energy use reports that were delivered to homeowners. CCHRC's deliverables were community energy action plans CEAPs for Atmautluak[1], Aniak[2], Akiachak[3], and Kwigillingok[4].

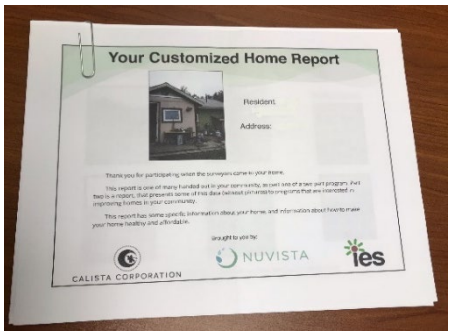

Figure 3: Home Energy Assessment

The home energy surveys were completed through community site visits. The CEMAI team trained local laborers to conduct home energy surveys using a Samsung tablet and a mobile software application to tabulate data collected at each home and store photos. The surveys could be conducted offline; when the tablet was connected to Wi-Fi, the surveys were uploaded to a cloud where the CEMAI team could download and produce the home energy assessment reports. These reports were then

[1] Can be accessed online at: http://cchrc.org/media/Energy_action_plan_Atmautluak.pdf
[2] Can be accessed online at: http://cchrc.org/media/Aniak-Energy_action_plan.pdf
[3] Can be accessed online at: http://cchrc.org/media/Energy_action_plan_Akiachak.pdf
[4] Can be accessed online at: http://cchrc.org/media/Kwig-Energy_action_plan.pdf

printed, formatted, and provided to individual homeowners. While the home energy surveys were a useful tool, the logistics of bringing Samsung tablets with the CEMAI team and leaving them in the community for trained local staff, then coordinating the materials (tablets, checklists, verified data, etc.) return to Anchorage was extremely labor-intensive and logistically challenging. This method did not always result in all the data being recorded as needed for complete surveys.

A breakdown of the home surveys and local capacity building is detailed below by community:

- Atmautluak: 58 home energy assessments, 4 local surveyors hired, trained, and employed to conduct the home surveys.
- Aniak: 51 home energy assessments, 4 local surveyors hired, trained, and employed to conduct the home surveys.
- Akiachak: 117 home energy assessments, 4 local surveyors hired, trained, and employed to conduct the home surveys.
- Kwigillingok: 68 home energy assessments, 4 local surveyors hired, trained, and employed to conduct the home surveys (April 2019).

3.9 - Aniak Energy Fair (September 2018)

In coordination with other agencies (REAP, Nuvista, AEA, AHFC), CEMAI hosted an Energy Fair in Aniak, Alaska (a sub-regional hub in the YK Delta) on September 26, 2018. The event was the culmination of five months of planning with Alaska Energy Authority, IES, DeerStone Consulting, CCHRC, AHFC, REAP, and ANTHC, as well as data collection and analysis. Bertha Prince and Brian Hirsch attended the event on behalf of CEMAI. 60 residents including elementary school-aged children attended the event. State and federal energy agencies that participated in the fair were Alaska Energy Authority, ANTHC Rural Energy Initiative, USDA Rural Development, AHFC Energy program, Renewable Energy Alaska Project, and the Cold Climate Housing Research Center. The CEMAI team delivered 15 Home Energy Surveys directly to homeowners that participated in the survey at the end of August. The remaining reports were left with the Tribal staff to distribute to homeowners.

CEMAI, CCHRC, AEA, and ANTHC presented preliminary energy audit findings to the Aniak Traditional Council on the morning of Thursday, September 27, 2018. Brian and Bertha presented to the Council on the CEMAI project, the status of the home energy reports, and CEMAI's next steps. The next steps consisted of a Community Energy Action Plan for Aniak Traditional Council. The Energy Plan was to incorporate the efforts of other organizations conducting energy audits and feasibility studies including a heat recovery project for the diesel generators to provide heat to the school that could displace up to 37,000 gallons of diesel fuel annually. The Energy Plan also included biomass projects for additional diesel fuel displacement, energy audits of seven (7) Tribal buildings, and energy audits of the sewer and water lift stations throughout the village. Combined with CEMAI's home energy surveys, the final report and energy plan would provide a comprehensive snapshot of energy savings opportunities in the community. As well, we discussed possibilities of solar PV development on targeted Tribal facilities.

During our visit to Aniak, we learned that the local power plant, Aniak Light and Power (a long-time family-owned business), was considering selling the company. Two local entities expressed interest in the purchase of the utility: The Kuskokwim Corporation (TKC) (ANCSA corporation) and Aniak Traditional Council (Tribal entity). The Tribe expressed interest in receiving technical assistance from CEMAI and DOE-IE on evaluating the potential of creating a Tribal owned electric utility for Aniak. CEMAI provided future support of this effort through a Utility Infrastructure Evaluation performed by CRW that will aid any interested party in evaluating the utility infrastructure condition and the utility value. CEMAI also reached out to TKC and ultimately verified that they did not want to pursue the purchase of this utility, so there is no conflict of interest or competition among Tribal and Native Corporation entities.

CEMAI's support for conducting an Infrastructure Evaluation is a necessary step in performing due diligence for Tribal acquisition of the utility, and both saved the Tribe money and helped inform them regarding the value of the utility. This last effort—supporting the Tribe in evaluating the local utility to determine if it is worth purchasing—has extended over the last few years of the CEMAI project as the Tribe initially expressed interest and then had other priorities especially during the COVID-19 pandemic, and then became interested again in technical assistance in Q2 and Q3 2021.

3.10 - Financial Management Utility Training (October 2018, June 2019)

CEMAI hosted two three-day Financial Management Utility Training classes for utility managers and clerks. It was taught by Connie Fredenberg and Pati Crofut in Bethel, Alaska. The events were a partnership with the AVCP Tribal Workforce Development and the Education Employment and Training departments. AVCP contributed $73,896 toward the effort while the CEMAI team created and coordinated the program, conducted outreach, provided quality control of the curriculum, and identified AVCP as a partner to support the trainers and the local participants with housing, meals, travel, and related logistics. Participants came from across the YK region and stayed in Bethel for the duration of the class.

Outcomes: This training provided utility managers and clerks the tools to set their electric utility rates accurately, maximize Power Cost Equalization payments, enhance utility sustainability, and help to determine renewables ready communities.

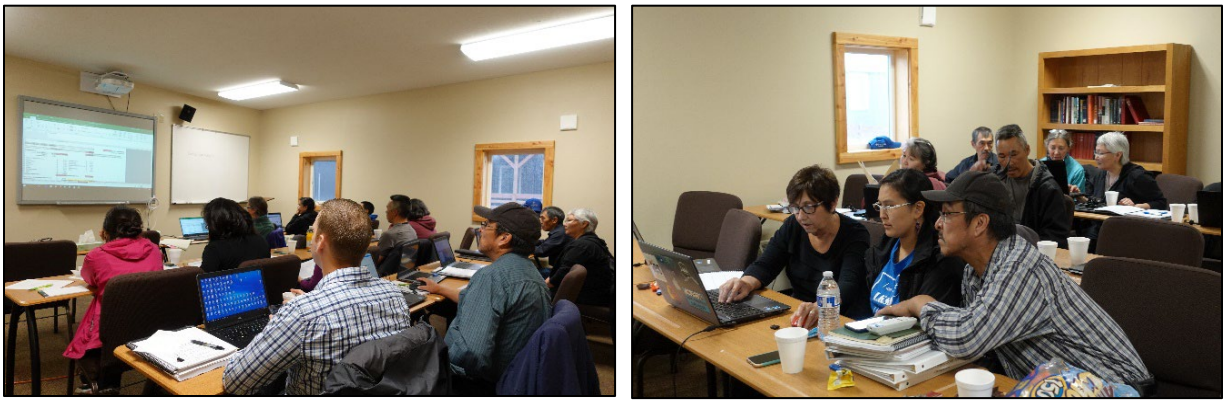

Figure 4: Financial Management Utility Training Session 2018

The use of QuickBooks accounting software in rural Alaska electric utilities is the status quo. Often the accounting software and bookkeeping practices are created and set up by individuals with little to no training. Due to a high turnover rate, many communities struggle with bookkeeping because various clerks have modified the company files and system over the years. Typically, the result is a Chart of Accounts with many errors, incorrect income and expense accounts resulting in duplicate accounts, and other issues. Since the Chart of Accounts flows to the Balance Sheet and the Profit and Loss Statement, the two major accounting statements can be filled with errors.

The class focused on streamlining the Chart of Accounts in each participant's company file so that it mimics the Chart of Accounts of the PCE reports. Each participant was required to bring their community's Chart of Accounts with them electronically so the lessons covered in the training could be directly applied to their files, rather than a generic training that would then need to be applied once the participant returned to their community. All participants left the training with an updated and accurate Chart of Accounts for their community's electric utility.

When the accounts are accurate, the financial statements become accurate and easier to track in the future. Once the numbers are in the appropriate categories, annual and monthly PCE reports can easily be created on an ongoing basis in the future. The community will also have accurate financial statements to help create budgets and apply for grants. Line loss and fuel efficiency affect a utility's bottom line and the PCE rate determination by the RCA. The class also explored possible causes and remedies for low fuel efficiency and/or a high line loss.

- Round 1: October 2018 participant communities included Chefornak, Tuntutuliak, Kipnuk, Kwigillingok, Kwethluk, Atmautluak, and Kongiganak.

- Round 2: June 2019 participant communities included Akiak, Tuntutuliak, Kipnuk, Tuluksak, Akiachak, Newtok, and Napakiak.

3.11 - Native Village of Kwigillingok (December 2018)

CEMAI facilitated conversations between Kwigillingok and the nearby community of Kongiganak to support Kwigillingok's need for Technical Assistance for their wind-diesel hybrid system.

In February 2019 CEMAI held a teleconference with Darryl John, Utility Manager for the Native Village of Kwigillingok, DOE-IE Alaska staff, and Roderick Phillip of Puvurnaq Power Company in Kongiganak to define the technical assistance needs in Kwigillingok. The teleconference was to develop a scope of services that the CEMAI program would support for Puvurnaq Power Company to provide to Kwigillingok. Kwigillingok had five wind turbines at the time of the teleconference, one (1) of which was inoperable and needed to be assessed by a wind technician. Community members of Kwigillingok were also unfamiliar with electric thermal heat stove use and were unaware of the cost savings and benefits of them, despite 20 electric thermal heat stoves currently in the community. The group decided that Puvurnaq Power staff (Roderick Phillip and a wind technician) would travel to Kongiganak to assess the wind turbine and report back to CEMAI within two weeks. This work was completed to the satisfaction of all parties.

This effort was a prime example of using both in-region and broader expertise to address a specific challenge through targeted technical assistance. Kwigillingok and Kongiganak are neighboring communities, both with high penetration wind-diesel projects using identical wind-to-heat technologies. Yet, Kwigillingok's system was not performing well, and the community was concerned with the outcomes. All while Kongiganak is a highly successful effort saving significant amounts of fuel and money. Both communities are predominantly Yup'ik speaking. Our solution to providing technical assistance was to contract with Kongiganak's main energy champion, Roderick Phillip. Mr. Phillip is a Yup'ik speaker and a highly respected rural energy expert throughout the state. We decided to bring him to the neighboring community to sort out the challenges and provide training to the people struggling with their system in Kwigillingok. As well, we brought in outside technical expertise to support Roderick on the technologies and troubleshooting. This was an extremely successful, culturally appropriate technical assistance effort that CEMAI conceived and supported. It was a result of our unique understanding of the players, the history, the technical situation, and the appropriate solution. We believe this is a strong argument for why and how this DOE-OIE Technical Assistance program should be continued. Regional entities have a unique mix of capacity, connection, credibility, and flexibility that is difficult to duplicate at a statewide or national level.

The second part of the scope of work was to host a community energy meeting in Kwigillingok with CEMAI and Puvurnaq Power Company in the spring or early summer to educate the recipients of electric thermal heat stoves on how they are used and the cost-saving benefits of electricity and heat. This was conducted in Yup'ik and had an excellent turnout. CEMAI staff distributed home energy survey reports to participating homeowners during that community visit and AHFC provided educational lessons to local children at the school.

3.12 YK Energy, Environment, and Economic Summit in Bethel (August 2019)

The event was a collaboration between the CEMAI program, the YK Comprehensive Economic Development Strategy (CEDS), and Adapt YK (a climate change response plan). The Summit was hosted in Bethel and was attended by members of the surrounding YK communities and agencies.

The Summit combined energy, environment, and the economy in a holistic approach to discussing needs and opportunities for the Yukon-Kuskokwim Region. The idea was to put the collective heads together, pool resources, identify priorities, highlight successful projects for replication, and then look for funding opportunities to turn the priorities into projects or initiatives.

Below is a description of the "3-Es" that was provided to regional stakeholders and individual communities for the three tracks of the Summit, identifying the topical leads for the region. This was widely distributed and highlighted CEMAI's leadership and DOE's support.

- Energy: The purpose of CEMAI is to develop and implement a sustainable regional energy strategy that saves energy, money, and creates jobs and opportunities within the Calista Region. This effort is supported by the DOE-OIE grant.

- Environment: The Adapt YK Delta Project aims to bring together local and regional decision-makers, researchers, knowledge-bearers, public agencies, and private organizations to create actionable strategies that bring climate adaptation into local and regional plans, projects, and programs. This effort is funded by the U.S. Fish and Wildlife Service via the Western Alaska Landscape Conservation Cooperative, the U.S. Army Corps of Engineers via the Silver Jackets Partnership, and the Alaska Sea Grant.

- Economy: The YK Comprehensive Economic Development Strategies (CEDS) reflects the thinking and planning of regional partners who aim to create more economic opportunities for YK Delta businesses, communities, and residents. The CEDS effort is supported by the Association of Village Council Presidents and partners.

The impact of climate change, the high cost of energy, the need to develop local capacity, and address deteriorating infrastructure were common themes discussed at the Summit.

The feedback received through the Summit and associated work sessions largely contributed to the 2019 Annual Update of the YK Community and Economic Development Strategy (CEDS). A CEDS is a regional tool with actions for supporting and expanding regional businesses, creating more jobs, and increasing economic resiliency to prevent and recover from economic, environmental, or other changes.

That 2019 CEDS update can be accessed online at: https://www.avcp.org/wp-content/uploads/2020/06/5-1-20_Y-K-CEDS_2019-Annual-Update_FINAL_No-Appendices.pdf

3.13 - Distance Delivery Energy Training Sessions (2020)

With the travel limitation after the pandemic, CEMAI was determined to offer energy training that had previously been planned for in-region, in-person sessions. The team developed a series of Zoom-delivered training in coordination with energy partners from around the state. These eight distance delivery sessions had specific focus areas ranging from energy efficiency to utility financial management, renewable energy development, and power plant maintenance. Industry experts in those areas participated in delivering the distance training. Below is a list of those sessions and the industry participants. Overall, the sessions were well attended with rural residents participating via Zoom or telephone. Copies of the PowerPoints were sent ahead of time to all participants so they could follow along during the presentation since internet connectivity is a constant challenge in remote communities and a handful participate by calling in.

3.13.1 - CEMAI 101 (August 2020)

Two instances of this track were offered. These sessions were a general overview of the CEMAI program and a brief overview of the future sessions. This primer session allowed participants to get a sample of future training webinars. CEMAI 101 also established our working relationship with participants (especially with staff turnover in many of the communities), and to work out any technical issues early in the training series.

3.13.2 - Maximizing Energy Saving Opportunities for Community Facilities (September 2020)

This track focused on energy efficiency in community buildings and rural water and sanitation infrastructure. Jim Fowler of Energy Audits of Alaska presented on the low-hanging fruit of energy efficiency in buildings—how to save energy and how much could potentially be saved by focusing on energy efficiency. Bailey Gamble, Mechanical Engineer from the Alaska Native Tribal Health Consortium, presented on more complicated energy efficiency that can be implemented in water treatment processes and operations of water and sewer facilities to save energy. Case studies were examined including the community of Chevak (population 1,074), which after energy efficiency and heat recovery implementation were saving nearly $100,000 annually in energy costs for their water and sewer system.

3.13.3 - Home Energy Basics (October 2020)

The presentation focused on potential home energy savings. The Alaska Housing Finance Corporation presented on the opportunities for savings from weatherization touching on programs that assist in this area. AHFC also warned against weatherizing without an understanding of building science and what some of the dangers are of doing it incorrectly, including ventilation problems that could lead to mold formation and unhealthy indoor air. The AVCP Weatherization program provided a few slides of their program opportunities and contact information. They were unable to attend the first presentation.

3.13.4 - PCE Rate Setting and Reporting (November/December 2020)

Connie Fredenberg presented on PCE reporting, best practices, and rate setting. Connie got into the particulars, looking at example spreadsheets, looking at actual Annual Reports to the RCA. CEMAI offered the first session on November 10, 2020, only a handful of participants were available to join the session due to community spread of COVID-19 and communities in lockdown. CEMAI repeated the session (live) 3 additional times to 2 communities per session in December 2020 (December 8th, 15th, and 16th, 2020). Participants of this session were offered one-on-one technical assistance with Connie to go over their PCE reporting questions.

3.13.5 - Operations and Maintenance for Rural Power Plants (January 2021)

The session was designed specifically as training for power plant operators. Devany Plentovich of DeerStone Consulting and Alan Fetters from the State of Alaska, Alaska Energy Authority presented. The presentation went through the day-to-day activities necessary for a rural powerplant to function safely. This included operating procedures, safety inspections, documentation, preventative maintenance, monthly reports, and engine selection and loading.

3.13.6 - Renewable Energy Systems & Electricity (February 2021)

This session was intended for utility power plant managers, power plant operators, and utility clerks. Participants learned the fundamentals of renewable energy systems in communities with diesel microgrids. Topics included electric thermal stoves for system stability and how to use excess renewable energy, how to set up heat sales agreements, the development process for implementing renewable energy technologies, and how to maximize PCE when introducing renewable energy and heat sales agreements on their system. Roderick Phillip of Puvurnaq Power Company and Brian Hirsch and Connie Fredenberg of DeerStone Consulting led the presentations.

3.13.7 - Advanced Operations and Maintenance for Rural Power Plants (May 2021)

As a follow-up to the previous session as an "advanced" module, the session dove deeper into power plant maintenance with a focus on specific safety protocols and prevention, common failures, fuel delivery system maintenance. The team addressed what to do when inspections indicate something is wrong, troubleshooting for specific issues, what should be on a utility's monthly, 6-month, and annual inspections. The session also included video links to relevant tutorials. Devany Plentovich was the lead presenter for this session.

3.14 - Heat Recovery Technical Assistance (Q2 & Q3 2021)

CEMAI team members worked in coordination with the Alaska Native Tribal Health Consortium to identify three (3) heat recovery systems in the region that needed repairs or troubleshooting to maximize efficiency. Heat recovery systems in rural Alaska are often used to reduce either heating fuel for community buildings or to add heat to circulating water to keep it from freezing. The systems are tied into diesel engine cooling systems and the heat is transferred via a glycol loop to other infrastructure. These are generally very "low hanging fruit" because the diesel fuel is already being burned in a diesel generator to produce electricity and the excess heat created by the generator is otherwise wasted if it is not recovered and used elsewhere. These heat recovery systems, which are capital intensive but generally have good paybacks (~five (5) to eight (8) years, depending on several variables including price of fuel and distance required to deliver the recovered heat in insulated pipes and heat exchangers) were not performing as originally designed but were expected to not need much repair to then deliver significant amounts of heat annually.

Three communities were identified for assistance: Hooper Bay, Kipnuk, and Marshall. Each community received a site visit by an engineer familiar with rural Alaska heat recovery systems, a trip report identifying issues, a deficiency report, and a cost estimate to address the repairs needed, which are all included in the attachments file. This effort intended to provide a scope and budget for future work needed on these three heat recovery systems.

3.14.1 - Marshall Heat Recovery Technical Assistance

An engineer conducted a site visit to Marshall in May 2021 to inspect the heat recovery system. The Marshall heat recovery system ties into the power plant main building, two storage buildings at the power utility, power plant living quarters, the water treatment plant, and the local store. It was noted that the power plant buildings either had minimal or no insulation. Reducing heat loss from the power plant buildings will increase available heat for the water treatment plant and store, particularly in the winter when the heat is needed most. It was noted that both building insulation and pipe insulation needed to be improved overall—this was most of the identified need. Other deficiencies included a broken flow meter, the need to relocate a thermostat, and the replacement of a unit heat fan motor. A trip report and a deficiency report were produced as deliverables for this effort along with a cost estimate to complete the repairs. The estimated cost for all repairs is $40,750.

3.14.2 - Kipnuk Heat Recovery Technical Assistance

Conducted a site visit to Kipnuk in May 2021 to inspect the heat recovery system. The Kipnuk heat recovery system ties into the Tribal Office building. Many of the findings in Kipnuk were related to mechanical issues in the Tribal Office building. The Tribal office building is heated from various sources. The primary source of space heating comes from the recovered heat system. The recovered heat system conveys hydronic heat to six-unit heaters and multiple baseboard heating units. Electric heaters of various types and sizes provide supplemental heat to the facility. The boilers at the Tribal office building are not in functioning order. There is no working fuel supply to the boilers. The existing heating fuel day tank is functional but there is no exterior bulk fuel tank connected to the facility.

The old recovered-heat piping between the old power plant and the Tribal office building is still in place and was circulating heated glycol during the inspection. This circulating loop consists of steel pipe housed

inside a poorly insulated wooden utilidor. This system is a large source of heat loss for the heat recovery system along with a spill contamination risk for the community. Radiator #1 was set to operate in by-pass mode at the power plant. This mode runs the radiator fan motor at 100% capacity continuously regardless of the need to disperse engine heat. In general, if there is an opportunity to capture the heat from the generator and effectively distribute it, there is often no need to run a radiator, which consumes a fair amount of electricity and reduces the recovered heat available for distribution.

To maximize the efficiency of the heat recovery system, most of the work should focus on the Tribal office building. Electric heat is utilized to supplement space heat. In Kipnuk, electric heat is much more expensive compared with diesel-fired heat for this space heating application. A trip report, deficiency list, and cost estimate were provided as deliverables. The recommended repairs included decommissioning the old heat recovery circulating loop, replacing the node pump with a properly sized model, providing back feed protection at the Tribal office building, installation of a bulk fuel tank outside the building, tuning and recommissioning of boilers with proper staging to maximize heat recovery utilized, insulating heat recovery piping, installation of a BTU meter, addressing electrical system deficiencies in the Tribal Office, installation of separate thermostat for a unit heater, replacement of non-functioning baseboard control valves, and fixing the VFD in the powerplant on radiator one. The total cost of these repairs was estimated to be more than $45,000.

3.14.3 - Hooper Bay Heat Recovery Technical Assistance & Water Treatment Plant Operator Energy Efficiency Training

The heat recovery system in Hooper Bay is tied into the AVEC power plant and provides heat to the water storage tank, water distribution loop and water treatment plant to preheat water and enhance the water treatment process. The system, when fully functional, is expected to offset much of the heat needed to keep the water distribution loops warm, with expected fuel oil savings of 20,000 to 30,000 gallons per year (equivalent to between $60,200 to $90,300 per year). However, the savings are not being fully realized due to the probable fowling of the heat exchangers and/or lack of flow through the heat exchangers due to incorrect valve positions.

CEMAI subcontracted to the Alaska Native Tribal Health Consortium to troubleshoot the heat recovery system to determine the cause of the unrealized fuel savings in the system, to list deficiencies identified and propose a solution, and to produce a cost estimate to complete the solutions proposed.

Additionally, the CEMAI team requested that the ANTHC team work closely with the water treatment plant operator to build energy efficiency capacity related to operating and maintaining the water treatment plant. ANTHC specializes in energy efficiency in rural water and sanitation facilities. Their team traveled to Hooper Bay in the summer of 2021, over two trips, and worked closely with the operator on energy efficiency, operations, and preventative maintenance training. The purpose of the training was to reduce energy costs associated with operating and maintaining the water plant. A training checklist was utilized, and new parts and components were funded from a separate ANTHC project to allow for specific components to be upgraded during the training program with the operator.

The outcome of this collaboration with ANTHC in Hooper Bay is a better functioning water plant, with an operator that now has specific energy efficiency training to reduce energy costs in the plant immediately. Also, with the scope and budget of needed repairs in the heat recovery system, the ANTHC Energy Program is now equipped to package up the project in a funding proposal. The ANTHC Department of Environmental Health and Engineering brings in $50 million to $80 million annually in water and sanitation project funding for rural Tribal communities and they are well equipped to get this project into the funding pipeline for future upgrades. After the upgrades are complete, the water plant will be saving up to $90,000 annually in offset fuel savings.

3.15 - Aniak Light and Power: Powerplant Utility Infrastructure Assessment (2021)

During our visit to Aniak for the Energy Summit, it was learned that the local power plant—Aniak Light and Power—was interested in selling the power company. Two local Tribal entities initially expressed interest in the purchase of the utility: The Kuskokwim Corporation (the local ANCSA corporation) and the Tribe, Aniak Traditional Council. As mentioned above, additional outreach determined that TKC was not interested in pursuing this possible purchase.

The Tribe had received a preliminary purchase price from Aniak Light and Power of $3 million. Industry professionals were consulted and using publicly available data they agreed that the purchase price seemed very high based on the current state of the utility infrastructure. The Tribe expressed interest in receiving technical assistance from CEMAI on evaluating a fair purchase price for the utility.

CEMAI worked with DeerStone Consulting and their subcontractor CRW Engineering to assess the infrastructure that will become a basis of a comprehensive utility valuation in the future.

CRW produced an assessment that was a thorough evaluation of the condition of the utility infrastructure including the power plant, electrical distribution system, bulk fuel tank farm, fuel pipelines, spare parts, maintenance, heavy equipment, and related systems. The assessment also notes any obvious ground staining or evidence of other environmental concerns. The assessment includes condition, infrastructure deficiencies, code violations, and available maintenance records.

The deliverables included a deficiency and site visit report, condition assessment, recommended improvements, and cost estimates to make those recommended improvements.

Armed with this information, the Tribe or any other entity interested in purchasing the power utility will have information to help to make an informed decision and to procure a valuation of the utility to determine a fair purchase price.

3.16 - Data Collection (2021)

Two efforts for data collection as standalone sub-projects under CEMAI included YK regionwide PCE data and The Kuskokwim Corporation (TKC) data collection to support an energy planning effort for the 10 communities in the TKC sub-region.

The YK Regionwide PCE Data Collection was a region-wide effort to collate all 2019 Power Utility Data that was readily available and synthesize the data to look at overall patterns, needs, and opportunities across power utilities in the region. All the “standalone” utilities (those owned and operated locally by either the Tribe, city, or another independent entity) were assessed for economies of scale if they were to form under a collaborative.

One of the biggest opportunities that was identified in this subset of utilities was the need for consistent PCE reporting. The PCE program is a state subsidy that reduces the electric rates paid by rural consumers to levels comparable to those paid by consumers in Anchorage, Fairbanks, and Juneau. The program reimburses the utility for credits it has extended to its customers. The transaction happens after the utility reports its sales and provides a customer ledger to AEA, AEA reviews and approves the utility monthly report (UMR), and pays the utility based on rates calculated by the state’s utility regulator, the RCA. Combined, the 17 independent utilities in the YK region missed 116 PCE reports, leaving those subsidies uncollected. This represents hundreds of thousands, if not millions, of dollars that could be used to reduce Tribal members’ electric bills and is readily available to the utilities—they simply need to properly fill out the monthly paperwork. However, it is not always so simple, as the PCE program has several unusual requirements and regulations. One energy consultant from outside Alaska, when analyzing the program, observed that the PCE program paperwork is like filing your taxes every month. Indeed, this is an ongoing

challenge to which we have devoted significant technical assistance time and expertise and is another strong justification for continued support for this DOE-OIE Technical Assistance program. Efforts made to streamline and automate the PCE paperwork filing process have not been successful because it is a complicated effort that does not easily lend itself to economies of scale and widespread adoption since every community utility's books and management system is slightly different, so there will still need to be customization and training investment in local staff that needs to be repeated every time there is turnover in the local utility clerk position.

The TKC Data Collection was to support a sub-regional request for energy planning that was first brought to CEMAI and then funded separately through DOE-OIE Technical Assistance Funding and performed by the Alaska Native Tribal Health Consortium and their contractors.

TKC is an Alaska Native Corporation formed pursuant to the Alaska Native Claims Settlement Act (ANCSA). TKC member communities include the YK villages of Lower Kalskag, Upper Kalskag, Aniak, Chuathbaluk, Napaimute, Crooked Creek, Georgetown, Red Devil, Sleetmute, and Stony River. Energy costs in this remote region are notably high and TKC strives to bring these costs down. They have taken multiple actions to support this goal including the Brighter Future project which to date has replaced over 10,000 light bulbs in the villages with LEDs.

Building upon this effort, TKC submitted a request for technical assistance in evaluating and prioritizing potential energy projects for the region as a collective and each of the shareholder communities individually. This project resulted in 10x community energy action plans, a summary of all building energy efficiency opportunities, regional wood Industry opportunities report, and a recommendations table of prioritized energy projects for the region.

The CEMAI team helped to collect data on the front end of the TKC energy planning project. The team compiled powerhouse data and determined opportunities around power utility collaboration. CEMAI also worked with ANTHC and their contractor to identify previous efforts in the TKC communities, lending background and knowledge of the community energy history. CEMAI helped to compile previous reports, energy assessments, and relevant documentation to be used to support the energy planning efforts.

3.17 - Agency, Regional, & State Coordination: Outreach, Presentations, & Networking

- March 2017 - DOE-IE Program Review in Golden, Colorado
- May 2017 – Tribal Energy Summit in Washington, DC
- February 2018 – SWAMC Energy Workshop
- April 2018 - Regional AVCP Community Economic Development Summit
- April 2018 – RACEE Day in Fairbanks, AK – Attended & Presented
- May 2018 - Began bi-weekly meetings with AEA, CCHRC for Aniak Energy Planning
- September 2018 – Aniak, Alaska Regional Energy Summit – Co-Hosted
- October 2018 – NWAB Energy Steering Committee Meeting (Kotzebue, AK)
- December 2018 – DOE-IE Program Review in Lakewood, Colorado
- March 2019 – NWAB Energy Steering Committee Meeting (Kotzebue, AK)
- May 2019 – DOE-IE Program Review in Washington, DC
- May 2019 – Bering Strait Regional Energy Summit in Nome, AK
- August 2019 – Energy, Environment, Economic Workshop in Bethel, AK
- September 2019 – Tribal Energy Summit in Washington, DC
- November 2019 – DOE-IE Program Review in Lakewood, Colorado
- February 2020 - Middle Kuskokwim Interior Rivers Adaptation Planning Meeting, Anchorage, AK

4.0 - Conclusions and Recommendations

Funding for the CEMAI project and similar regionally supported technical assistance efforts across Alaska under this same grant undoubtedly made a huge impact on the ability of Tribal communities to build capacity, develop meaningful energy projects, and provide framework and resources to work together and learn from each other's regional efforts. However, as a unique opportunity without continuous funding, the momentum is likely to dwindle. While a significant effort was put toward developing the sustainability of this effort with additional support, especially in the Calista Region, this is a challenge simply because of its size—56 villages with unique needs, systems, and other logistics such as costly travel and decaying infrastructure. Over the five years of this grant, the state energy supported infrastructure, especially the Alaska Energy Authority and the Alaska Housing Finance Corporation—the two entities that have traded off over the years as the officially designated State Energy Office—has shrunk in capacity, budget, focus, expertise, and in almost every other aspect imaginable.

The reality is that the DOE-OIE is essentially the last agency left standing when it comes to infrastructure support and capability to provide a long-term commitment to Alaska Native Tribes, Corporations, and communities. While the recent decision within the Bureau of Indian Affairs to fund Alaska Tribes and Native Corporations under the Energy and Mineral Development Program is welcome (2021 is the first year this program was made available to all Alaska Tribes, most of which do not have Tribal Trust lands or related territorial jurisdiction), this BIA funding is only for 1-year projects and does not support infrastructure development or Tribal staff. These restrictions also apply to the BIA Tribal Energy Development Capacity program. Hence, DOE support—especially for multiple years and with somewhat open-ended parameters that allow for situation-specific tailored responses with a diverse team of technical and culturally connected teams and organizations—is not only invaluable but also not easily replicable. This is essentially the "sweet spot" that DOE-OIE is designed to fill and that organically emerged because of the historic role that DOE played in Tribal community energy and capacity development.

Through this project, the CEMAI team was able to foster relationships and nurture community energy champions. This was done through formal training, knowledge sharing in bilingual (Yup'ik and English) communities, and through merely working closely with specific community energy champions on specific projects. For example, the funding allowed CEMAI to pay a utility worker in Kongiganak to travel to Kwigillingok and work closely with the utility staff there on troubleshooting, training, and operation needs, all of which were performed in their first language, Yup'ik. This homegrown approach was so well received and successful, there was an immediate trust between the participants because they were culturally connected, neighbor communities facing similar challenges. This is just one example of knowledge sharing and capacity building but is a perfect demonstration of how outside help from DOE created space for local and regional problem-solving approaches. The distance delivery technical assistance workshops, developed in response to COVID-19 travel restrictions and adapted for communities with poor internet, is another example of flexible problem-solving developed through this program that is not easily replicated with shorter and more rigid approaches.

It is often hard for small, rural, Tribal communities to fund capacity development and the feasibility of the project development stage of projects without outside funding and technical assistance. The funding from DOE resulted in numerous instances of project development activities turning into work plans and ultimately the implementation of energy and money-saving projects were realized as a result. Many of the instances of project development will continue to be pursued via self-funded projects, be used for grant or loan applications, and will result in energy savings projects being implemented for many years to come.

The DOE-OIE currently accepts and responds to Technical Assistance requests from Tribes. We recommend that these Tribal Organizations, key players, consultants, and locally grown energy experts continue to be tapped into for responding to these technical assistance requests. Currently, in Alaska, many

of the requests are either directly responded to by DOE in Alaska, National Energy Labs, or by the Alaska Native Tribal Health Consortium. This insulated approach to responding to energy needs may miss the mark by not including local or regional experts that have specific expertise working with communities in a particular region. Additionally, by tapping into local expertise you will continue to build local capacity and it is much more likely that a local entity, whether it's an Alaska Native Corporation, Borough, Tribal Non-Profit, or even a consultant with connections and history in the region, will continue the momentum beyond a single technical assistance request.

Many of the recipients of this grant were regional entities in Alaska (Northwest Arctic: NANA; Bering Strait: Kawerak; Yukon-Kuskokwim: Calista; Southwest: SWAMC; Southcentral: AHTNA; Interior: Tanana Chiefs Conference, and Statewide: the Alaska Native Tribal Health Consortium). One of the perhaps unexpected results of this project was the fact that the entities that received these grants started to work more closely together, invite each other to regional energy planning meetings, and collaborated in such a way that capacity, knowledge sharing, and inter-regional coordination added so much value to the rural energy landscape in Alaska. We recommend that DOE continue to support a regional collaboration framework for Tribal energy players in Alaska, where over 40% of federally recognized Tribes are located. This might look like an annual meeting in Alaska where DOE supports travel assistance for participants, a venue, and partners with regional organizations to develop an agenda.

5.0 - Lessons Learned

Funding opportunities often have unique applicant requirements. In this case, we were able to leverage our status as an Alaska Native Corporation to serve our region and leaned on Nuvista as the energy expert. While Calista is the Alaska Native Regional Corporation for the Yukon-Kuskokwim communities, our organization had not previously focused on community energy planning or energy project implementation. It was obvious early on that a partnership with an energy-focused organization would provide the most value. This resulted in a partnership that was a great marrying of two regional organizations. Our partnership with Nuvista allowed us to direct the project while relying on local energy experts to respond to community needs effectively. In this arrangement, Calista added credibility and regional accountability while Nuvista added energy-specific expertise and skill set in project management. We also established a very effective collaboration with DeerStone Consulting, filling out our energy expertise and project implementation needs. They provided additional credibility and connections for our program among outside energy experts and other regional stakeholders as well. Lesson learned: the CEMAI project was best administered through a meaningful partnership between the Tribal applicant and an energy-focused non-profit with strategic assistance from consultants. Partnerships allow Tribes to leverage their status for funding while forming meaningful relationships with other organizations to manage grant-funded work most effectively and ultimately provide the most benefit for Tribal members.

High turnover can be prevalent, derailing continuity in project execution. Turnover was experienced on many levels including local community leadership, Tribal staff, state agency support, contractors, and at Calista. Lesson learned: It would have been helpful to come up with an internal onboarding process to help newcomers more quickly get their bearings in relation to the CEMAI project objectives, history, and work plan.

It appears that our initial targets in terms of the number of communities visited, systemic approaches to coordinating large volumes of data and establishing regular meetings among many stakeholders, was overly ambitious, especially in the face of a global pandemic. We ended up revising some of our targets and approaches to make them more realistic, achievable, and meaningful for the participants we could impact. Of course, we need to be mindful of equity and ensure our services are provided to the maximum number of communities and Tribal citizens, but we also need to be strategic and determine where we can have the most impact. In some cases, this was with communities that already had a lot of energy activity and were

successfully “pushing the envelope” toward renewable energy and energy efficiency projects. In other cases, our services were most helpful for communities struggling to implement basic bill collection and energy efficiency measures. Lesson learned: Develop multi-level technical approaches that target communities with diverse needs and capabilities and consider strategies that include information and technical exchange between and among communities that already have things in common.

We believe this was a very successful program overall and we are pleased with the technical assistance our team provided. We are proud of the progress communities in the Calista Region made during the life of the project. This multi-year technical assistance and networking program established by DOE has been a unique and ground-breaking initiative that shines a very positive light on government-provided support. We believe that if the program were offered again, many of these lessons learned could be applied to streamline and improve a long-term approach and result in even greater success. Thank you for your support, DOE-IOE.