

“The Icebox of the Nation”

Air source heat pump performance in one of America’s coldest towns



Mountain Parks Electric in partnership with NRECA & Xergy Consulting

The Challenge

Fraser, Colorado located 8,500 ft. above sea level

79 nights a year below 0 °F

The Opportunity

Can cold climate air source heat pump (CCASHP) technology offset fuel use of a propane furnace allowing a homeowner to improve comfort and save money while providing additional kWh sales?



- Three test homes were fitted with Mitsubishi Hyper Heat (24,000 btu, -13° F rated) ductless mini-splits.
- Two indoor cassettes were installed to serve large high occupancy areas.
- The remaining areas of the home were served by the existing propane furnace.
- Average install price was \$7,200 after Tri-State's \$900 rebate.

Indoor Cassette Unit (heat delivery) LIVING ROOM
Mitsubishi 15,000 BTU (1.25 ton)

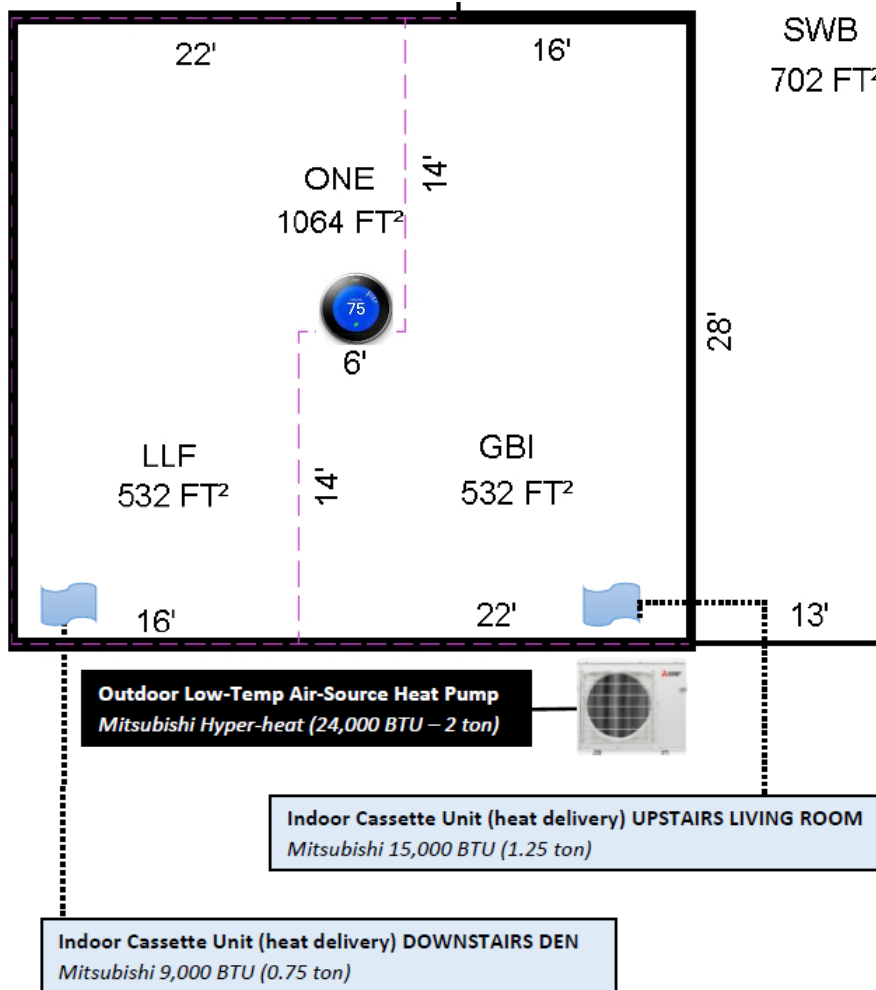


Indoor Cassette Unit (heat delivery) OFFICE
Mitsubishi 9,000 BTU (0.75 ton)



Design Considerations

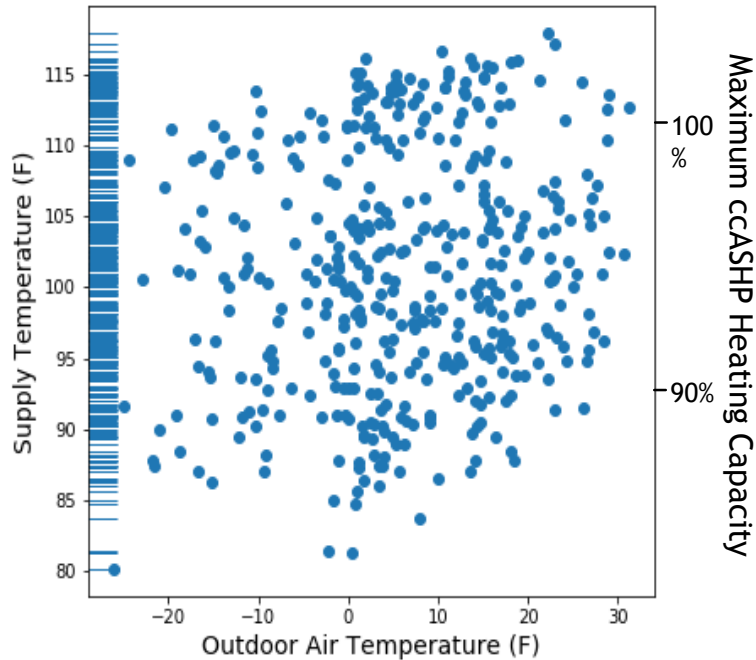
House C



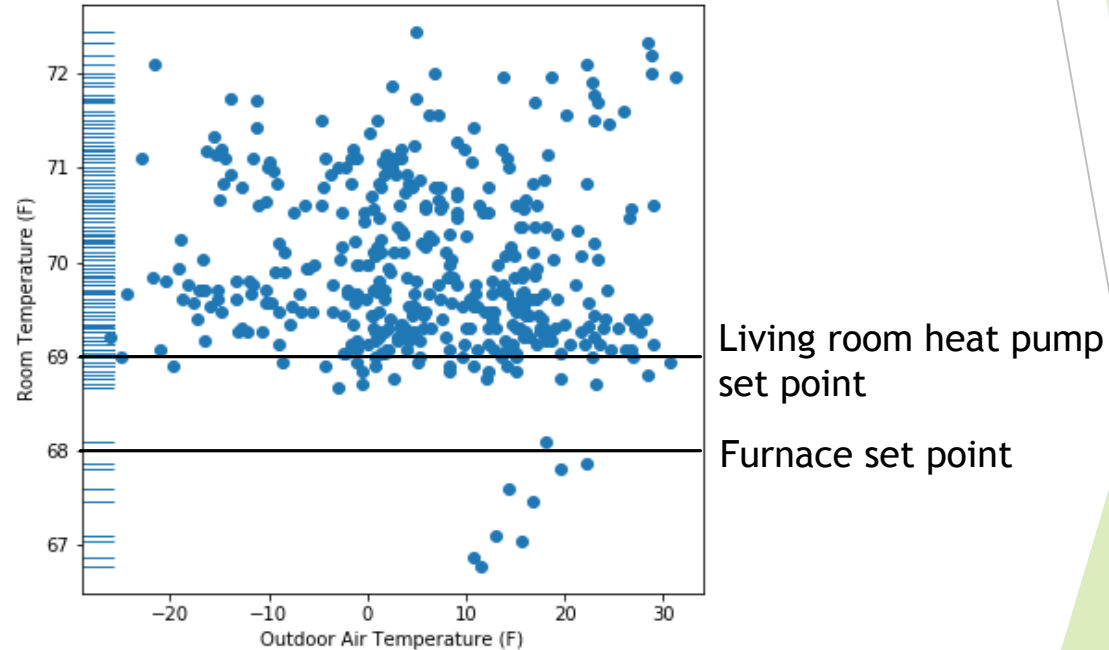
- Each system operated on their own respective thermostats.
- Placement of the indoor cassettes in relation to the furnace thermostat is important so that each system operates independently. Relocating the furnace thermostat was needed for one of the homes.
- To ensure the furnace was not supplying areas served by the heat pumps the furnace floor registers were closed to allow the heat pumps to act as the primary heat source for that area.

Heat pump maintains performance at low temperature

House A

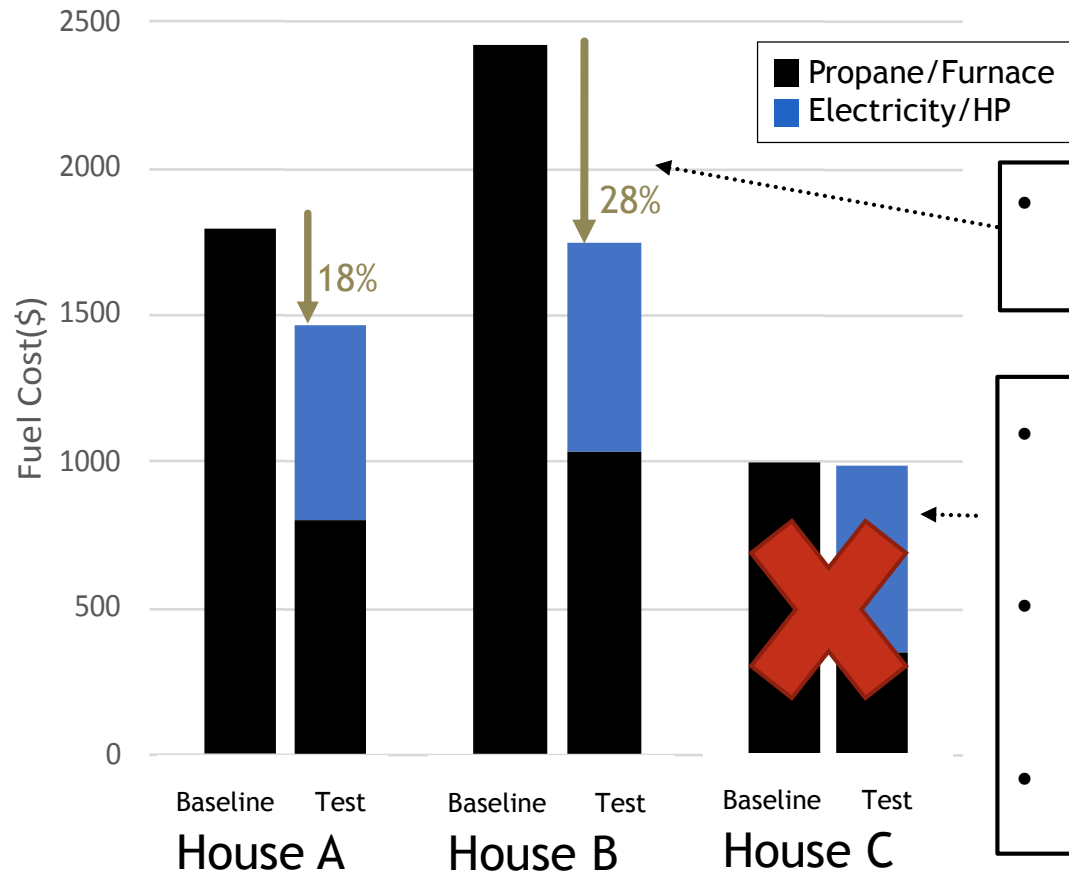


- Supply temperature only slightly degrades with decreasing outdoor temperatures



- Heat pump + furnace maintained room temperature

Total fuel costs decreased for 2 of 3 homes



- Heat pump set point 9 degrees higher than furnace setpoint

- Homeowner was instructed to not use their propane stove because it was not metered.
- At the end of the pilot homeowner acknowledged that they were using their propane stove.
- Their data set is compromised 😞

Heat pump annual savings & payback

House A - \$450 estimated annual savings = 16 year payback

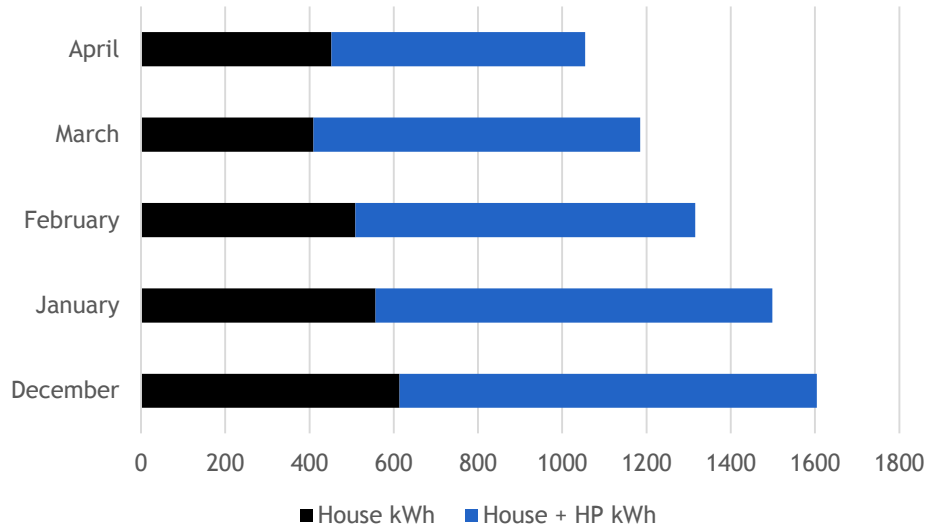
House B - \$800 estimated annual savings = 9 year payback

House C - \$0 estimated annual savings = -\$7,200

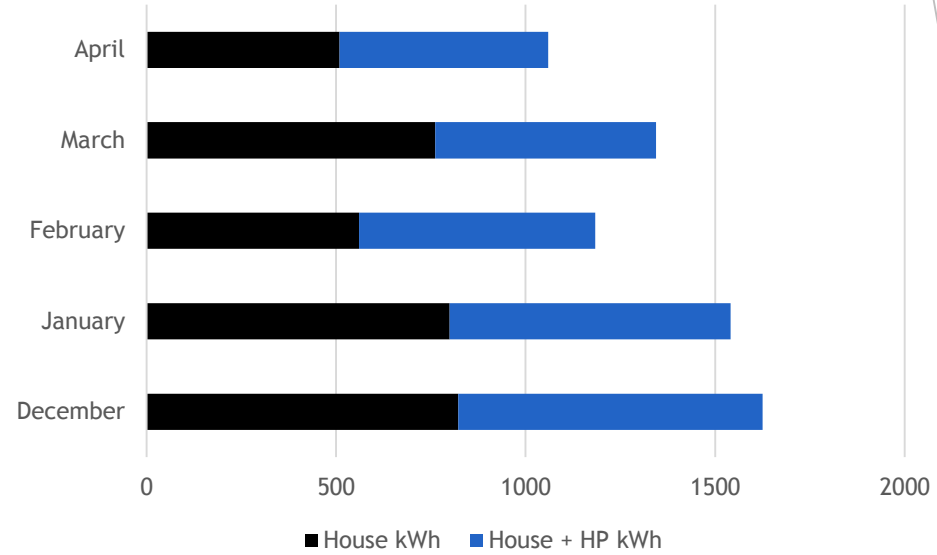
*Mitsubishi systems warrantied for 12 years

Heat pumps increased overall kWh sales

House A



House B



Homeowners had overall positive feedback about their experience

“That first electric bill shocked us!”

“We are warmer with the combined systems and haven’t been using space heaters anymore”

“We are loving this system so far, with a warmer house and zero propane use through the furnace since the system was turned on”

“We give it a big thumbs up on the heat pump”



Takeaways

- Local contractor and community experience with heat pumps varies. Members have either never heard of it or they've had past experience from older systems not rated for cold climates.
- Propane's price volatility coupled with rebates and or incentives can make payback during the lifespan of the heat pump possible.
- With the heat pumps and furnace working together homeowners never experienced discomfort.

Thank You



xergy consulting



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