

Sacramento Ductless Heat Pump Demonstration



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Presentation Overview

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Objective: Seeking TF feedback on Sacramento research plan data collection effort

- TF comments on abstract from March
- Utility information received to date
- Other studies reviewed/considered
- Summary of Sacramento research effort
- Questions for TF

TF Comments from March – Status Update

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- Clearly define measure delivery strategy.
 - Workpaper for program will be determined by delivery strategy - Targeting Third Party delivery
- Answer behavioral questions.
 - Will need operational data across seasons - Cooling season
 - John Proctor to share year-long study information with UCONS - Received
 - Smart meter data is also an option – Useful if available
- UCONS to reach out to PG&E and SCE with defined data requests
 - SCE to provide aggregate swamp cooler data to UCONS – Possible precedent setting for “supplemental-system” analysis/program development.
- SCE and PG&E to consider leveraging Emerging Technology data – TBD?
- IMC must use labor and measure costs. - Understood
- Sherry Hu to share SCE WP with UCONS - Received
- UCONS to address possibility of incorporating controls – Researching with vendors
- UCONS team to use a 15 year EUL - Yes
- Measure approved to proceed to workpaper development.

Utility Information Requested/Received

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- Requested/received the following information:
 - Age and type of SEER rating of AC units installed in manufactured homes – Received SDG&E data
 - Number of manufactured homes by climate zone – Received SCE Data
 - Annual cooling loads for manufactured homes by climate zone – Not yet received
 - Possible SCE Impact Evaluation – Request update

Other Studies Considered

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- SCE workpaper SCE13HC033 (DHP) – Received and reviewed.
- PG&E workpaper PGECOHCVC163 (Evap. Cooler) – Received and reviewed.
- Proctor Engineering Group Study – Received and reviewed.
- NW Research – RTF/Ecotope received and reviewed.

Summary of Sacramento Research Plan

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- Objective:

Evaluate the energy performance, temperature distribution, and occupant comfort of high efficiency, single-head, ductless heat pumps (DHP) installed in four Sacramento area manufactured homes.

- Rationale:

- ❑ Small study to initiate data collection, understand occupant behavior/satisfaction.
- ❑ Data useful to confirm concepts and model calibration
- ❑ Outcomes to assist in informing larger study

Summary of Sacramento Research Plan

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- Research Questions:

1. What fraction of the total cooling load will a single-head DHP be able to satisfy over the cooling season?
2. Of the fraction of cooling load displaced, what are the resulting energy savings in comparison to the existing central air conditioning system?
3. What are the differences in zonal temperature distributions (DHP versus existing AC) across the major living zones (living room, kitchen/dining, and bedrooms)?
4. In comparison to the central AC, how well does the DHP provide for occupant comfort? This research question will be answered through occupant surveys.

Summary of Sacramento Research Plan

- Description of Approach:
 - End-use metering at electrical panel of existing central AC (compressor, condensing fan, air handler, and auxiliaries) and DHP circuit.
 - Whole building/service main electrical metering
 - For all electrical metering, recommend true power, root mean square (RMS), measurements and time series data recording.
 - Space temperature and relative humidity (RH).
 - Multiple point temperature and RH logging of affected zones. All partitioned zones to be monitored.
 - Air delivery temperature. Delivered air temperature for existing and DHP systems
 - Delivery head of DHP
 - Existing duct supply air diffuser, validate use and when/if ducts are to be used for distribution
 - Demonstration site outdoor air temperature – optional, downloaded from local weatherstation .

Summary of Sacramento Research Plan



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Description of Approach, con't:

- Occupant survey to assess comfort, operation, and system satisfaction

Summary of Sacramento Research Plan

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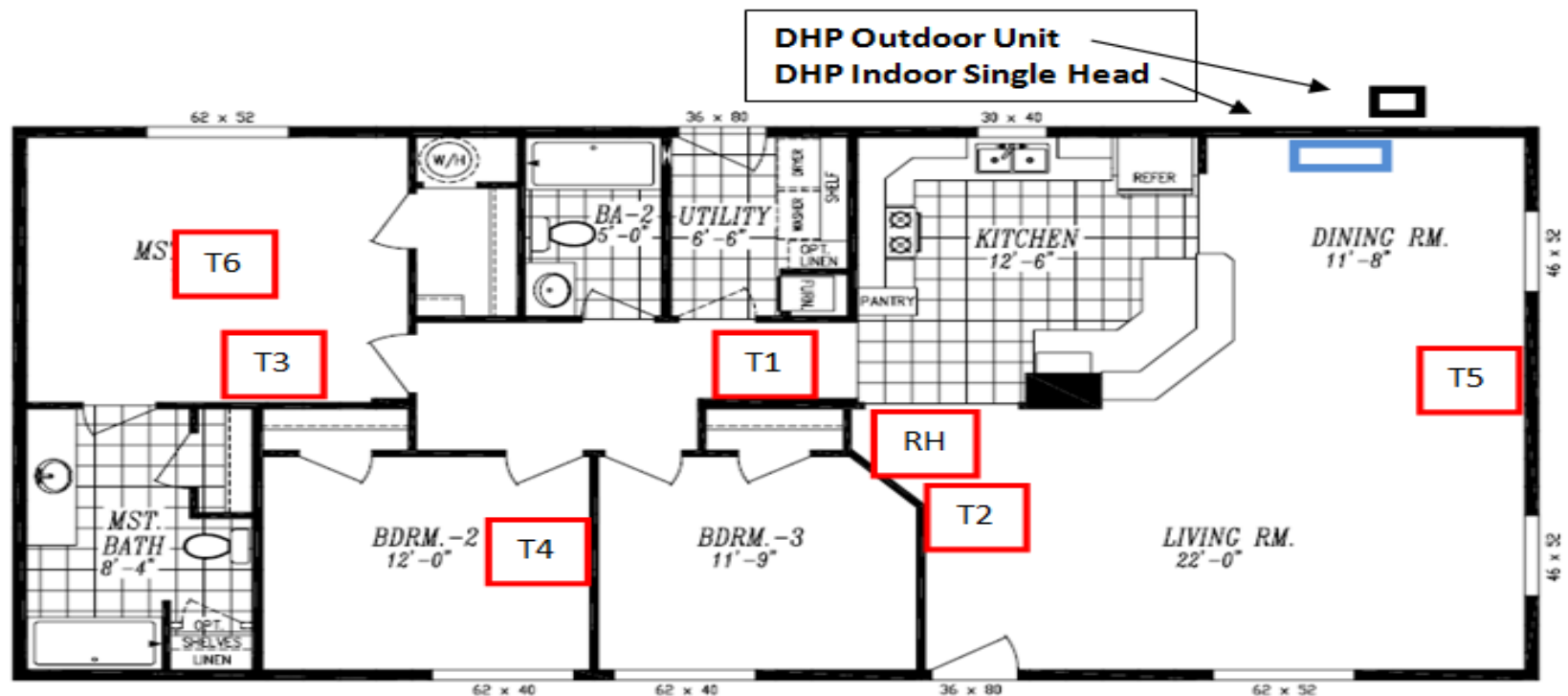


Figure 1. Sample Logger Placement Points – Typical Manufactured Home

Summary of Sacramento Research Plan

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Typical Outdoor Unit



Typical Indoor Head

Summary of Sacramento Research Plan



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- Timing of workpaper
 - Interim workpaper to follow demonstration
 - Presentation to the TF - Target late Fall.

Workpaper Process and Timing

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- Questions for the TF:
 - Clarification on approach?
 - Other information the TF would like collected in the study?
 - Path for follow-on larger study
 - ✦ Validate savings
 - ✦ Customer behavior/comfort/acceptance
 - ✦ Funding options and process for approval?

Thank you.