DUCTLESS MINI SPLITS IN CALIFORNIA MANUFACTURED HOMES

Presented to the
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TECHNICAL FORUM

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CA Technical Forum New Measure Information
PRESENTATION OVERVIEW
Objective: Seeking TF approval of draft abstract

Measure Description

The ductless mini split (DAC) is a residential HVAC measure which utilizes a more efficient technology than current DEER measures. The measure presented to the TF 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.

This 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; but overall ratepayer savings are greater than in the Northwest due to much higher rates for summer peak cooling.

The measure is for cooling loads only where natural gas is available for space heating. DAC will replace existing, low-efficiency, central air conditioning systems or window units (which can still be used in extreme weather to supplement cooling needs). Where natural gas is not available for space heating, this measure addresses the installation of a new, ductless mini split for both space heating and cooling.

PROGRAM IMPLEMENTATION

The measure is currently being provided to California homes by many HVAC contractors. 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 is a measure installed 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:

1) Much higher efficiencies derived from DAC efficiencies
2) Not using the inefficient duct systems in the manufactured homes
3) Space conditioning of only the kitchen and living room areas with the single head system

This is a downstream deemed measured which would be eligible in all climate zones for all utilities. The target market (initially) would be for those climate zones with the highest cooling degree days and with the largest saturation of manufactured homes. The "greatest impact" savers could be for those homes where natural gas is not available for space heating.

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, but primarily due to low cost construction, poor weatherization or 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) mini split
- 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 mini split
- Measure case Description 3:

ABSTRACT DATA and METHODS: BASELINE

- Baseline data collection
    - Use DEER-based central AC measure as surrogate (where existing customer or utility measured data is not available)
    - Collect and review available California research on manufactured home AC system energy use, efficiency, age, and demographics
    - Request all current and past utility program offerings and evaluations related to high efficiency air conditioning and manufactured homes.
    - Propose a detailed end-use metering study to better inform program development
        - The California version of the RBSA?

- Baseline methodology
    - Rated SEER differential analysis with population/cooling zone-weighted air conditioning vintages
        - Baseline SEER values de-rated by vintage
        - Request assistance with data availability

    - DEER-based analysis using existing SEER and manufactured home assumptions
        - Request assistance with data availability

- Measure methodology
    - Rated SEER differential analysis by cooling zone
        - Evaluate displacement percentage of existing central air conditioning with ductless AC
            - Develop population distributions based on "operation" of both systems
            - Request assistance with data and methodology

    - 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

Additional Proposed Parameters

- Measure Costs
  - Baseline costs – is there a baseline cost?
  - Measure cost – see latest from Mitsubishi/others
  - Incremental cost – to be discussed at TF (not early replacement or at burnout)
  - Data source: TBD

- EUL
  - 15 years
  - Source: DEER High Efficiency Residential AC

- NTG
  - 0.8
  - Source: DEER High Efficiency Residential AC

Summary of Parameters

Parameter	**Value (or Range)**	**Confidence Level (high, medium, low)**
kWh/year (per home)	500 – 2,600 (CZ dependent)[1,2]	Medium
kW/year (per home)	0.8 – 1.9 (CZ dependent) [1,2]	Medium
Therm/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)
Estimated Customer Bill savings (for current annual AC loads of 6000 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

Describe 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 mini split or AC only?
- Manufactured home demographics?