“Ductless Heat Pump Mini-Splits: Big Issues, Big Breakthroughs on the Horizon”
Challenge YOUR Thinking! - COMFORT
Technology Improvements

60 Watts → 14 Watts → 8 Watts
Technology Improvements

PAST....
• 10 SEER
• Operation to 32°F
• Back-up heating req’d at 32°F

PRESENT....
• Up to 33 SEER
• Operation below -13 °F
• 100% capacity at 5°F
INVERTER Technology

INVERTER compressor

Conventional compressor
Technology Advancements - Zoned Comfort Solutions™
Connected Control Solutions

Customer choice to control & monitor their Mitsubishi Electric indoor units.

- Any Smart Thermostat
- Kumo Cloud
- Kumo Station – Full Integrated Solution
Complete Control with Wi-Fi
Fully Integrated Control Strategy

- **Supplemental Heat**
- **Outside Air**
- **Heat pump Only**
- **Heat pump 1st, backup 2nd & 3rd**
- **Backup Only**
- **Ventilation**
- **Dehumidification**
- **Humidification**
2019 Energy Star Most Efficient

Products must meet the following cooling and heating performance levels: 20 SEER, 12.5 EER and (for heat pumps) 10 HSPF.

• Achievement with Top Tier HVAC Efficiency and Controls
• Mitsubishi has 56 of 63 (89%) Mini-Split Models
The Grid IS Getting Cleaner!

- Xcel Energy Carbon Free by 2050
- By 2021 Heat Pump has 10% reduced CO² levels over Nat. Gas (CRR Rev 2018)

Source: 2016 Xcel Climate Change & Greenhouse Gas Emissions CRR2016
Market Shift – Electrification
Two choices

SO WHY MINI-SPLIT HEAT PUMPS?

• Grid Getting Cleaner
• They Work
Cold Climate...Not Problem!

H2i MXZ HEATING CAPACITY AT LOW TEMPERATURES*

- 93%
- 78%
- 76%
- 100%

% Heating Capacity

Outdoor Temperature Degrees FWB

MXZ-C-NAHZ
Standard Heat Pump

~17.9 °F
Cold Climate Heat Pump Research!

- Research Cold Climate Heat Pumps
  - Capability of Cold Climate Technology
  - Compared Heat Pumps w/propane backup
  - Ductless HP displacement strategy
Addendum - Cold Climate Air Handler – Sole Source

CASE STUDY 1
Field Test of Cold Climate Air Source Heat Pumps

BACKGROUND
This field study is an extension of the recent heat pump project (2019) in a similar launch of the CASE study. This system was provided by Mitsubishi Electric. Cooling was measured to be 75% of the cooling load installed in one unit of a split system in an residence.

Site Characteristics
- Single family 2-bedroom
- Lower level has the basement and 1st floor
- 2,905 square feet heated area

FIELD WORK
The project team installed detailed monitors at various points to assess energy usage and performance for measurement of system temperatures, etc.

Equipment
A 2.5 ton cuHP/SP was installed, which was a substantial upgrade from the existing system. The heat pump was designed to be 50% more efficient in heating and cooling compared to the existing system.

Data Collection
The data collected from the monitors were used to assess the performance of the heat pump system.

CASE STUDY 2
Field Test of Cold Climate Air Source Heat Pumps

BACKGROUND
This field study is an extension of the recent heat pump project (2019) in a similar launch of the CASE study. This system was provided by Mitsubishi Electric. Cooling was measured to be 75% of the cooling load installed in one unit of a split system in an separate residence.

Site Characteristics
- 1-bedroom, 1-bath, 1-car garage
- Square footage 1,853 square feet

FIELD WORK
The project team installed detailed monitors at various points to assess energy usage and performance for measurement of system temperatures, etc.

Equipment
A 4.5 ton cuHP/SP was installed, which was a substantial upgrade from the existing system. The heat pump was designed to be 50% more efficient in heating and cooling compared to the existing system.

Data Collection
The data collected from the monitors were used to assess the performance of the heat pump system.

Figure 1: Indoor Unit
Figure 2: Outdoor Unit

Figure 3: Capacity vs. Outdoor Air Temperature

Figure 4: Measured Heating Load vs. Outdoor Air Temperature

Figure 5: Measured Cooling Load vs. Outdoor Air Temperature
Utility Team

• 3 Utility Managers - Support Utilities & Implementers C
• Emphasis to Educate, Transform Markets, Best Practice Programs

Mini-Split & VRF Best Practice Program Recommendations
Your Energy Star Partner Here to Serve!!

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