



STATEMENT OF PROJECT OBJECTIVES (SOPO)

Utility Solar Grid Forming Technology

Concept Paper ID: TA3-049-E

A. OBJECTIVES

To obtain funds for inverter upgrades and two battery energy storage systems (BESS) at one or both of Kaua'i Island Utility Cooperative (KIUC) owned 12MW solar sites. The addition of the inverter upgraded and BESS is a necessity to achieve Kaua'i, and the states, renewable goals. KIUC was over 60% renewable in 2022, has planned projects to achieve approximately 80% renewables in the 2026 timeframe, and has a strategic goal of reaching 100% renewable generation by 2033. The project supports Hawai'i's statutory zero emissions clean economy target in §225P-5 (a) "..., a statewide target is hereby established to sequester more atmospheric carbon and greenhouse gases than emitted within the State as quickly as practicable, but no later than 2045" and positions Kaua'i to achieve a one hundred percent renewable portfolio standard well ahead of the December 31, 2045 statutory target.

The Utility Solar Grid Forming Technology (USGFT) project is a Combination Systems application that uses assets in one sector (resources integrated the transmission system) to provide services to the other sector (distribution system) in a manner that reduces upgrade or expansion requirements, improves communications across sectors, and allows for more complete optimization of grid operations.

This project involves a technology application and activities to provide grid-forming capability of one or both of two large solar energy production facilities owned and operated by KIUC. USGFT will enhance and expand the operation of high penetration distributed renewable generation on the island grid.

The objective of the USGFT project is to enable effective operation of the electric grid when dispatching a variety of electric generation sources and dispatchable loads. On Kaua'i, these include two KIUC-owned fossil fuel power stations, located at Port Allen and Kapaia, two KIUC-owned 12 megawatt (MW) solar farms (KIUC Anahola Solar [KRS1] and KIUC Kōloa Solar [KRS2]), a 6.7 MW biomass plant, a number of mostly plantation legacy hydroelectric units, some smaller solar farms, and three large solar/battery sites, ranging in size from 13 MW to 20 MW. To manage the Kaua'i grid effectively, KIUC must not only regulate system frequency by proper MW dispatch, but must manage the grid voltage. The USGFT project is to purchase, install, and interconnect to existing substations between 6 and 12 MW of grid-forming inverters and battery energy storage systems (BESS) at one or both of the utility-owned solar sites, KRS1 and KRS2.

The USGFT project is a high-value undertaking for KIUC that demonstrates a technological solution for expanded renewables dispatch and reliable island operations. The adding of battery storage and grid forming inverters to the solar power plants creates a hybrid power supply with enhanced dispatchability, greater resource availability, and will provide important ancillary services including frequency regulation, reactive power and voltage control, and operating reserves. The grid regulation service will generate significant community benefit by furthering the capability of the system to accommodate 100% dispatch of renewable generation sources and provide a more reliable and resilient island grid.

This innovative technology will demonstrate an installation of grid-forming technology that could be replicated for local, regional, and interregional grid enhancement while advancing electric system decarbonization by reducing fossil generation and adding value to legacy solar installations.

B. SCOPE OF WORK

Planned activities for this project are expected to last three (3) years, and will be conducted in four broad tasks to achieve the stated objectives:

- **Task 1.0:** Project Management and Planning
- **Task 2.0:** Procurement of BESS and Associated Components
- **Task 3.0:** Site Preparation at the Selected Location(s); and
- **Task 4.0:** Installation, Interconnection and Commissioning of the BESS

Additional details regarding each Task are provided in **Section C** of this document. Moreover, while the tasks/subtasks are presented sequentially, some work activities will likely be performed concurrently.

Note: This project contains three **Go/No-Go Decision Points**. Subtask 1.2 will require a Go/No-Go decision if the Project fails to complete NEPA compliance. Subtask 1.4 will require a Go/No-Go decision if the Project fails to receive approval from the Hawai'i Public Utilities Commission (PUC). Subtask 2.2 will require a Go/No-Go decision if Project finances are not sufficient to complete the work.

C. TASKS TO BE PERFORMED

The tasks/subtasks associated with this project are described below. Moreover, while the tasks/subtasks are presented sequentially, it is expected that work on some of the tasks/subtasks may occur concurrently. Deliverables associated with this project are summarized in Part D.

Task 1.0 - Project Management and Planning

- **Subtask 1.1** - Within 30 days of award, the Recipient shall submit a Project Management Plan (PMP) to the designated Federal Project Officer (FPO). The Recipient shall not proceed beyond Task 1.0 until the PMP has been accepted by the FPO. The PMP shall be revised and resubmitted as often as necessary, during the course of the project, to capture any major/significant changes to the planned approach, budget, key personnel, major resources, etc. The Recipient shall manage and direct the project in accordance with the accepted PMP to meet all technical, schedule and budget objectives and requirements; and will coordinate activities to effectively accomplish the work. The Recipient will ensure that project plans, results, and decisions are appropriately documented, and that project reporting and briefing requirements are satisfied.
- **Subtask 1.2 - National Environmental Policy Act (NEPA) Compliance** - As required, the Recipient shall provide the documentation necessary for NEPA compliance for The Project via expected categorical exclusions (CX) as outlined in 7CFR §1970.53 (a) (2) (iii). Based on CX determination, a Go/No-Go briefing will be scheduled with the DOE.
- **Subtask 1.3** - As required, the Recipient will complete planning and design for the Project.
- **Subtask 1.4** - As required, the Recipient will receive Hawai'i Public Utilities Commission (PUC) approval for the Project. Based on the PUC decision and order, a Go/No-Go briefing will be scheduled with the DOE.
- **Subtask 1.5** – The Recipient will brief DOE on roughly an annual basis to explain the plans, progress and results of the technical effort. The briefing shall also describe the performance relative to project success criteria, milestones, and the Go/No-Go Decision point that are documented in the Project Management Plan (PMP).

Task 2.0 – Procurement of BESS and Associated Components

- **Subtask 2.1** – The Recipient will develop and issue a BESS Request for Proposal to leading battery manufacturers with proven grid-forming inverter capability.
- **Subtask 2.2** – Responses received from Subtask 2.1 will be ranked based on established evaluation criteria. A Go/No-Go briefing will be scheduled with DOE to determine if financial resources for the Project are sufficient to move forward.
- **Subtask 2.3** - Unless a No-Go decision is made, the Recipient will award contract(s) to successful BESS bidder(s).

Task 3.0 – Site Preparation at the Selected Location(s)

- **Subtask 3.1** – Develop engineering designs and installation plans based upon the BESS that was selected in Task 2.3.
- **Subtask 3.2** - Develop and issue RFP to civil contractors to bid on site preparation work.
- **Subtask 3.3** - Award contract(s) to successful site preparation bidder(s).

Task 4.0 – Installation, Interconnection and Commissioning of the BESS

- **Subtask 4.1** - Complete site preparation and install BESS.
- **Subtask 4.2** – Conduct inspections and acceptance tests on various elements of the Project upon completion.
- **Subtask 4.3** – Place various elements of the Project into service as construction, inspection and testing is completed.

D. DELIVERABLES

Subtask 1.1 - Project Management Plan - Due within 30 days after award. Revisions to the PMP shall be submitted as needed or as requested by the FPO.

Subtask 1.2 - National Environmental Policy Act (NEPA) Compliance – Recipient shall provide documentation of NEPA Compliance.

Subtask 1.5 – Continuation Briefings – The Recipient shall brief DOE annually on performance relative to project success criteria, milestones and the Go/No-Go decision points.

In addition to the deliverables listed above, the Recipient shall submit all periodic, topical, final, and other reports in accordance with the Federal Assistance Reporting Checklist and accompanying instructions.

E. BRIEFINGS/TECHNICAL PRESENTATIONS

The Recipient shall prepare and present periodic briefings, technical presentations and demonstrations as requested by the FPO, which may be held at a DOE or the Recipient's facility, other mutually agreeable location or via webinar. Such meetings may include all or a combination of the following:

- **Kickoff Briefing** - Not more than 30 days after submission of the Project Management Plan, the Recipient shall prepare and present a project summary briefing as part of a Project Kickoff Meeting.

- **Pre-Continuation Briefing:** Not less than 90 days prior to the planned start of a new budget period, the Recipient shall brief the DOE on the results to date, and their plans for subsequent periods of work. The DOE will consider the information from this briefing, as well as the content of deliverables submitted to date, prior to authorizing continuing the project.
- **Final Project Briefing** - Not less than 30 days prior to the end of the project, the Recipient shall prepare and present a Final Project Briefing on the results and accomplishments of the entire project.
- **Other Briefings** - The Recipient shall prepare and present technical, financial, and/or administrative briefings as requested by the DOE. Additionally, the DOE may require the Recipient to make technical presentations at national and/or industry conferences.