Ductless Mini Splits in California Manufactured Homes

TOM ECKHART, GREG SULLIVAN, ED IMPALA

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Proposed Motion

" I _____ move the RTF, for the UES measure Residential Existing MH and SF Ductless Heat Pumps for Electric Forced-Air

- accept the 'Research Strategy';
- set the Category to 'Planning';
- set the Status to 'Active'; and
- set the Sunset Date to March 2018."

Note: The intention of the 3-year sunset date is for the RTF to check in on whether the measure is still of interest to the Region,, and if so, update the savings estimate with any new information. RTF discussion of moving measure to Provisional would be triggered by funders having a Research Plan for the RTF to review.

Reminder on Savings estimates approved in January:

- 3,722 kWh for Single Family
- 5,696 kWh for Manufactured Homes

Presentation Overview

Objective: Seeking TF approval of draft abstract

- **Measure Description**
  - The ductless mini splits (DAC) utilizes a more efficient technology than current DEER measures.
  - The measure is not for whole house cooling, but for zonal applications.
  - It “succeeds” by not using an inherent design and construction flaw in most manufactured homes: their ducts.
  - The measure was reviewed and approved at the RTF on a “provisional basis” in January; a research plan was approved at the March 17 RTF.
  - The focus for this measure in California is for cooling; the focus in the Northwest is for space heating.
  - The total energy savings for California applications is less than the ~6000 for this measure in the Northwest; overall ratepayer savings greater than in the Northwest due to much higher rates for summer peak cooling.

Program Implementation

- Industry projections of growth for the next 10 years is higher for the Southwest than the Northwest (without a utility rebate or as a recognized utility program).
- The measure will be provided as a direct install measure. This would not be as the result of either “early retirement” or “at time of burnout.” Normally, the existing HVAC system will be left in place (and can be used in emergencies as a supplemental cooling and/or heat system).
- Savings are derived by providing AC at a much lower cost due to 3 factors:
  - Much higher efficiencies derived from mini split efficiencies
  - Not using the inefficient duct systems in the manufactured homes
  - Space conditioning of only the kitchen and living room areas with the single head system
- This is a downstream deemed measure which would be eligible in all climate zones for all utilities.

Program Implementation

- **Target Market**
  - Existing “in park” manufactured homes
  - Existing “out-of-park” manufactured homes
- **Market Potential**
  - There are over 400,000 manufactured homes in California. Very few of these homes would not benefit for this measure.
  - This customer class remains the highest energy use due to a variety of factors: low cost construction; few codes or lack of code enforcement; and duct systems not designed to efficiently transmit warm or cool air. This customer class also is the least able to pay their utility bills.
  - Past efforts to address the problems in this class of buildings has helped reduce bills, but there are a new class of measures which better serves this customer. Like the Northwest, this could be a “large saver.”

Measure Description

For California applications, this measure is proposed as a single zone, high efficiency HVAC system that offers cooling efficiencies to SEER 21 and above. Beyond the high efficiency, additional savings result from the ductless aspect and a higher "delivered cooling" efficiency.

- **Base Case Description 1:** Existing, lower efficiency (SEER 10, probably lower) central air conditioner
- **Base Case Description 2:** Existing, lower efficiency (SEER 10, probably lower) air conditioner
- **Base Case Description 3:** Existing, lower efficiency (SEER ??) window/wall air conditioner

- **Measure Case Description 1:** Retrofit, high efficiency (SEER 21) zonal ductless air conditioner
- **Measure Case Description 2:** Retrofit, high efficiency (SEER 21) zonal ductless air conditioner
- **Measure Case Description 3:**

Abstract Data and Methods: Baseline

- Baseline Data Collection
  - Use DEER-based central AC measure as surrogate (where existing customer data not available)
  - Collect and review available California research on manufactured home AC system energy use, efficiency, age, and demographics
  - Propose a detailed end-use metering study to better inform program development
    - The California version of the RBSA?
    - DOE MH lab homes in Richland Washington

- Baseline Methodology
  - Rated SEER differential analysis with population/cooling zone-weighted air conditioning vintages
  - DEER-based analysis using existing SEER and manufactured home assumptions
    - Request assistance with data availability

Abstract Data and Methods: Measure

- Measure Methodology
  - Rated SEER differential analysis by cooling zone
  - DEER-based proxy analysis using proposed SEER and manufactured home assumptions
    - Evaluate displacement percentage of existing air conditioning with ductless AC
    - Request help with data availability
- Measure Application and Delivery Type
  - Utility program with rebates – the NW model
  - Third party program
  - Other?
- Eligibility
  - Climate zones – all; greatest customer value in hotter climate zones and where gas not available
  - Building types – manufactured homes

Summary of Parameters

CALIFORNIA TECHNICAL FORUM

Parameter	Value (or Range)	Confidence Level (High, Medium, Low)
kWh/year	500 – 2,600 (CZ dependent)[1,2]	Medium
kW/year	0.8 – 1.9 (CZ dependent)[1,2]	Medium
Therms/year	NA	NA
EUL	15 years	DEER Value
IMC	Not a replacement measure	To be reviewed at the TF
NTG	0.80	DEER Value

Notes
1 Awaiting word back from DEER analyst on kWh/kW listed savings
2 Values assume 100% existing system displacement

Estimated TRC: > 2.0 for RTF (requires TF review on methodology)

Summary of Parameter

- Estimated TRC: > 2.0 for RTF (requires TF review on methodology)
- Estimated Customer Bill savings (for current annual AC loads of 4000 kWh or more)
  - PG&E 131% - 200% of Baseline: $0.27504/kWh
    201% - 300% of Baseline: $0.33504/kWh
  - A reduction of 2000 kWh would reduce the typical MH customer annual bill by $600 (5 year simple payback)
  - Many Northwest utilities currently provide rebates of $800 to $1200 per home for this measure

Additional Information Needed

- Additional research plans or needs:
  - Confirmation of DEER values – other relevant research
  - Assessment of DAC/AC zonal use assumptions, i.e., percent of existing system displacement
  - Demographic assessment of opportunity, i.e., manufactured home market variables, climate locations, existing system vintage/efficiencies, and calculated savings distributions.
  - Who would fund an RTF type “research plan”?
  - Types of Controls; overlap of current and new thermostat controls
  - Areas of uncertainty that need shoring up.
  - Differential SEER savings by climate zone?
  - Offered as a heat pump or AC only?
  - manufactured home demographics?
  - Describe additional research plans or needs

Additional Information Needed

- Areas of uncertainty that need shoring up
  - Differential SEER savings by climate zone?
  - Offered as a heat pump or Mini Split AC only?
  - Manufactured home demographics?