Project: Hawaii Statewide Zero Emissions Bus Pilot Program

Project No.: W99603-00

Project Location. Counties of Kauai, Maui, and Hawaii.

BACKGROUND

Project Purpose. The State of Hawai'i Department of Transportation (HDOT) has partnered with the Counties of Kauai, Maui, and Hawaii to establish the State of Hawaii Zero Emission Bus (HZEB) Program. The goal of the HZEB Program is to provide each county with the expertise, tools, and funding needed to successfully deploy zero emission buses with the ultimate goal of transitioning their entire fleets to zero emission technologies in support of Hawaii's renewable energy and transportation electrification goals.

HDOT was successful in its grant application for Federal Transit Administration 49 U.S.C. Section 5339 Bus & Bus Facilities FY2018 Low/No Discretionary funds. This pilot program is funded by the grant in order to implement the critical research phase of the HZEB Program. As a result of this phase, through industry and operations research, Low or No Emission vehicles for each agency will be identified and recommended, and implementation plans to design, purchase and construct vehicles and infrastructure needed developed. The Pilot Program provides reviews of the current system capabilities and offers alternatives and recommendations for each agency to fully convert to zero emission fleet.

Operational performance data will be collected throughout the pilot program to assess the overall benefits of a battery electric bus (BEB), Key Performance Indicators will include availability, reliability, energy efficiency, fuel cost, and maintenance costs. A final report will be prepared summarizing project results, findings, and lessons learned.

Project Schedule. The total project time is expected to be 36 months.

Project Objectives

1. Conduct route simulations based on a generic battery electric bus performance models for the Counties which can be used as the basis for the bus and charging equipment procurements for the Counties.
2. Develop rate models to estimate the cost of electricity to operate battery electric buses on each county's routes.
3. Provide a Service Assessment to evaluate the energy requirements of all routes and blocks to assess the type of zero emission bus technologies that may be applicable to each route and block.
4. Conduct a Fleet Assessment to evaluate the Counties' fleet procurement schedule for converting the diesel bus fleet to zero emission bus.
5. Conduct a Fuel Assessment to assess the daily and annual fueling requirements and cost estimates for each fuel type throughout the transition period.
6. Provide assistance to the Counties during bus procurement, build, and delivery.

7. Provide assistance to the Counties during charge equipment procurement.
8. Provide assistance to the Counties during infrastructure procurement, design, build, installation, and commissioning.
9. Conduct validation testing on delivered buses
10. Provide oversight on bus and charger operator, maintenance, and first responder training, and oversight of bus and BEB infrastructure deployment.
11. Provide one year of reporting on bus operations and performance metrics.

Project Approach

The following minimum requirements are not intended to be a complete or comprehensive list of all work issues and tasks required for the project.

1. All work shall be subject to review and approval by the HDOT and be in full compliance with current State and Federal statutes, policies and guidelines.
2. An initial meeting shall be held to discuss and clarify expectations for this overall project effort. Specific details shall be discussed on project products and critical project elements including development and application of appropriate BEB technologies, prioritization, and performance criteria; development and implementation of training and workshop program for the Counties.
3. Conduct monthly project management coordination meetings to review project progress.
4. Conduct coordination and data collection meetings with the HDOT and the Counties.

SCOPE OF WORK AND REQUIREMENTS

Task 1: Project Planning and Initiation

This phase will include detailed project planning to finalize the scope, approach, tasks, assignments and timeline. This phase will result in a formal kick-off of the project with all stakeholders and project team members to align the project team on tasks, assignments, timelines, and expectations to successfully meet project goals and objectives.

CONSULTANT shall:

a. Schedule and conduct a series of planning workshops with project team members
b. Draft all project planning deliverables for review and acceptance by project team members.
c. Schedule the Project Kickoff and prepare kickoff materials.

Task 2: Requirements Analysis

This phase includes bus modeling, route simulation, charge modeling, rate modeling, and confirmation of the technical specifications for the bus and charging equipment. CONSULTANT shall model the Counties routes and generic BEB models to predict the performance of the bus on the selected routes. The model uses a simulation software. CONSULTANT shall collect data on route to capture time, distance, speed, acceleration, GPS coordinates, and grade. CONSULTANT shall also collect local environmental conditions, passenger loading profiles, route planning details, and blocking schedules from the agency. CONSULTANT shall use this data, along with specifications for a generic BEB to simulate bus operations on the selected route. CONSULTANT shall also analyze potential charging solutions (on-route and/or depot charging stations), to develop charging performance models to assess charge rates, duration of charge, and concurrency of charge events. Additionally, CONSULTANT shall develop a rate model to assess potential electrical loads, consumption, and estimated "fuel cost" of the proposed service. CONSULTANT is to present the results of the route, charge, and rate modeling to Kauai, Maui, and Hawaii Counties respectively to determine if any changes are required to the bus specifications, routes, or passenger service schedules in order to optimize bus operations and operating costs.

CONSULTANT shall:

a. Conduct route modeling workshops with the Counties to determine the routes that will be used as the basis for the requirements analysis. The project team will also discuss baseline bus specifications to use as the basis for route simulation.
b. Collect data on selected routes within Counties service areas, by riding the routes on existing Counties buses with a GPS data logger to capture time, distance, speed, acceleration, GPS coordinates, and grade.
c. Process the collected data and load the route data and selected bus specifications into a computer modeling approved by the HDOT and run simulations of the selected bus model on the selected routes.

d. Present modeling results to each county. These results shall be used as the basis for developing specifications that shall be used to develop the bus and charging equipment procurements.
e. Develop rate models to estimate the cost of electricity to operate battery electric buses on each county's routes.
f. Conduct a Service Assessment to evaluate the energy requirements of all routes and blocks to assess the type of zero emission bus technologies.
g. Conduct a Fleet Assessment for the Counties and provide estimates for annual fleet procurement costs to assess alternative ZEB strategies.
h. Conduct a Fuel Assessment to assess the daily and annual fueling requirements and cost estimates for each fuel type throughout the transition period.

Task 3: Assisting during Request for Proposal (RFP), Evaluation and Award for Buses

This Phase involves assisting Kauai, Maui, and Hawaii Counties to develop the bus and charger specifications and other documents required for the Counties' BEB procurement. CONSULTANT shall assist with a technical evaluation of submitted proposals.

CONSULTANT shall:

a. Conduct a procurement workshop with HDOT and the Counties to determine the bus and charger procurement strategy and plan.
b. Assist HDOT and the Counties with preparing technical specifications and procurement documentation to be used in the bus and charger RFP. CONSULTANT shall also package route data to be included with the RFP for vendor consideration.
c. Assist HDOT and the Counties in responding to vendor questions during the bid period.
d. Conduct a technical evaluation of qualified proposals. CONSULTANT shall rerun route and rate models on each proposed bus and create a comparative analysis of proposals for each County.

Task 4: Assisting during Bus Procurement and Build

This Phase involves assisting Kauai, Maui, and Hawaii Counties with procuring. Each County will execute a procurement contract with the BEB original equipment manufacturer (OEM). The selected BEB OEM will submit their final design for approval by the respective county before proceeding with production.

CONSULTANT shall:

a. Assist HDOT and the Counties with documentation needed to complete contracts with selected bus and charging vendors.
b. Complete pre-award Buy America Audits on each bus procurement.
c. Participate in pre-production meetings with each county and selected bus vendors.
d. Provide oversight and guidance during weekly design and production meetings between the counties and the selected bus vendors.

e. Conduct periodic quality inspections and pre-delivery inspections at the bus manufacturing plants.
f. Complete pre-delivery Buy America Audits on each bus procurement.

Task 5: Assisting during Infrastructure Procurement, Design and Build

This Phase involves assisting Kauai, Maui, and Hawaii Counties with finalizing site plans for the on-route and/or depot charging stations. The project team shall also meet with the utility to review charging requirements and site plans to ensure there are no issues with meeting power requirements. Kauai, Maui, and Hawaii Counties will issue an RFP (either individually or combined) for site engineering, followed by evaluation, selection, and award. Once the site design is completed, the Counties shall issue IFBs for permitting, construction, and equipment installation. Once the site preparation is completed and the charging equipment has been installed, the charging station contractor shall coordinate site inspection by the utility and the city. The charging equipment provider will commission the equipment for charging operations.

CONSULTANT shall:

a. Conduct a procurement workshop with HDOT and the Counties to determine the charging station design/build procurement strategy and plan.
b. Assist HDOT and the Counties with preparing procurement documentation to be used in the design/build RFP.
c. Assist HDOT and the Counties in responding to vendor questions during the bid period.
d. Participate in design and construction status meetings with selected design/build contractors and monitor progress of the deployment of charging stations

Task 6: Assisting during Bus and Infrastructure Deployment

Delivered buses will be registered and insured by each County. The BEB OEM will conduct a series of tests to ensure the buses can be charged properly with the on-route and/or depot charging equipment. During this phase, Kauai, Maui, and Hawaii Counties staff will receive the necessary training to operate and maintain the vehicles. Training will be coordinated through the BEB OEM. The CONSULTANT and each County will conduct a series of tests to validate the performance and operation of the buses. These tests will include route validation, where buses are operated along the planned route under controlled conditions to validate the bus against the performance specification and modeling results. Next, the Counties may conduct a Full Service Validation where buses are placed in shadow service for an acceptable period to demonstrate full operational capability. Once buses and the charging stations have completed testing and acceptance, they will be transitioned into passenger service.

CONSULTANT shall:

a. Work with each County to develop a bus and charger acceptance plan.
b. Develop and execute a performance validation plan.
c. Compare actual test results to bus models and assess any variances.
d. Provide oversight of bus deployment

Task 7: Deployment Validation

The Phase involves various data collection to measure operational performance and realized benefits (i.e., actual energy savings, cost savings, and greenhouse gas emissions reductions) resulting from deployment of BEBs into passenger service. The data will be used to generate a series of Key Performance Indicators (KPIs) to validate performance of BEBs against other buses in each County Agency's fleet. Key performance indicators include availability, reliability, energy efficiency, fuel costs, and maintenance costs. By tracking and analyzing these KPIs, HDOT, Kauai, Maui, and Hawaii Counties and FTA may assess the overall impact and benefits of electric buses. Data logging hardware and data access services shall be supplied by CONSULTANT, OEM, the charging equipment vendor, and/or a third-party vendor under sub-contract to a named project partner, and implemented prior to bus delivery to ensure that accurate and effective data is collected.

CONSULTANT shall:

a. Conduct a Reporting Workshop to define Key Performance Indicators (KPI) and data collection and reporting procedures.
b. Collect operational and maintenance data and generate quarterly KPI reports. Present quarterly KPI results to each County.

Task 8: Project Management, Administration, Reporting and Control

CONSULTANT shall:

a. Conduct periodic (i.e., weekly, bi-weekly) project meetings to review status and action items, discuss and resolve issues
b. Issue quarterly progress reports to HDOT.
c. Provide ad hoc reports and/or presentations, as requested, to support any external communication requirements.

Task 8: Project Close Out

Once the data collection period expires, CONSULTANT shall issue a final report summarizing research findings, project results, and lessons learned.