



September 23, 2025

The Honorable Chair and Members
of the Hawai'i Public Utilities Commission
Kekuanao'a Building, First Floor
465 South King Street
Honolulu, Hawai'i 96813

Dear Commissioners:

Subject: Docket No. 2022-0212 – Innovative Pilot Process
Hawaiian Electric Companies' Responses to PUC-HECO Wildfire EFT-IRs 01-06

The Hawaiian Electric Companies¹ enclose for filing the Companies' responses to PUC-HECO Wildfire EFT-IRs 01-06, which the Commission issued in this proceeding on September 16, 2025, and a certificate of service.

Very truly yours,

/s/ Dean K. Matsuura

Dean K. Matsuura
Director, Regulatory Rate Proceedings

Enclosures

¹ The "Hawaiian Electric Companies" or "Companies" are Hawaiian Electric Company, Inc. ("Hawaiian Electric"), Hawai'i Electric Light Company, Inc. ("Hawai'i Electric Light"), and Maui Electric Company, Limited ("Maui Electric").

PUC-HECO Wildfire EFT-IR-01

Reference: Non-Docketed Case No. 2023-04661, “Hawaiian Electric Companies’ Wildfire Safety Strategy; Books 1 through 3; January 10, 2025,” filed on January 10, 2025 (“WSS”), Book 1 at 87.

In the WSS, Hawaiian Electric contemplates development of a Fire Potential Index (“FPI”) model, but indicates that this will require “access to a broader range of data than what is currently available to the public, as well as increased computational power to perform detailed analyses down to the circuit level for [Public Safety Power Shutoff (“PSPS”)] application. Hawaiian Electric intends on acquiring this capability as part of its broader operational risk model efforts.”

- (a) Please discuss the estimated costs associated with establishing a FPI model and developing enablement criteria and how such costs compare to the costs associated with the Pilot.
- (b) Please discuss and compare the estimated costs associated with implementing more traditional approaches, such as utilizing sectionalizing devices or loop schemes.

Hawaiian Electric Companies’ Response:

- (a) As a preface to this response, the Companies do not view a Fire Potential Index (“FPI”) model and the Pilot as mutually exclusive. They both serve different purposes and collectively work toward reducing reliability impacts associated with Enhanced Fast Trip (“EFT”). FPI models help to forecast hazardous conditions in the future and potentially in real time. This could assist the Companies in making operational decisions. For example, whether to disable or enable EFT and whether a particular circuit may be in scope for a Public Safety Power Shutoff event. The Pilot is intended to reduce reliability impacts if a fault should occur, and depending on the location reduce the number of customers affected by that fault.

The response to subpart (b), below, describes costs of the Pilot. The Companies are unable to provide a cost for the FPI model as this capability is part of a broader wildfire risk modeling platform that provides many other capabilities aside from FPI.

(b) Reclosers on their own and in loop schemes can help with reliability, although they are used in different cases and can cost more. One recloser with Supervisory Control and Data Acquisition communications costs approximately \$193,000. A recent smart loop project that required the use of six (6) reclosers had a total project cost of \$979,700. The Companies' estimated Pilot cost is \$275,000 for four (4) FT-50 systems.¹ This shows that the Companies can implement multiple systems for a cost much lower than traditional approaches. The technologies are also used in different ways and complement each other. A standalone recloser will typically be used for an area where a circuit starts in a lower wildfire risk and then traverses into an elevated risk area. At this recloser the Companies will be able to enable EFT settings for the elevated risk area, coordinating protective devices with the slower trip at the circuit breaker in the lower risk area. A smart loop can work when the majority of a circuit is in a wildfire risk area and there is a need to break the circuit up into multiple areas to help with restoration. The Pilot equipment will be used in areas where the circuit starts in an elevated wildfire risk area and moves into a lower risk area (where EFT is not needed as an additional wildfire mitigation measure) and coordination can be done if a fault occurs in the lower risk area.

¹ See Notice at 14-15.

PUC-HECO Wildfire EFT-IR-02

Reference: WSS, Book 1 at 20.

In the WSS, Hawaiian Electric lists actions it will take to reach the current target of 68-72% risk reduction over the next three years, including “[m]easures to lessen the impact of reliability disruptions caused by wildfire mitigation,” including the “pursuit of battery programs through a virtual power plant program.”

- (a) Please discuss how the Pilot complements the Companies’ plans to reduce the impact of reliability disruptions through a virtual power plant program.
- (b) Between the Pilot and the virtual power plant program, please clarify and discuss which of these initiatives the Companies plan to prioritize to reduce EFT reliability disruptions, and why.

Hawaiian Electric Companies’ Response:

- (a) The Pilot will help prevent outages from occurring or help an outage from affecting a larger area than needed. This will complement the potential virtual power plant (“VPP”) program and customer battery back-up systems which will keep customers energized if their area is experiencing an outage. The VPP program is not directly related to reliability disruptions caused by wildfire mitigation, but the program may lead to greater battery adoption, which in turn may provide greater backup power availability that may lessen the impact of reliability disruptions.
- (b) The Companies are pursuing multiple ways to help customers alleviate power disruptions. Different mitigations have different reasons for application and also have different costs and benefits. The Pilot system is a solution that affects a large number of customers for a lower cost than other traditional methods. Since this has a lower cost, the Companies intend to deploy this technology to an additional 29 distribution circuits across all three

Companies if the Pilot is successful.¹ The VPP referred to in the 2025-2027 Wildfire Safety Strategy, as discussed in Docket No. 2025-0156, is dependent on the U.S. Department of Energy loan that the Companies are pursuing.² The VPP solution's ability to mitigate reliability impacts is not a requirement of any contemplated VPP program offering, but will enable backup power as a point solution for participating customers that adopt/install battery systems.

¹ See Notice, Exhibit A, at 11.

² See Companies' response to PUC-HECO-IR-04065, filed on June 16, 2025, in Docket No. 2025-0156.

PUC-HECO Wildfire EFT-IR-03

Reference: “Hawaiian Electric Companies’ Wildfire Enhanced Fast Trip Reliability Mitigation Pilot; Notice of Intent; Exhibits A-E; and Certificate of Service,” filed on August 25, 2025 (“Wildfire EFT Reliability Mitigation Pilot Request”), at 13.

The Companies state the following:

If, at the end of the first 6-month monitoring period, the Companies determine the primary objectives of the Pilot are being met, the piloted equipment may be deployed to additional EFT enabled distribution circuits outside the scope of the Pilot.

- (a) Please clarify that the Companies do not propose to monitor the Piloted equipment on each of the four Pilot circuits for the entire duration of both six-month monitoring periods, if the primary objectives are determined to be met over the course of the first six-month monitoring period. If not, please discuss.
- (b) Please discuss how many events in a six-month period the Companies anticipate for each of the four Pilot circuits.
- (c) Please discuss the communication speed the SEL-FT50 units will communicate with the SEL-RP50 units and the SEL-FR12 units.
- (d) Please discuss the Companies estimated total response time from the SEL-FT50 detection of a fault to the substation protection relay receiving a signal to block the EFT or reclose for the worst case of the four pilot circuits and the worst case of the additional 29 circuits that were identified as benefiting from the Pilot, if the Pilot is successful.
- (e) Please discuss whether the Companies will be able to determine the actual total response times (SEL-FT50 detection to substation protection relay receiving signal to block EFT or reclose) during the six-month periods.

Hawaiian Electric Companies’ Response:

- (a) The Companies clarify that they will continue monitoring all Pilot installations throughout both six-month monitoring periods, through outage logs and Supervisory Control and Data Acquisition logs, even if the primary objectives are determined to be met over the course of the first six-month monitoring period. The data being brought back from the Pilot provides

useful information for troubleshooters and dispatchers to help locate outage locations. The outage locations will also be tracked for operational purposes.

- (b) While it is difficult to predict how many events will occur, one method of estimating what may occur during the Pilot period is to look at historical events in 2024. The below table reflects the average, for a 6-month period, of full circuit outages caused by distribution events for each Pilot circuit in 2024. This includes events that occurred before fast trip was implemented, which would likely have been full circuit outages had fast trip been implemented at the time.

| Circuit | Average # of full circuit distribution outages in 2024 in 6-month period* |
|--------------------------------|--|
| O‘ahu Pilot Circuit | 3 |
| Maui Pilot Circuit | 2.5 |
| Hawai‘i Island Pilot Circuit 1 | 3.5* |
| Hawai‘i Island Pilot Circuit 2 | 6.5* |

**Note: Includes outages that would have likely been full circuit outages due to partial circuit outages that occurred before fast trip was implemented in 2024.*

- (c) The estimated system latency from fault detection at the SEL-FT50 to the SEL-FR12 mirrored bits communication to the relay is 6 milliseconds (“ms”) or 0.006 seconds based on manufacturer specifications. If a radio repeater is needed, each repeater (SEL-RP50) would add an additional 1.5 ms per hop based on manufacturer specifications.
- (d) The worst-case scenario that has been determined without a comprehensive communications path analysis currently requires an additional two hops of repeaters adding on an estimated additional 3 ms per manufacturer specifications. The total response time would be an estimated 9 ms.
- (e) It is not possible with the technology to determine the actual response time from SEL-FT50 detection to the time the substation protection relay receives a signal to block

EFT or reclose. There is not a way to accurately determine the timing of when a

SEL-FT50 detects a fault and transmits this information.

PUC-HECO Wildfire EFT-IR-04

Reference: Wildfire EFT Reliability Mitigation Pilot Request at 15-16.

The Companies propose the following expected metrics, in relevant part:

- Over the two (2) 6-month monitoring periods, verification for each of the piloted distribution circuits, that if a fault occurs in a low wildfire risk area, the circuit is not fast tripped or reclose blocked (if appropriate), supported by the following data/metrics from each fault:
 - o Count of coordinated trips for each circuit (i.e., [Enhanced Fast Trip (“EFT”)] of entire circuit blocked).
 - o Count of non-coordinated trips for each circuit (i.e., EFT triggers outage on entire circuit).
- (a) Please confirm that “Count of non-coordinated trips” refers to an EFT or reclose blocking where the Pilot project was unsuccessful in preventing an outage on the entire circuit. If not, please explain why not.
- (b) Please discuss the success rate (total successful blocking of EFT or reclose events compared to total opportunities to attempt the blocking of EFT or reclose) required to deem the Pilot successful.
- (c) Please discuss whether the Companies will monitor and analyze the frequency of “fast trip” events, the number of circuit-days when EFT is enabled, and the customer hours of unplanned outages resulting from EFT enablement, both total and at the circuit level. If not, please discuss why not.
- (d) Please discuss how the Companies will quantitatively assess the electric service reliability impacts of its EFT and PSPS wildfire mitigation programs.
- (e) In addition to collecting data on the number of coordinated and non-coordinated trips for each circuit on the Pilot, please discuss whether the Companies will also track and analyze other metrics, such as the frequency and duration of sustained outages due to the Pilot equipment’s ability to block EFT, the level of customer satisfaction, and/or customer complaints regarding outages on lines on which EFT was enabled. If not, please discuss why not.

Hawaiian Electric Companies’ Response:

- (a) The Companies confirm that the count of non-coordinated trips refers to the number of Enhanced Fast Trip (“EFT”) events where the Pilot project was unable to prevent an outage

on an entire circuit due to the Pilot equipment not detecting and/or transmitting the fault information to the relay. The Companies further clarify that non-coordinated trips (i.e., EFT triggers outage on entire circuit) may occur in situations where (1) a fault is not detected by the FT50 in an area that the FT50 is monitoring (in which case the equipment was unsuccessful), and (2) if a fault occurs in an area not monitored by the FT50 (in which case the equipment did not fail). In both cases, customer safety is not negatively impacted as the circuits default to the existing EFT protective setting (i.e., outage on entire circuit).

- (b) Due to the high speed, changing of the environment that can affect communication between devices, different types of faults and timing of detection of faults, and other unforeseen circumstances, the Companies do not expect a 100% success rate. However, if the Pilot can be successful for 50% of the applicable events where equipment intervention was possible, this would still be a significant improvement in reliability and considered a success.
- (c) The Companies will be monitoring and analyzing the frequency of “fast trip” events, the number of circuit-days when EFT is enabled, and the customer hours of unplanned outages affected by EFT enablement, both total and at the circuit level of the Pilot circuits.
- (d) The Companies will quantitatively assess the electric service reliability of impacts of their EFT and Public Safety Power Shutoff (“PSPS”) wildfire mitigation programs by continuing to monitor T&D SAIDI¹ and T&D SAIFI² for all three of the Hawaiian Electric Companies.

¹ Transmission and Distribution System Average Interruption Duration Index.

² Transmission and Distribution System Average Interruption Frequency Index.

- (e) The Companies will be monitoring other metrics discussed in the response to subpart (c), above. Although the Companies actively monitor customer satisfaction and customer escalations, these metrics are not specifically tailored to customers on enabled fast trip circuits. When customer complaints or escalations arise, they are handled manually through the Companies' call center. In such cases, escalations are forwarded to supervisors, who document details of the escalated calls. The supervisors can then investigate whether the affected customer was on an enabled fast trip circuit by cross-referencing the relevant data. However, at this time, the Companies do not maintain a dedicated customer satisfaction score or metric specifically for customers impacted by outages on enabled fast trip circuits.

PUC-HECO Wildfire EFT-IR-05

Reference: Wildfire EFT Reliability Mitigation Pilot Request, Exhibit A at 7.

The Companies state that they “do not plan to issue customer surveys as part of the Pilot, as participant customer surveys are unnecessary to evaluate the success of the Pilot.”

- (a) Please discuss in further detail why the Companies do not believe that customer surveys could be informative in determining not only the success of the Pilot, but also how the Pilot could be more successful in addressing customers’ experience with outages and whether the objectives of the Pilot are comprehensive enough and/or causing other unanticipated impacts on customers.
- (b) If customer surveys are required, please discuss how the Companies could incorporate the development and implementation of customer surveys prior to and following conclusion of the Pilot, with a particular focus on customers who have experienced frequent outages and access and functional needs customers.
- (c) Please discuss whether and how the Companies could collect all outage-related complaints filed in 2025 from customers on the four Pilot distribution circuits, in order to establish a baseline for measuring an additional metric to analyze the Pilot’s success.

Hawaiian Electric Companies’ Response:

- (a) The placement of the fault sensors and signaling equipment in the Pilot is to separate lower wildfire risk areas from higher wildfire risk areas, to allow the coordination of protective equipment, and minimize outages when possible without negatively impacting safety. The Pilot is intended to benefit all customers on distribution circuits where this solution is applicable. The targeted circuits (and the customers that will benefit) are not selected based on a specific group of customers, but are selected based on wildfire risk and geography. The Pilot does not differentiate between different customer types and is intended to improve reliability for all customers on a selected circuit, regardless of customer type. Pilot success can be quantified by whether or not the equipment and protection settings work as intended and improve reliability for all customers on piloted distribution circuits. Safety and reliability will not be negatively impacted if the Pilot

equipment does not perform as expected, as the circuits will default to the existing Enhanced Fast Trip (“EFT”) protective setting.

- (b) If customer surveys are required, the Companies could work to develop customer surveys to achieve the goals of the survey, however, the Companies would need to take into consideration the overall objective, any customer privacy concerns and whether it is possible to obtain the desired data from the survey. It may not be appropriate for the Companies to request certain customer financial and medical information, and certain customer information may not be obtainable or practicable to obtain. The development of surveys could be time intensive and carry certain legal risks requiring review, which would be counter to the Companies’ proposed Pilot timeline intended to move forward with urgency to improve customer reliability. As discussed in the Notice, the Companies have proposed to start the Pilot at the beginning of the fourth quarter of 2025, and if, at the end of the first 6-month monitoring period the Companies determine that the primary objectives of the Pilot are being met, the piloted equipment may be deployed to additional EFT enabled distribution circuits outside the scope of the Pilot.¹ The Companies emphasize that they would like to move forward with the Pilot with urgency to mitigate customer reliability issues, and as such, if any surveys are required, they would be best designed so they do not delay the start date of the Pilot. See also the response to subpart (c), below.
- (c) Although the Companies do maintain records of customer escalations, they do not currently collect or track outage-related complaints specifically for customers on the Pilot distribution circuits. As discussed in the response to subpart (a), above, Pilot success can

¹ See Notice at 13.

be quantified by whether or not the equipment and protection settings work as intended and improve reliability for all customers on piloted distribution circuits, and as such, customer surveys are not necessary to evaluate the success of the Pilot. However, the Companies could implement a targeted outreach approach to collect feedback from customers on the Pilot distribution circuits regarding their outage experiences. Such feedback could be gathered through direct communication or other engagement methods to document and analyze outage-related complaints.

PUC-HECO Wildfire EFT-IR-06

Reference: Non-docketed Case No. 2023-04661, Order No. 41033, “Providing Guidance Regarding Hawaiian Electric’s Wildfire Safety Strategy,” filed on September 13, 2024, at 7; Wildfire EFT Reliability Mitigation Pilot Request at 18.

In the Wildfire EFT Reliability Mitigation Pilot Request, the Companies state:

The Pilot initiative aligns with the PBR Framework regulatory outcome of Reliability, the Pilot Framework Workplan goal to mitigate reliability issues, the Commission’s WSS guidelines in Order 41033 to identify specific measures to lessen the impact of reliability disruptions caused by wildfire mitigation, and the Commission’s expectation in Order 41256 that the Companies will continue to pursue additional mitigation efforts to minimize the impacts of the Protective Measures.

In Order No. 41033, the Commission established the minimum requirements for the Companies’ Wildfire Safety Strategies, which included but were not limited to the following:

Identify specific measures to lessen the impact of reliability disruptions caused by wildfire mitigation, especially relating to low-to-moderate income customers, customers with special medical needs, kupuna, public safety partners, and critical facilities.

- (a) Please discuss in greater detail if and/or how the Pilot specifically addresses the objective of reducing the impact of reliability disruptions caused by wildfire mitigation on low-to-moderate income customers, customers with special medical needs, kupuna, public safety partners, and critical facilities.
- (b) Please discuss whether the Pilot can be implemented in a way to more specifically reduce EFT reliability impacts on such customers, including but not limited to how the Companies determine which circuits to deploy the Piloted equipment and conducting customer surveys to evaluate impacts on customers, particularly with respect to customers who have experienced high numbers and/or durations of outages and/or customers referenced in (a).

Hawaiian Electric Companies’ Response:

- (a) As described in the response to PUC-HECO Wildfire EFT-IR-05 subpart (a), the Pilot aims to minimize outages when possible to benefit all customers on distribution circuits where the solution is applicable, including these specific groups of customers. The way Enhanced Fast Trip (“EFT”) is presently implemented, EFT typically affects whole circuits and all of

the customers on those circuits. The Pilot will test to confirm the ability of Pilot equipment and protection schemes to block EFT and minimize the extent of outages – this is expected to benefit all customers on piloted circuits because in situations where EFT is blocked due to a fault in a low wildfire risk area, the entire circuit is not expected to experience a full circuit outage. For the low wildfire risk area where the fault occurred, the traditional protection scheme (i.e., blow fuse or reclose) will continue to function. Thus, there will not necessarily be an outage in the low wildfire risk area either. Furthermore, the Pilot is also expected to reduce the need for visual inspection before restoring power due to the reduction in outages. As such, all of the customer groups on the piloted circuits are expected to benefit.

Should the Pilot be successful, the Companies plan to deploy the equipment on 29 additional distribution circuits across all three Companies, which will help reduce reliability disruptions caused by wildfire mitigation to additional customers.¹

- (b) Please refer to the response to subpart (a), above, and the response to PUC-HECO Wildfire EFT-IR-05.

¹ See Notice at 13 and Exhibit A and 11.

CERTIFICATE OF SERVICE

I hereby certify that a copy of the foregoing document, together with this Certificate of Service, was duly served on the following party, by electronic mail service as set forth below:

Michael S. Angelo
Executive Director
Division of Consumer Advocacy
Department of Commerce and Consumer Affairs
mangelo@dcca.hawaii.gov
consumeradvocate@dcca.hawaii.gov

DATED: Honolulu, Hawai‘i, September 23, 2025.

/s/ Christine Mounthongdy

Christine Mounthongdy

HAWAIIAN ELECTRIC COMPANY, INC.

From: noreply@salesforce.com on behalf of PUC CDMS <hpuc@notify.hawaii.gov>
Sent: Tuesday, September 23, 2025 1:19 PM
To: Mounthongdy, Christine
Subject: Hawaii PUC CDMS eSERVICES - E-Filing F-331752 FILED Confirmation

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Aloha Christine Mounthongdy,

Your electronic filing to the Hawaii Public Utilities Commission has been **FILED**. You will receive an email when the filing is public.

Please note that filings submitted after 4:30 p.m. Hawaii Standard Time will be deemed "FILED" the next business day. The mere fact of filing shall not waive any failure to comply with Hawaii Administrative Rules Chapter 6-61, Rules of Practice and Procedure Before the Public Utilities Commission, or any other application requirements.

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Account: Hawaiian Electric Company, Inc., Hawaii Electric Light Company, Inc., and Maui Electric Company, Limited

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