



UNIVERSITY of HAWAII*at HILO
CENTER FOR MAUNAKEA
STEWARDSHIP

MEMORANDUM

January 9, 2025

TO: Mauna Kea Stewardship and Oversight Authority

FROM: Greg Chun, Executive Director

SUBJECT: Request to Construct VIS Storage Enclosure

- Date proposal rec'd: 12/17/2024
- Type **A** B / C
- CMS MIP #350
- ED review: 12/26/2024
- MKMB FYI: 1/7/2025
- EC FYI: 1/9/2025
- KKM FYI: 1/9/2025
- MKSOA FYI: 1/9/2025

I. Project Description

The Center for Maunakea Stewardship (CMS) requests to install a solar water heating system for Halepohaku (HP) to supplement the current electric water heater serving the Common and dormitory buildings. HP was originally approved under Conservation District Use Permit HA-1430, issued in 1982. The new system, to be completed by a contractor and CMS staff in approximately one week, will consist of the following new installations at HP:

- Two, 4'x8' externally-mounted solar collectors;
- Interior and exterior copper plumbing;
- An interior, 80 gallon solar water tank;
- An interior recirculating pump and controller.

An earlier solar water heating system, consisting of sixty solar panels, each measuring 3' x 6', was included in CDUP 1430. However, it failed due to freeze-damaged pipes and was subsequently removed pursuant to CDUP HA-03-34, Removal of Solar Hot Water Heating System, issued in 2002.

CMS finds the current project is a minor and cosmetic operation to an existing, permitted facility (HP) and involves no ground disturbance. Any resulting impact to the surrounding landscape and other natural and cultural resources is expected to be negligible. The proposal is being presented as informational-only to the Environment Committee, Kahu Kū Mauna (KKM), Maunakea Management Board (MKMB), and the Mauna Kea Stewardship and Oversight Authority (MKSOA).

II. Department of Land and Natural Resources Rules

The project presumes the following land use under HAR §13-5-22, P-8, Structures and Land Uses, Existing, (A-1) *Minor repair, maintenance, and operation to an existing*

structure, facility, use, land, and equipment, whether it is nonconforming or permitted, that involves mostly cosmetic work or like-to-like replacement of component parts, and that results in negligible change to or impact to land, or a natural and cultural resource...

III. Identified Impacts

The nearest identified cultural resource may include an ahu-lele over 700 feet south of the project area and within the Department of Natural Resources' silversword enclosure. The proposed land use is not anticipated to have any effect on this cultural resource. CMS has also determined the project will not extend or enlarge the HP footprint and does not change the permitted use of the facility. No impacts are anticipated to any identified historic properties or cultural resources, nor to any natural (biological, hydrological, geological) or recreational resources.

IV. Comprehensive Management Plan Compliance

The request is consistent with the Comprehensive Management Plan (CMP), the University's lease for the Halepōhaku parcel, and the Hawai'i Administrative Rules §20-26 for University-managed lands. Further, CMS' review of this proposal complies with the following CMP Actions:

- Infrastructure and Maintenance Management Action 5 (IM-5): Develop and implement a Debris Removal, Monitoring and Prevention Plan.
 - Crating material shall be removed daily. All incidental rubbish and debris shall be kept in a windproof rubbish bin or inside HP behind closed doors. All perishable materials such as food and food wrappers shall be removed daily.
- IM-11: Encourage existing facilities and new development to incorporate sustainable and energy-efficient technologies, whenever possible.
- IM-13: Install locally-based alternative energy sources as opportunities arise.
- Astronomical Resources Management Action 2 (AR-2): Prevent light pollution, radio frequency interference and dust.
 - Contractors and staff will be informed not to use cell phones, two-way radios, or other electromagnetic frequency emitting devices, and to keep within posted speed limits. All work will be done during daylight hours so as not to affect nighttime operations of other observatories.
- Permitting and Enforcement Management Action 1 (P-1): Comply with all applicable federal, state, and local laws, regulations, and permit conditions related to activities in the UH management Areas.
- P-4: Educate management staff and users of the mountain about all applicable rules and permit requirements
 - All project workers will be required to attend cultural and environmental training prior to onsite work.

- C-9: Inspection of construction materials
 - Shipping containers and crates will be inspected by a DLNR-approved biologist or by Department of Agriculture personnel prior to arriving at Maunakea. Identified mitigation measures will be complied with.
- EO-2: Require orientation of users

V. Center for Maunakea Stewardship (CMS) Recommendation

CMS recommends these conditions should this request receive OCCL concurrence:

- Best Management Practices will be employed.
- The work area will be clearly delineated to warn the public of any hazards.
- All project participants must attend a Maunakea Orientation prior to work.
- Allow Maunakea Rangers to visit and monitor activities.
- Ensure that loose tools or equipment are not left unattended and are properly stored at the end of each day.
- In preparation for high wind conditions, protocols must include measures to ensure debris and equipment are not blown from the job site.
- All improvements shall be designed and installed to withstand the severe weather conditions on the mountain.
- Removal and proper disposal of all waste material. All perishable items including food, food wrappers and containers, etc. shall be removed from the site at the end of each day and properly disposed.
- Use of lighting from sunset to sunrise is prohibited unless otherwise stated in the project proposal and approved.
- Employ invasive species prevention best practices, including inspections of materials by a DLNR-approved biologist, as identified in the *Maunakea Invasive Species Management Plan* prior to entering UH managed lands. Inspections shall not occur on UH managed lands on Maunakea, at State or County parks, along public roadsides, or on Department of Hawaiian Home Lands.
- Nēnē (*Branta sandvicensis*) may be present. If a nēnē appears within 100 feet (30.5 meters) of ongoing work, all activity shall be temporarily suspended until the animal leaves the area of its own accord. Feeding of nēnē is prohibited.
- The project approval/permit may not be transferred or assigned without prior approval.
- No use of mechanized equipment except as provided for in DLNR concurrence or approval.
- Identify and comply with other permit requirements, such as County of Hawaii building permits or Department of Land & Natural Resources (see both any applicable DLNR permit and HAR §13-5-42 Standard conditions).
- The project must be completed within the time frame specified in the proposal and (when applicable) as provided for in DLNR concurrence or approval.

MKSOA: HP Solar Heater

If you have any questions, please do not hesitate to contact Nahua Guilloz via email, guilloz@hawaii.edu, or by calling 808-933-0734.

Sincerely,

Gregory C Chun

Greg Chun
Executive Director, CMS

Facility Project Proposal for the UH-Managed Lands

for projects anticipated to be classified as having “Minimal Impact”

Proposals due by the 15th monthly

Please mark all that apply to your project

- Project was reviewed in a 3-Year Plan
- Project is a CMP, lease, or sublease compliance measure (e.g., keeps the site in safe working order)
- Project involves heavy machinery
- Project requires ground disturbance such as digging or trenching
- Project will result in a change to the facility footprint

Facility Name

Center for Maunakea Stewardship (CMS).

Brief Descriptive Title of Project

Solar water heating system for Halepōhaku (HP).

Project Description

Install a solar water heater to supplement the current electric heater used to heat the domestic water system within the HP commons and dormitory buildings.

Proposed Commencement Date

As soon as approved.

Proposed Completion Date

Estimated one week for installation and testing.

Estimated Project Cost

\$28,700.

Total size / area of proposed use

Set atop and secured to existing 8' x 13' concrete pad and building siding.

Project Purpose and Need

CMS seeks to reduce HP electricity consumption as part of CMP management actions and Hawaii's statewide goal of becoming 100% renewables-based by 2045. Currently, a significant amount of electrical use is required to run the electric water heater, at a rough average of 6 kilowatts per hour or 4,400 kWh per month. Replacing the electric water heater with a solar-powered heater would reduce the electricity consumed for hot water production; CMS estimates a new solar water heater would lower the electric water heater daily runtime by 6-8 hours.

As part of its shift to renewables, CMS in 2016 installed a photovoltaic (PV) system at HP. PV generates electricity that is sold to CMS at a discounted rate of \$0.20/kWh. Excess energy is returned the grid to offset the energy that is imported from HELCO, at \$0.40/kWh, during the night or during cloudy days. So far this year:

- PV system generated a total of 185.7MWh, of which 110.26 MWh have been used in house and 75.47 have been exported to the grid.
- HP total energy use was 169.87 MWh, of which 110.26 (65%) were supplied by PV and 59.61MWh (35%) were imported from HELCO.

Has professional peer-review occurred

Design planning has been conducted with a technician from Steve's Plumbing, a licensed contractor who specializes in Solar Water Heaters.

Are there any related ongoing, pending, or planned projects associated with this submission?

No.

Description of the Project

The proposed solar water heating system will consist of:

- Two exterior solar collectors (new; see Fig. 1) will be securely anchored between an existing 8'x13' concrete pad and the southwest corner of the common building (Figs. 2-3).
- Exterior and interior copper plumbing (new). Only the pipe connecting the collectors and new heater would be located outside the existing building; all other piping located inside the Mechanical Room. Appropriate insulation will be applied to all piping and the solar collectors to prevent equipment from freezing.
- Interior 80 gal solar water tank (new) and backup electric water heater (existing), installed within the existing mechanical room located under the HP kitchen area (see Fig. 4). Since the existing, electric water heater is approximately one year old (installed ~October 2023), it would be retained as a back-up unit should the solar water heater require maintenance or repair. As such, the water would remain plumbed into the system but valved and powered off.
- Interior recirculating pump (new). A recirculating protocol will be programmed into the controller to recirculate hot water through the collectors during freezing conditions.
- Interior controller (new), installed on the back wall of the mechanical room.

Each collector is a 4' x 8' box containing pipes that heats water via solar radiation. Water from the insulated hot water tank is pumped to the solar collectors and the hot water is returned to the holding tank. During cloudcover or night time, water is pumped from the 1900 gal holding tank to an 80 gal solar water tank equipped with a back-up electric heater.

Location

The installation is proposed for an area that is south-facing and receives unobstructed, direct sunlight year-round (see Fig. 2). This location is also a non-public, restricted-entry area out of the public view.



Fig. 1, Solar collector



Fig. 2. South-facing wall of HP common building. Circled area shows where solar collectors will be secured between concrete pad and outer wall. Red double doors indicate entry to Mechanical Room.



Fig. 3, Closer rendering of installed solar collectors. New exterior piping (not depicted) would consist of a single, insulated copper pipe connecting the collectors to system in Mechanical Room.



Fig. 4, (Left) 1900 Hot water insulated holding tank and (right) electric water heater.

Description of the process of completing the project

Work will be completed in accordance with a project plan established between the contractor, Steve’s Plumbing, and CMS staff and utilizing Best Management Practices. The installation does not require use of any heavy machinery or ground disturbance.

Who will do the work?

CMS staff will assist the contractor to complete the installation.

Equipment & Transportation

The project will utilize the normal, day-to-day work equipment and transport vehicles. No heavy machinery, nor wide or oversized vehicles will be required.

Measures to protect the environment and/or mitigate impacts

Impacts

The project is limited to existing infrastructure with no anticipated environmental impacts. The project does not involve any ground disturbance, change to facility footprint, nor change in any approved uses of HP. In addition, since the project occurs in a restricted-entry area with no recreational, hunting, or cultural activities, neither public access nor any recreational, hunting, or cultural use will be impacted.

All necessary measures will be taken to protect the environment, including compliance with Standard Operating Procedures 1 and 2 (e.g., required delivery inspections) of the Maunakea Invasive Species Management Plan (CMS, 2015) and appropriate waste handling. All personnel involved onsite will be required to complete the Maunakea Users Orientation.

Compliance with Lease, Sublease, or Comprehensive Management Plan (CMP)

The proposed installation either involves or fulfills the following CMP actions:

- Infrastructure and Maintenance (IM) 11, Encourage Sustainable and Energy-Efficient Technologies. This project will implement sustainable, energy-efficient technologies.
- IM-12: Conduct Energy Audits and Implement Recommendations. CMS is studying potential changes to its facilities to reduce energy consumption.

Identify other required or associated permits

Any permits required for this installation will be obtained by the mechanical contractor; for example, County electrical permit.

Community Benefits

Benefits to other Maunakea entities and/or global astronomy community

The project includes the following benefits to the Maunakea astronomy community:

- Maintain uninterrupted provision of hot water for cooking, bathing, laundry, etc.
- Reduce electricity consumption. CMS expects a reduction over the long-term in electricity use fees.

Benefits to the Hawaii Island community

Implementing this solar water heating system will reduce the demand for petroleum-generated electricity, particularly during periods of adequate solar exposure. The project will also support the state's goal to source 100% of its electricity from renewable energies by 2045.

Will data, publications, or other products be free and available to the public?

N/A

For internal use only by CMS

Review checklist

N/A Staff review and report

Yes Outside agency review or approval required: County electrical

FYI Environment committee, if environmental impacts are anticipated

FYI Kahu Ku Mauna: The project was not included in a 3YP

FYI Maunakea Management Board

FYI MKSOA



FY25 HP Solar Water Heater System Proposal

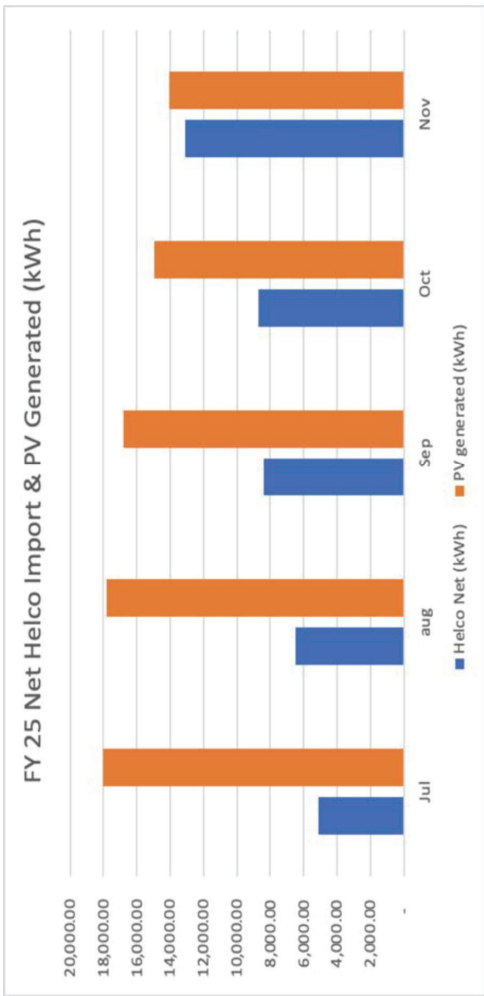
Current System

- Oct 2023 Diesel Water Heater suffers catastrophic failure
- Given UST project, diesel heater is replaced with electric water heater.
- Electric water heater two 6.1kW elements, 80 gal tank.
- 1900 gal thermally insulated water tank



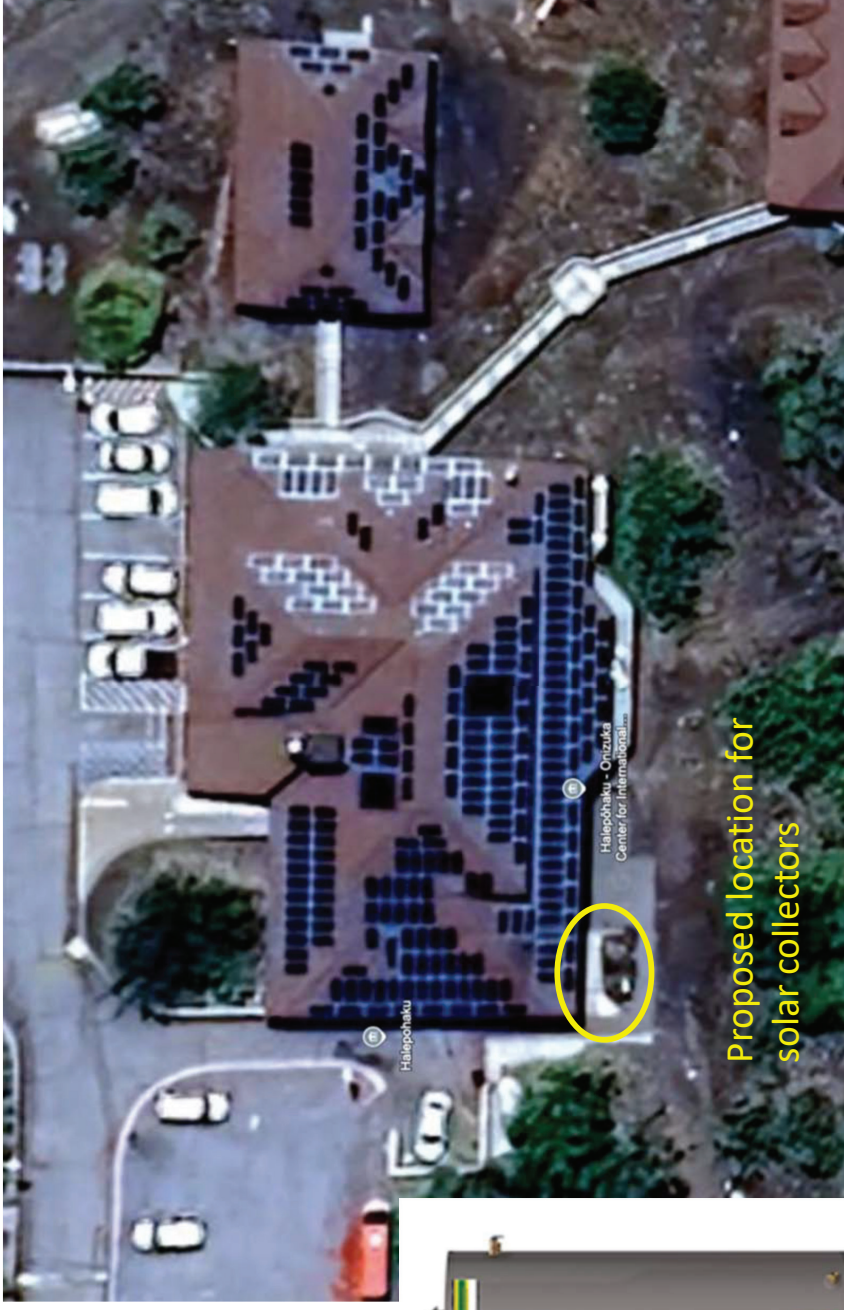
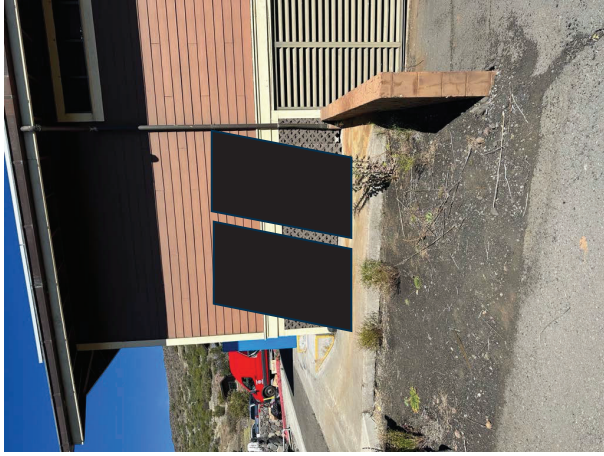
Photovoltaic Power Purchasing Agreement

- Altus Power holder of PPA
- All power generated by PV system is billed by Altus @ \$0.19/kWh
- Helco net metering agreement (Import – export = net).
- Helco rates range \$0.46/kWh - \$0.59 kWh (as high as \$0.78/kWh Aug 2023)
- Current average power consumption of electric heater is 6.1 kWh (4,357 kWh/month)
- Net import/month range for FY25 5,100kWh – 13,100.

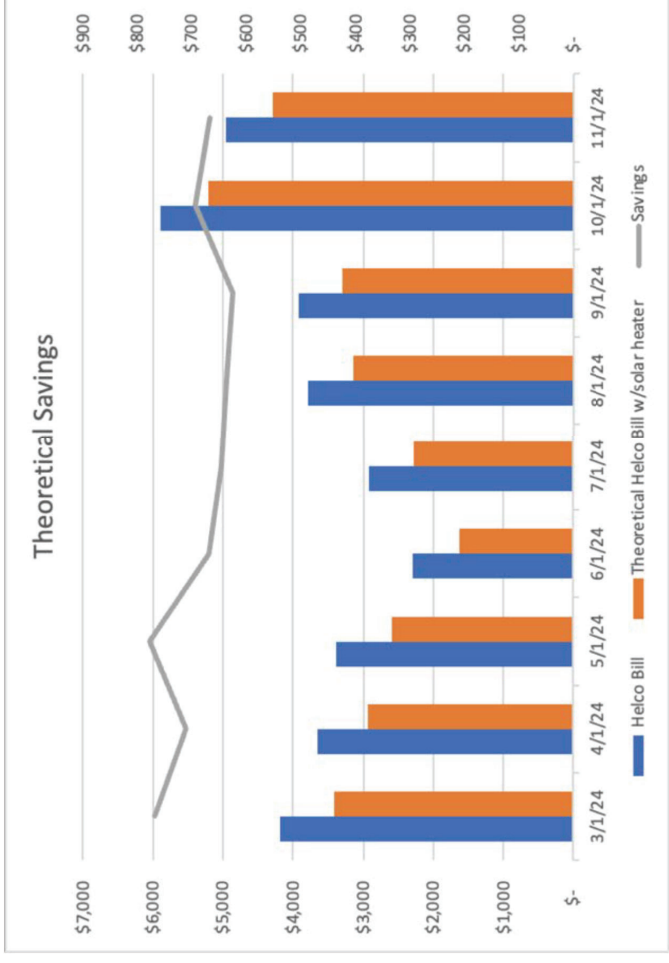
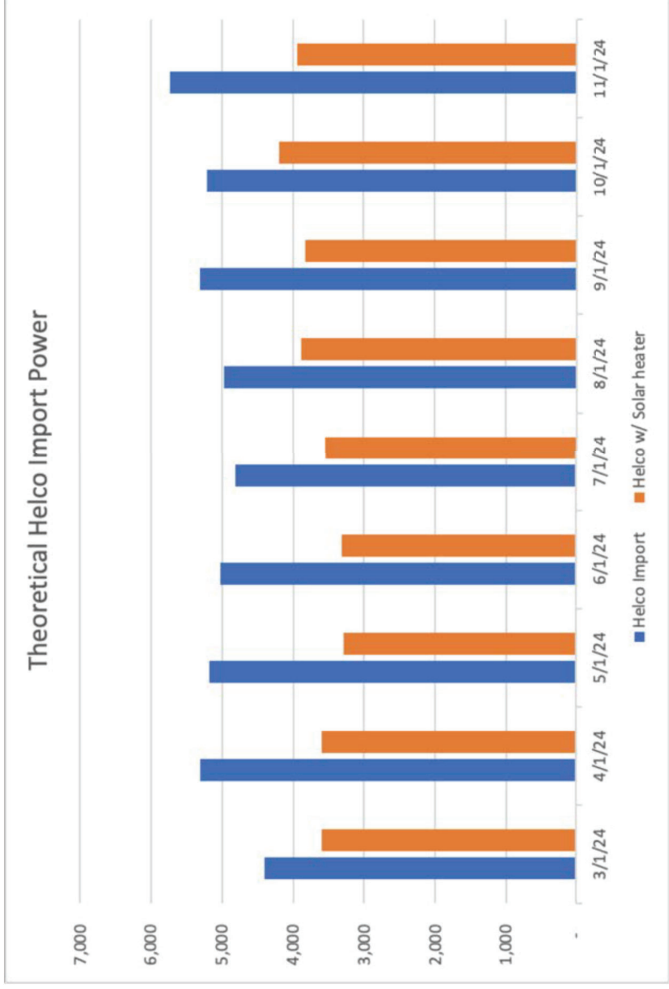


Proposed Solar Water Heating System

- Two to three solar collectors 4' x 8'
- One 80 gal storage tank with back up electric heater
- Plumbing & controllers.
- Cost \$30k - \$50k (current budgetary quote \$28k)



Theoretical Benefits



- Selected location is south facing wall, full solar exposure year-round.
- Average 8 h/day of solar exposure.
- Installation of collectors on existing concrete pad, no ground disturbance required.
- Estimated monthly savings \$700 - \$800 (33% reduction of electric heater power use)
- Estimated payback 3 – 5 years.