Green Energy Component Narrative

1. Program Description and Scope of Work

a. Executive Summary

The Green Energy Mariculture component project, lead by Southeast Conference and partnered with the Alaka Fisheries Development Foundation (AFDF) as a subaward recipient, will develop a long-term renewable energy plan, collect baseline data measurements of how energy is currently being used in the industry and generate an analysis with recommendations for renewable energy alternatives, and develop a "best practices guide" through energy audit procedures and standards for the Alaska mariculture industry. These three deliverables will help ensure that the industry develops sustainably and minimizes fossil fuel combustion by improving energy efficiency and using renewable energy when feasible. The mariculture industry would develop with a reliance on fossil fuels *but for* an intervening investment in renewable energy technology, expertise and development. This component project allows the Alaska Mariculture Cluster to fulfill the EDA's environmentally sustainable development investment priority by empowering mariculture entrepreneurs to reduce greenhouse gas emissions from their energy infrastructure. In addition, the green energy component project fulfills the recovery and resilience priority by preventing reliance on fossil fuels that may become more expensive and less accessible in the future. The EDA's investment in this project now allows the mariculture industry to grow with energy efficiency, renewable energy, and best practices incorporated into initial designs rather than hoping for a transition in the future. This effort also opens the door to entrepreneurs and business owners in rural areas and those of diverse backgrounds to access a more sustainable, cost effective industry. The lead applicant for the Alaska Mariculture Cluster is Southeast Conference. The lead organization for this Green Energy component project is Alaska Fisheries Development Foundation.

b. Scope of Work

Project deliverables include the development a long-term renewable energy plan, the collection of baseline data measurements of how energy is currently being used in the industry to generate an analysis with recommendations for renewable energy alternatives and develop a "best practices guide" through energy audit procedures and standards for the Alaska mariculture industry. The mariculture industry is composed of aquatic farms, harvest and transport vessels, seafood processing facilities, hatcheries and nurseries distributed throughout coastal Alaska. The number of these facilities and businesses will grow as the industry grows; stakeholders of particular interest in the opportunities that mariculture presents are commercial fishermen and seafood processors. Several have already made investments to expand their businesses into mariculture and many more are likely to enter, particularly if public investments are made to reduce risk of entry. This is important to note in the context of this component project, because these existing commercial fishing and seafood processing assets are likely to be repurposed for use in the mariculture industry and hence are important assets to invest in energy efficiency and renewable energy improvements. This project will develop a roadmap to enhance the resiliency of Alaska's mariculture facilities.

This component project will develop a *Green Energy Plan for Alaska's Mariculture Industry* which will provide a statewide vision for increased energy efficiency and integration of renewable energy in mariculture which will redirect the industry away from a dependence on fossil fuels and toward utilization of renewable energy resources. In addition to a statewide plan, the industry requires local resources. For example, industry needs to develop renewable energy expertise and infrastructure within local communities and at remote sites. Specifically, mariculture farm sites rarely have access to shore-based electricity grids. Sites rely on generators to provide electricity for lifts, pumps and other equipment on site. The loads are typically small and intermittent, but require generators to run as long as people work the site. This type of load is particularly well suited to solar power but local owners need an accessible resource to understand how to design, procure, implement and maintain solar powered mariculture sites.

Alaska's commercial fishing industry is built on decades of fossil fuel reliance, and its efforts to transition show that building a mariculture industry that utilizes green energy from the beginning will maximize success. Volatile fuel costs stress the fishing industry while premium sustainable seafood markets increasingly demand demonstration of low carbon footprint. High fuel prices hinder economic development for vessel operators, whether commercial fishermen, mariculture farmers; in many cases, fishermen are the farmers, and this trend is likely to continue as fishermen look to diversify revenue sources as future uncertainties related to climate change impact fish stocks. When fuel prices surge, fishermen fish fewer days, delay equipment upgrades, and hire fewer crew members to offset costs. In order to avoid the challenges currently facing the fishing industry, the mariculture industry must develop green energy technology now.

The Green Energy Mariculture component project aims to do this through the development of research and strategies that will be freely available to entrepreneurs, business owners, processors, investors, and others in the industry or looking to enter the industry through the following two deliverables. The first is to develop a long-term strategy for a low-carbon mariculture industry in Alaska (farms, vessels, processing facilities, hatcheries and nurseries, including finding pathways for energy efficiency improvements, conversions to renewable or hybrid systems, delineation of needed equipment, infrastructure and workforce development, cost estimates, associated timelines and community planning in strategic hubs to support the transition. We will engage a contractor through an RFP process to collect baseline measurements of how energy is currently used in the industry. This will include connecting with mariculture site owners or producers, examining current energy systems, measuring use and producing a report of findings. From this report, an analysis will be generated including recommendations for potential micro-solar and other renewable energy generation projects and describing how the mariculture industry can grow while relying on renewable energy sources. Deliverables include outreach to disseminate the findings and recommendations through digital methods, in-person community presentations and workshops, and sharing the information with curriculum developers.

The second objective is to facilitate adoption of renewable best practices through the development of energy audit procedures and standards for the Alaska mariculture industry, including hatcheries and nurseries, farms and processing facilities. This project will engage a contractor through an RFP process to develop procedures that will allow site and vessel owners

to conduct self-audits on their energy use to gauge their energy consumption and provide cost analysis and comparison to reduce energy consumption or transition to renewable energy sources. Deliverables include a "best practices" or user guide developed for the industry and distributed throughout the industry including to curriculum developers and in workforce training programs.

2. Regional Industry Assets and Needs

a. Regional Description

Each component of this cluster is focused on the four southern regions of coastal Alaska (Southeast (SE), Prince William Sound (PWS), Kenai Peninsula (KP), Southwest (SW)) due to the location of the waters appropriate for mariculture development, as well as the existing seafood industry participants and interested workforce, infrastructure, and vessels which already operate and move across communities to access fishery resources. See attached separate FIPS code spreadsheet as directed by EDA staff.

Alaska comprises more than half of the US coastline, continental shelf, and exclusive economic zone (EEZ) and is a world leader in seafood production; over 60% of the seafood harvested in the US comes from Alaska waters. Therefore, Alaska has the coastline and infrastructure to support growth of its mariculture industry. At the same time, Alaska has over 250 rural coastal communities that are largely inaccessible by road and have limited employment opportunities. Many of these communities have high numbers of Alaska Native residents, who make up 22% of the state's population. The communities in these coastal regions have the need and desire to build ocean-related businesses, diversifying opportunities for residents to live and work in their communities in an industry that is beneficial to the environment and complementary to commercial and subsistence fishing.

b. Industry, Employer, and CEDS alignment

Mariculture development is a priority in state and regional development efforts and as well as aligning with the *Alaska Mariculture Development Plan*, this cluster also aligns with the CEDS fo each of the EDDs (SEC - pgs. 2, 11, 24, 41-43, PWSEDD – pgs. 8, 32, 41, 44, 58, KPEDD – pgs. 39-50, SWAMC – pgs. 1, 4, 5, 7), and the State of Alaska (pgs. 2, 11, 24, 41-43).

3. Proposed Solution

The BBBRC will build on the success achieved by project partners to serve similar business models in the commercial fishing industry. Specifically, the Rural Energy for America Program managed by the USDA and Economic Development Districts (EDDs) in Alaska have demonstrated a feasible path for achieving energy efficiency and renewable energy adoption in small businesses. The EDDs provide subsidized energy audits that business owners use to identify and quantify energy efficiency opportunities. The business owners then use the audit reports to apply for funding from the Rural Energy for America Program. Since 2019, the Southwest Alaska Municipal Conference (SWAMC) has helped 27 Alaskan small businesses and commercial fishers in Bristol Bay receive funding through REAP, and the program has 127 registrants. Energy audits for commercial buildings are well supported by ASHRAE publications

and software, but energy audits for small vessels and mariculture sites are not established. SWAMC's program to support fishing vessel energy efficiency retrofits built on earlier work by the Alaska Longline Fishermen's Association (ALFA), the Alaska Fisheries Development Foundation (AFDF) and others to develop an energy auditing method for fishing vessels. These organizations purchased equipment to measure vessel energy loads, conducted energy audits on dozens of vessels to establish baseline assumptions, and released a model of vessel fuel consumption patterns. SWAMC's program relies in part on the results of these early energy audits and proves that developing an energy audit procedure, inviting business owners to participate in energy auditing programs and providing a path to energy efficiency funding is feasible.

We propose a similar program to establish energy auditing procedures for the mariculture industry. In the first phase, energy audits will be performed at sites throughout the state. Data loggers that measure fuel consumption, electrical and hydraulic loads will be installed to record energy consumption throughout one year of operation, the results will be compiled in a publicly accessible database and a model will be developed that allows energy auditors to estimate energy usage based on conversations with mariculture site operators. Finally, we will release a report documenting standard assumptions that should be used in energy assessments of mariculture sites. These standard assumptions will allow fair energy audits to be conducted remotely, allowing isolated, rural communities to access federal funding programs like REAP that require energy audits.

Remote energy audits are essential to ensuring equitable distribution of energy efficiency funds. When small businesses may see savings of a few thousand dollars per year through energy efficiency improvements, justifying travel costs of thousands of dollars for an energy auditor from Anchorage to access a remote site is impossible. Providing a baseline collection of energy audit measurements and standard assumptions will support energy efficiency efforts for years to come.

The baseline data collected while developing standardized energy auditing assumptions will support a comprehensive green energy plan for the mariculture industry. We expect three types of energy demand within the industry: marine site operation, vessel operation, and shoreside processing infrastructure. Each of these types of energy demand warrants a unique renewable energy approach. Existing mariculture sites in Alaska have intermittent loads of less than one kilowatt that may be well served by solar installations with battery infrastructure. Reducing emissions from vessels will require different technologies depending on operations. Skiffs that remain at the mariculture sites may be fully battery-electric and recharge at the site, depending on the solar resource availability. Larger vessels that provide transportation to the sites may be best served by hybrid diesel-electric systems, renewable liquid fuels, or hydrogen fuel cell systems. Any of these technologies will require shoreside infrastructure to provide recharging or refueling opportunities. Finally, shoreside infrastructure may increase load on local electric grids or develop their own power sources. A comprehensive plan will chart a path toward zero carbon operations while minimizing energy costs, capitalizing on the intersection between types of energy loads and maximizing benefits for local communities.

In addition to the industry-wide green energy plan, we will also create resources designed to serve Indigenous and rural mariculture enterprises. For example, the green energy plan may recommend small solar power systems to serve mariculture sites. We will develop

standard guidelines for mounting solar panels at marine sites, purchasing and installing panels, batteries and charge controllers, and financing the systems. This information will be compiled online, in written reports, and distributed through in-person and virtual workshops.

The solutions presented here will accelerate industry growth and innovation by reducing barriers to sustainable energy and limiting exposure to volatile fuel costs. Stable energy costs will reduce risk for entrepreneurs as they start and grow their businesses. The reduced risk will encourage additional private investment in these businesses. Mariculture sites that rely on sustainable energy will also have access to premium markets for sustainable seafood. Utilizing renewable energy will increase reinvestment of mariculture profits in local communities by reducing fuel costs. The reinvestment will support additional local employment. Early investment in sustainable energy will create a virtuous cycle as entrepreneurs benefit from the reliable energy source and create a market for renewable energy technology that spurs further investment in developing technologies for the mariculture industry. The proposal aligns with EDA's Recovery and Resilience investment priority by ensuring that the industry is resilient to volatile fuel prices and increasing pressure to reduce greenhouse gas emissions. This component project empowers the Mariculture Cluster to reduce greenhouse gas emissions from their energy infrastructure in order to fulfill the EDA's environmentally-sustainable development investment priority.

4. Partners and Program Outreach

a. Partnerships

- **Alaska Fisheries Development Foundation (AFDF)**
- **Alaska Longline Fishermen's Association (ALFA)**
- **Economic Development Districts (EDDs)**

With regard to energy systems, coastal Alaska's assets include industry leading expertise in fishing vessel energy auditing and efficiency through established programs managed by the Alaska Fisheries Development Foundation (AFDF), the Alaska Longline Fishermen's Association (ALFA), and Southwest Alaska Municipal Conference (SWAMC). AFDF and ALFA began working on vessel fuel efficiency in 2013. Their work has developed energy auditing processes for fishing vessels, identified energy efficiency improvements and quantified the potential and limitations of hybrid diesel-electric propulsion systems for fishing vessels in Alaska. Their work informed dozens of energy efficiency investments by fishing vessels in Alaska.

AFDF will manage development of a Green Energy Plan and ALFA will manage development of renewable best practices for Indigeneous and rural farmers, hatcheries, and nurseries. The manager of each objective will develop the relevant request for proposals to identify contractors with the necessary expertise, capacity and connections to execute the solution described in the previous section. After the contractor is hired, the manager will monitor their progress and direct their effort to ensure that the final product serves the industry.

b. Promoting Diversity, Equity, and Inclusion

Applying the Equity Engagement Goals of the Alaska Mariculture Cluster, at least 25% percent of the sites/facilities surveyed will be owned by individuals identified as Alaska Native (underserved populations). Additionally, at least 25% of the sites/facilities surveyed will be rural (underserved communities). Of the almost half-million square miles that make up this aggregate project area, only 45 square miles are designated as urban, ensuring that all or nearly all the sites surveyed will be in rural areas.

Additionally, 13 of Alaska's 25 Qualified Opportunity Zones (distressed, low income communities, many of which have experienced a lack of investment for decades) are located in the project area, ensuring this component project is well positioned to support equitable opportunities.

5. Measurable Goals and Impacts

Each of our objectives are associated with measurable goals and impacts. Table 1 describes our goals across three categories: execution of the solutions proposed above, measurement of the success of the solution, and racial and geographic diversity. While executing the solutions will result in a report or a number of site surveys, success will be measured in renewable energy penetration and efficiency. Since 13 of Alaska's 25 Qualified Opportunity Zones are located in the project area, our equity goals ensure that green energy investment will flow equally to rural, Alaska Native and low income communities that have endured a long standing lack of investment.

Task 1: Baseline energy use profiles

Objective	Execution Goals	Performance Goals	Equity Goals
Baseline energy use profiles	Create a publicly accessible database of energy usage Release a report documenting patterns and results from the measurement campaign	Measure energy usage at 20 mariculture sites	25% of sites surveyed will be owned by Alaska Natives; 25% will be rural Survey at least one site in every Qualified Opportunity Area in the project region.
Green energy plan	Release a renewable energy plan	Achieve 30% green energy by 2027 and 90% by 2040	Equal renewable energy penetration across all geographic areas in the project.
Renewables in best practices	Release a best practices guide by the third year of the project	30% of sites powered with renewable energy by 2027	30% of rural and minority owned sites powered with green energy

6. Sustainability Plan

The Alaska Mariculture Cluster's growth will be sustained by the Alaska Mariculture Alliance (AMA) and the Mariculture Research and Training Center (MRTC). These two entities will provide the long-term structure necessary for continuity after the project period ends. The AMA provides leadership and longevity to mariculture development, while providing for coordination across a broad spectrum of stakeholders. The MRTC is the central entity for coordinating mariculture research and training activities, furthering information sharing and efficient use of resources toward the statewide vision and goal. More information regarding the sustainability of the Alaska Mariculture Cluster can be found in the Governance, Coordination and Outreach component narrative.