

ET Summit 2021

Presented by



Implementing Advanced Fuel-fired Combined Space and Water Heating Systems as an Energy Efficiency Measure in California

Tim Kingston, R&D Director

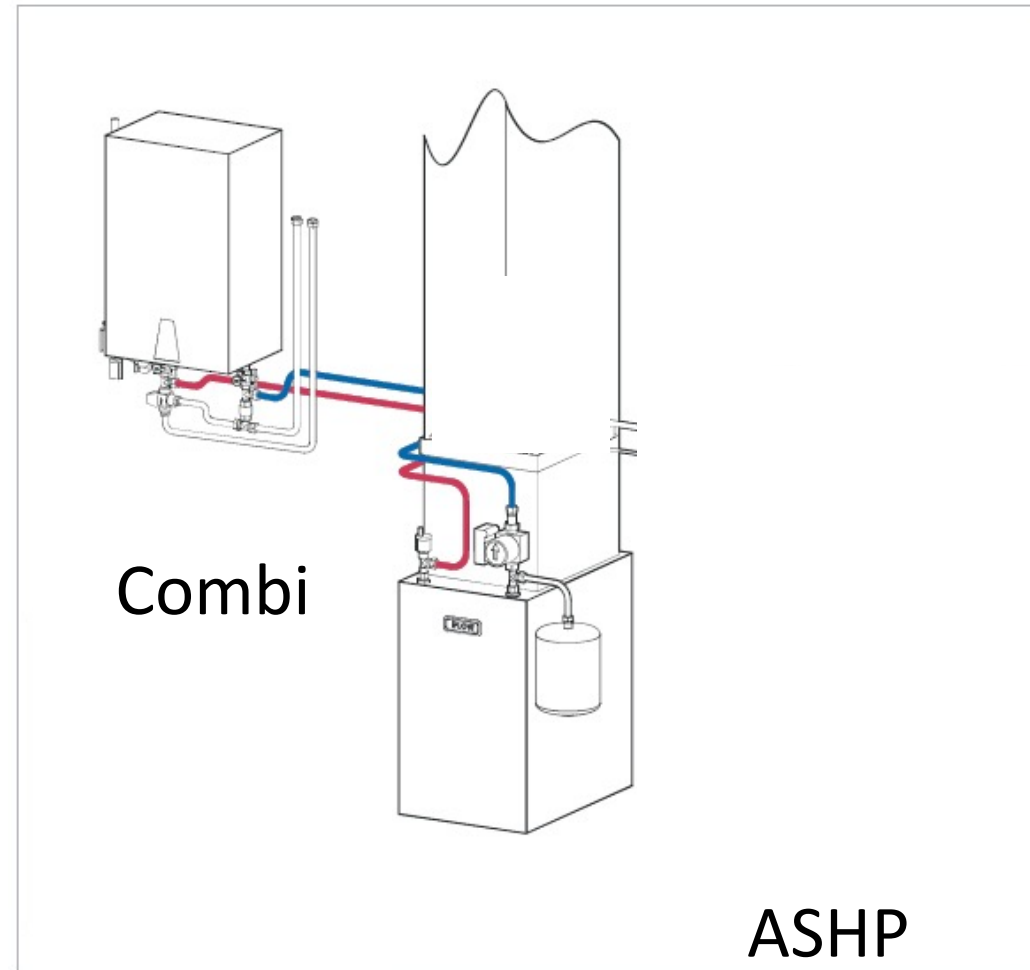
Ryan Kerr, Sr Manager ET

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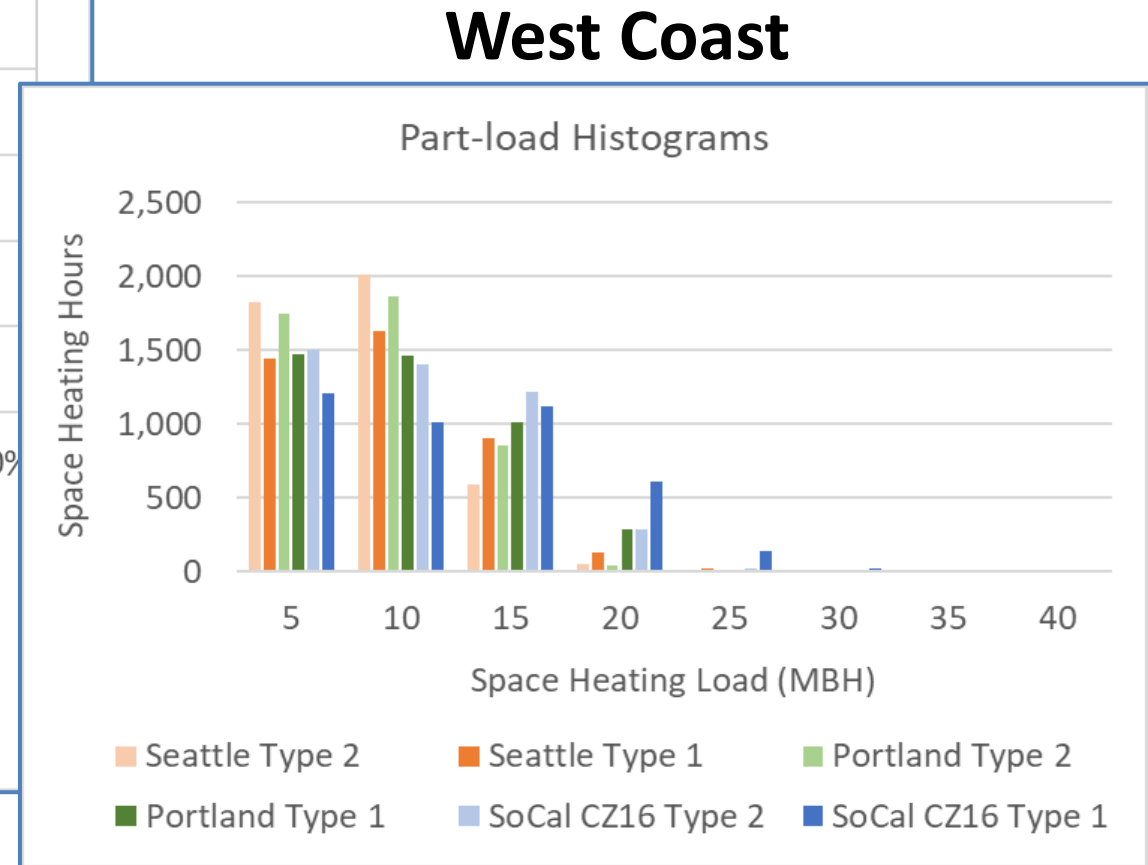
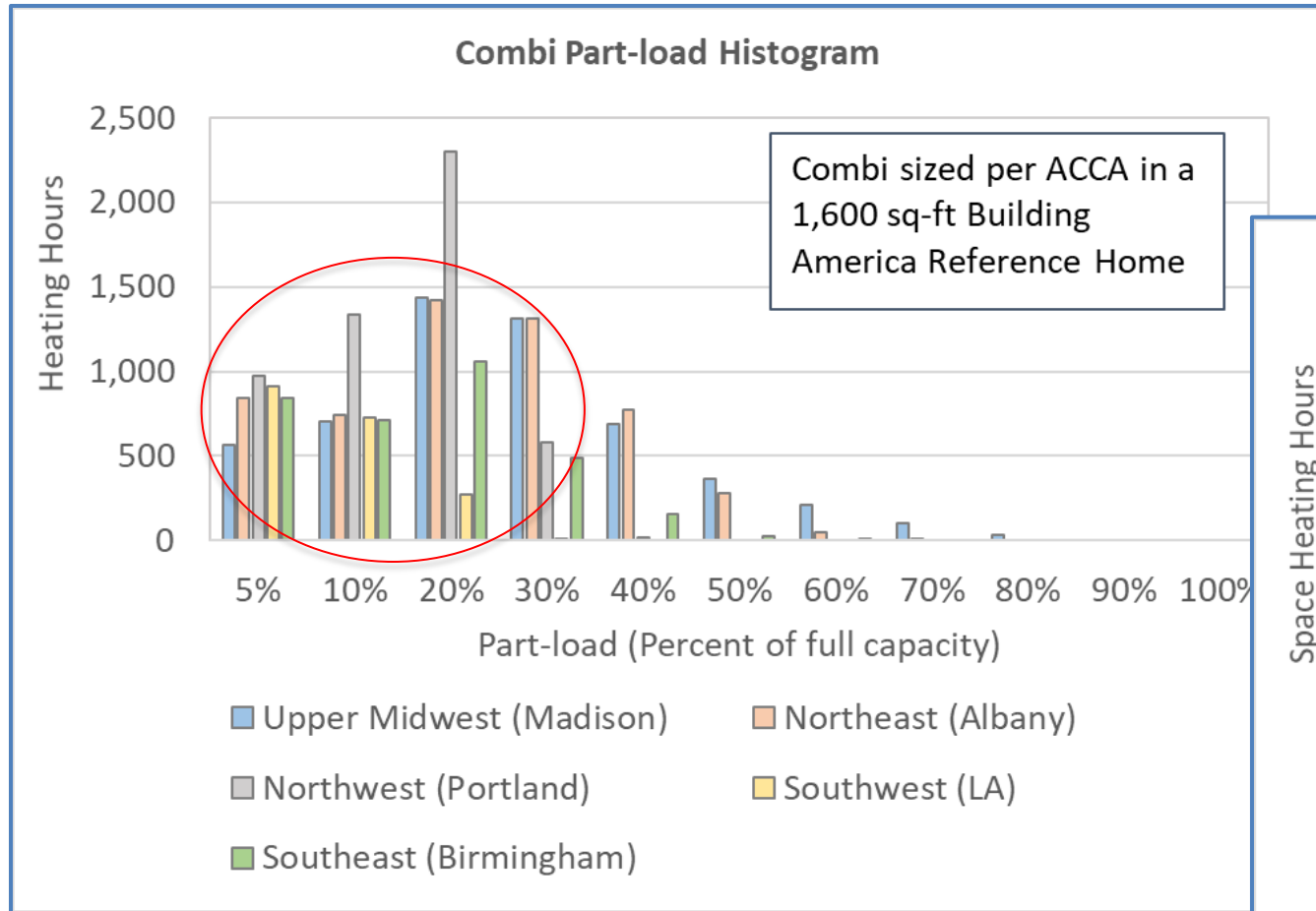


Combined Space and Water Heating (Combis)

- Single appliance
- 10 to 100+ MBH
- Hydronic heating
- Forced-air
- ASHP Integration
- One EE measure
 - Domestic HW +
 - Space Heating

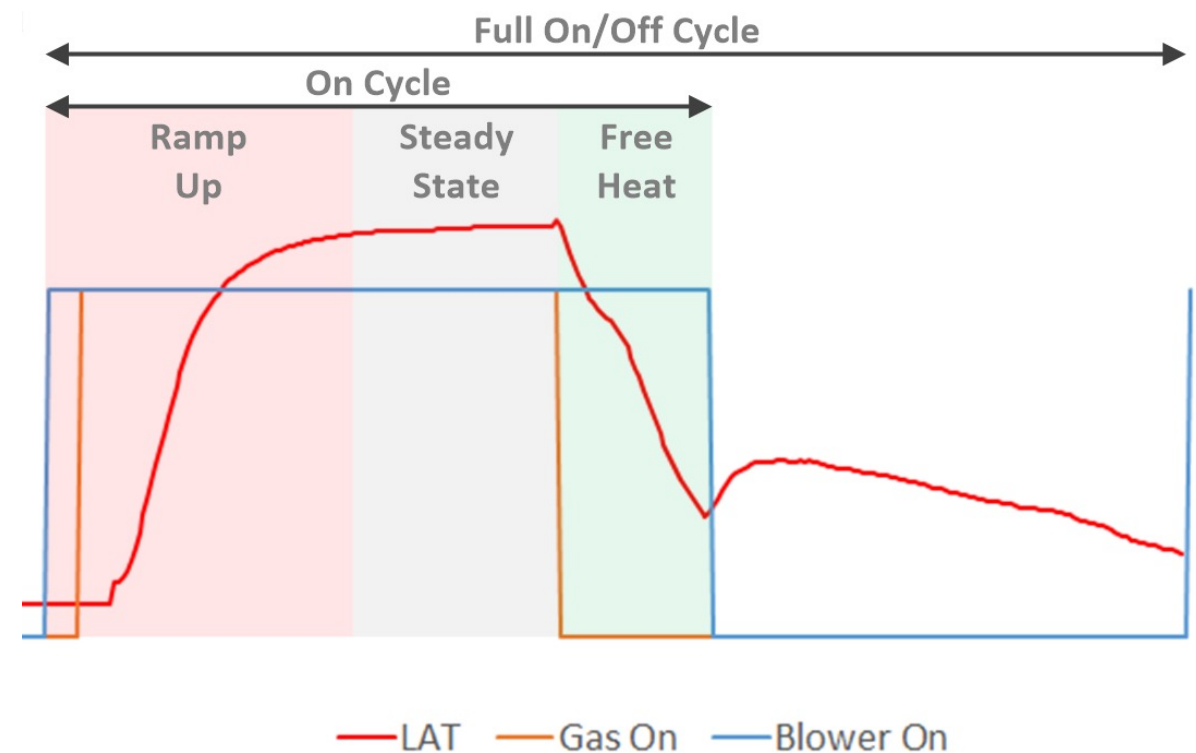


Space Heating Part-loads

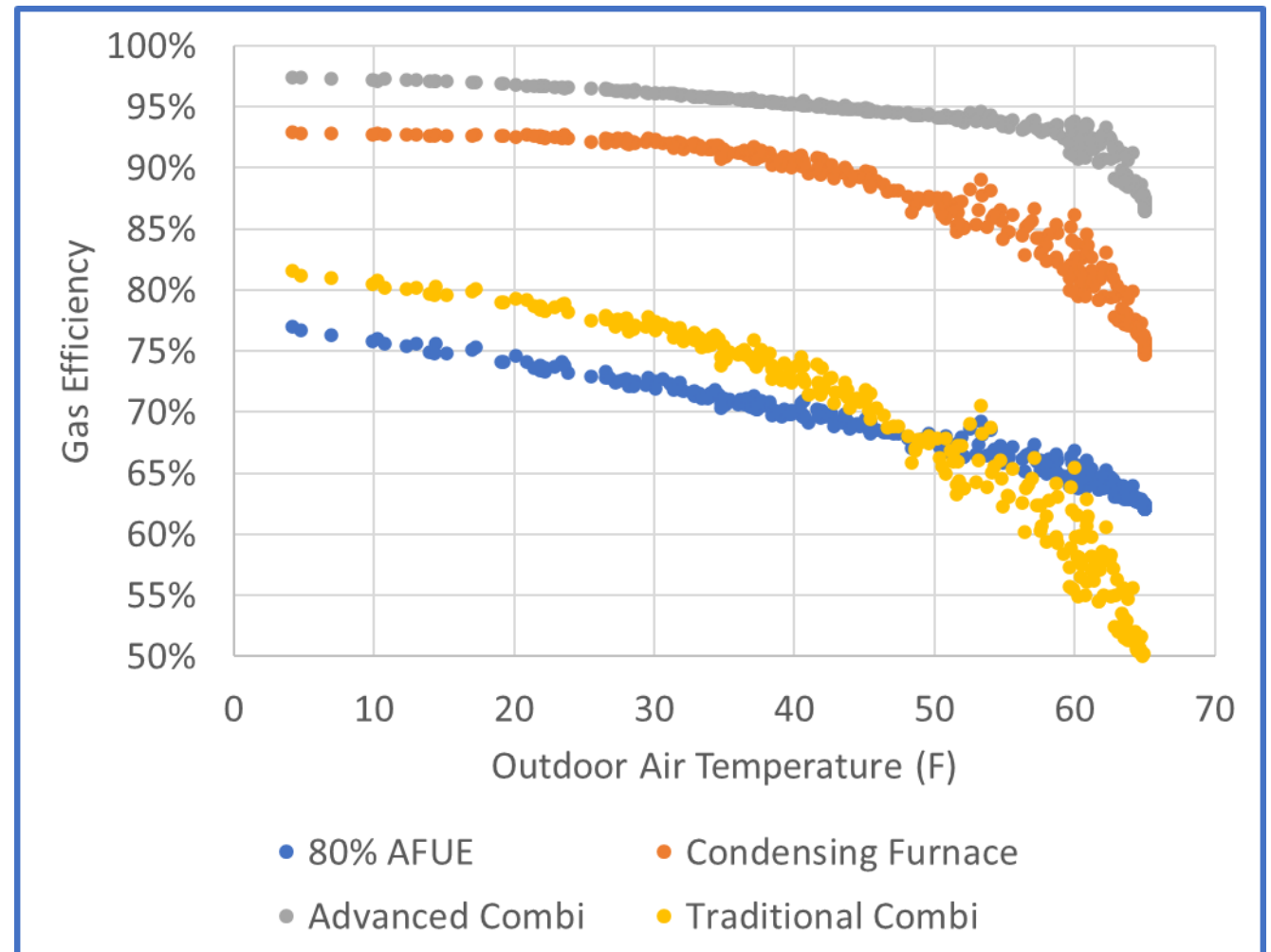


Advanced Combi Design

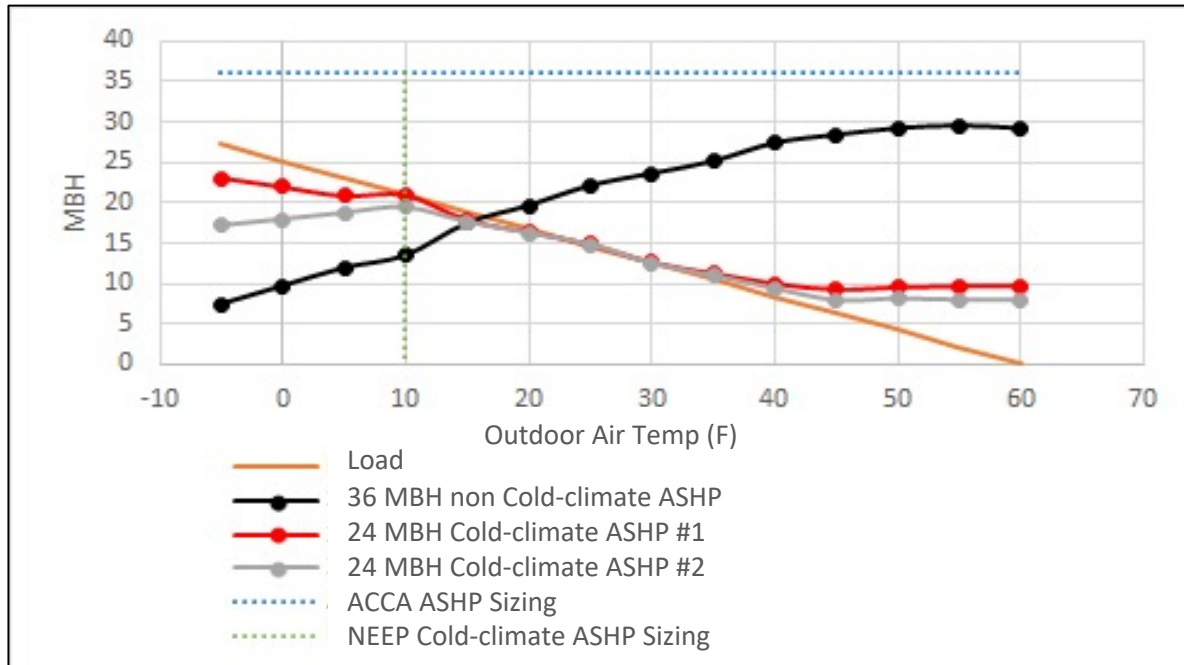
- Fully modulating burner
- DHW+Space Heat set point
- Air and water flow controls
- Blower and pump delays
- Outdoor temperature reset



Advanced Combi Performance

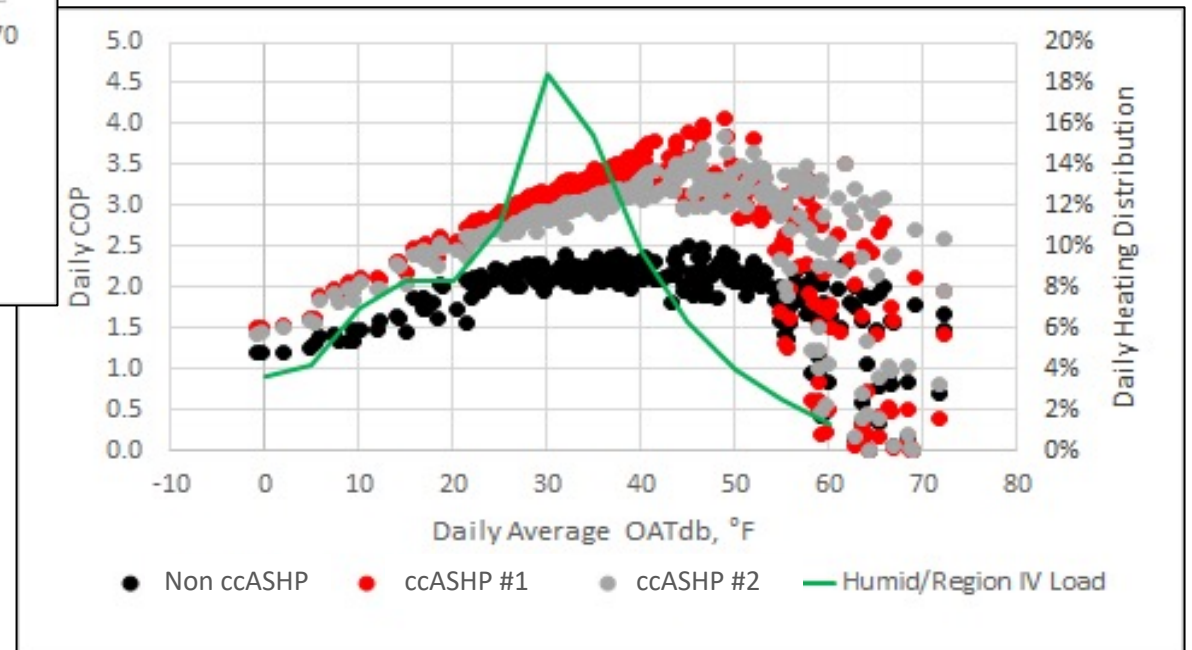


Air Source Heat Pump (ASHP) Performance

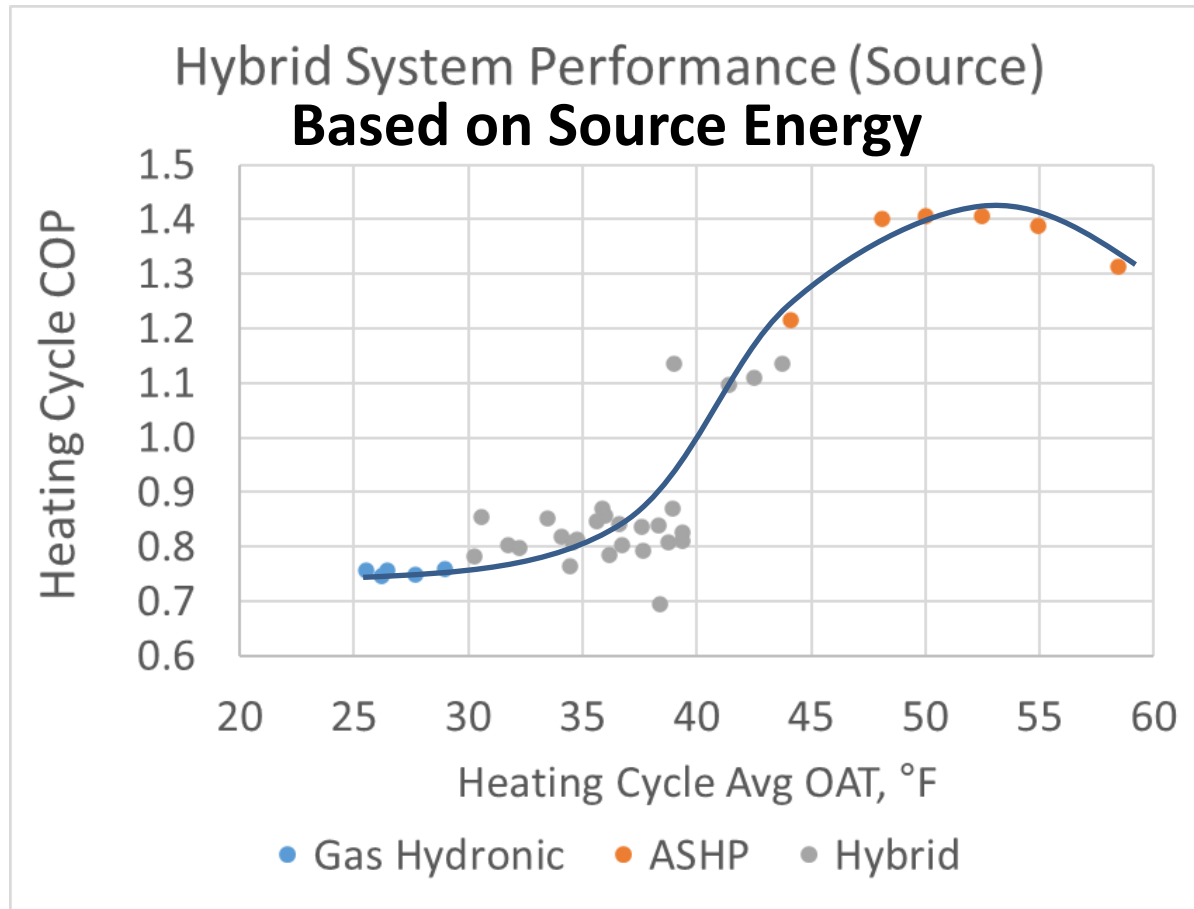


Capacities

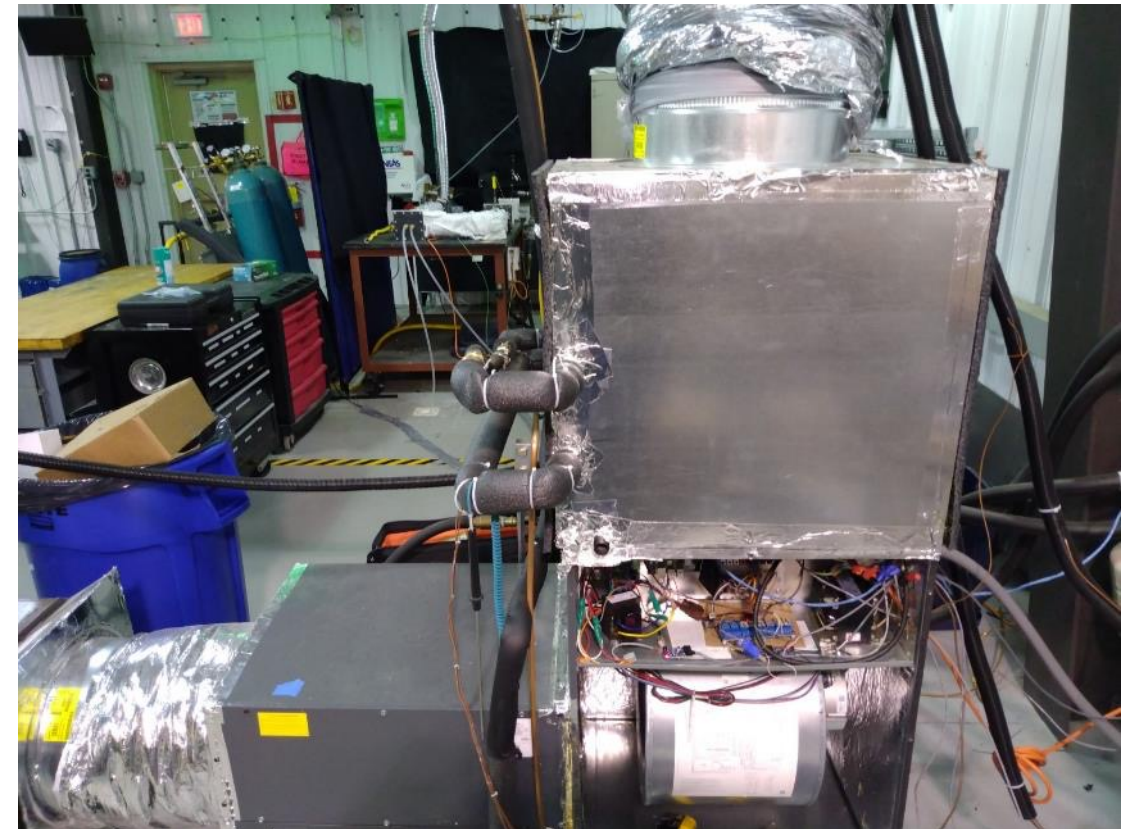
Efficiencies



Advanced Combi Performance with ASHPs

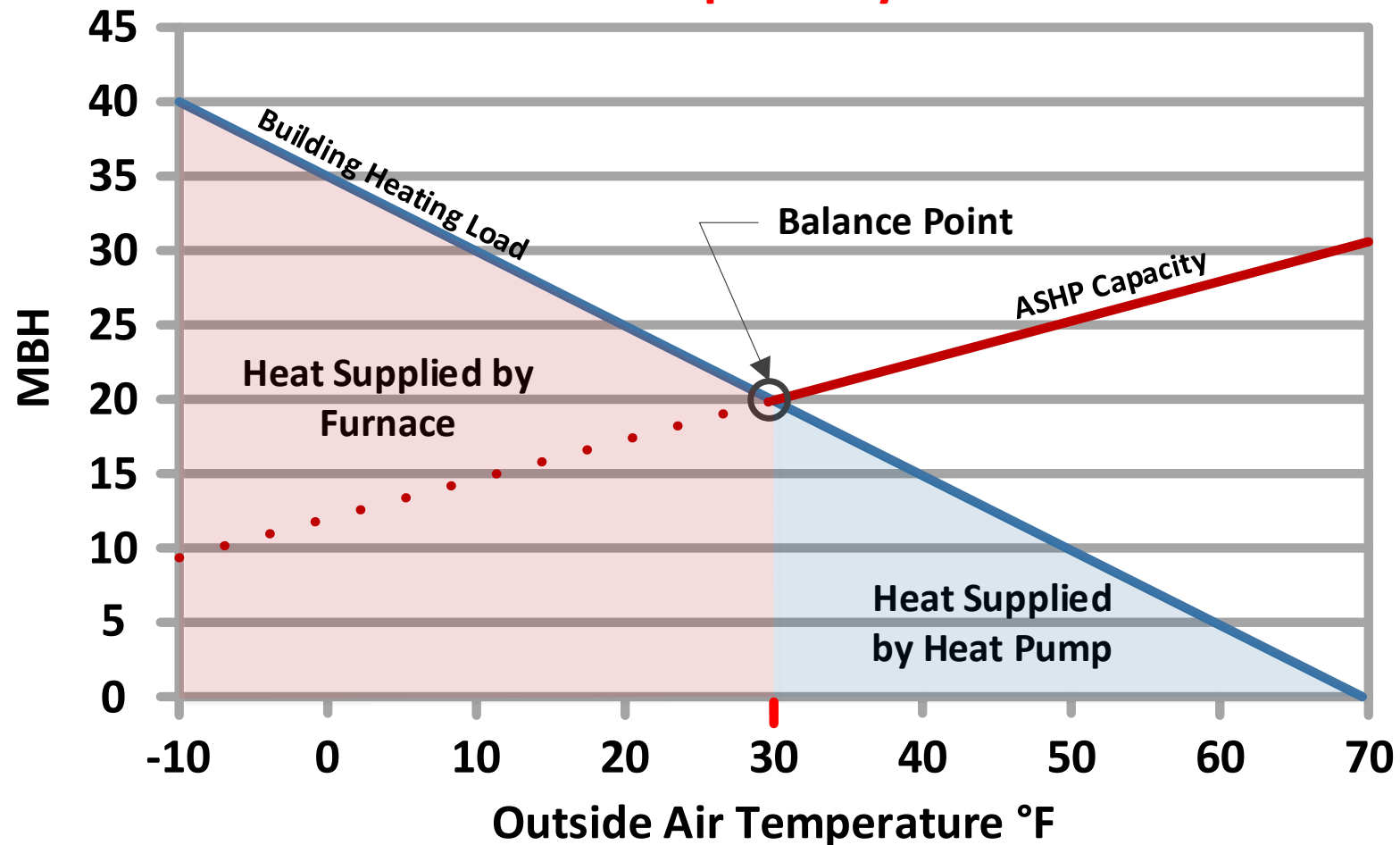


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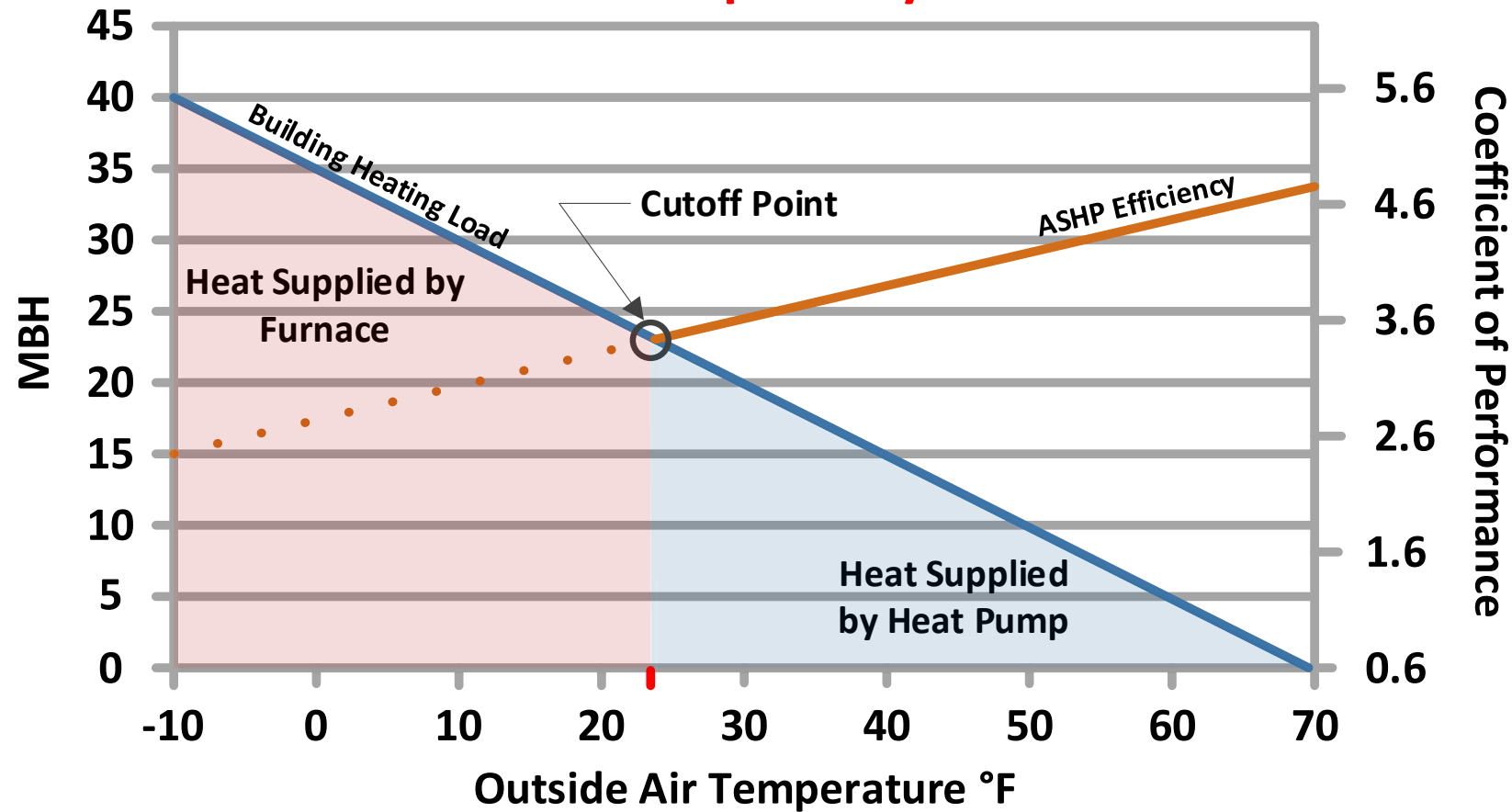
Hybrid Controls – Capacity Balance Point

Example Only



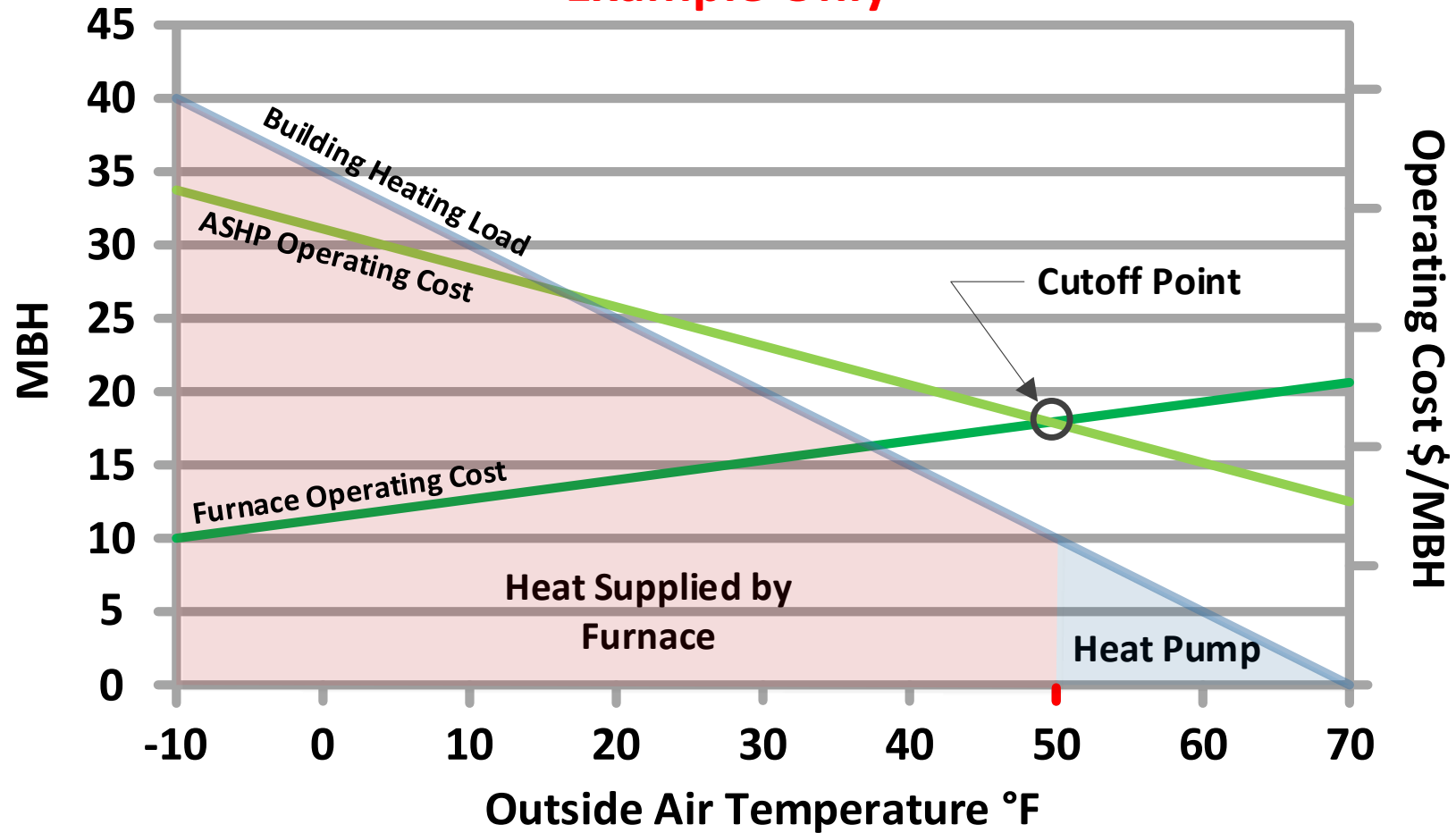
Hybrid Controls – Efficiency Cutoffs

Example Only

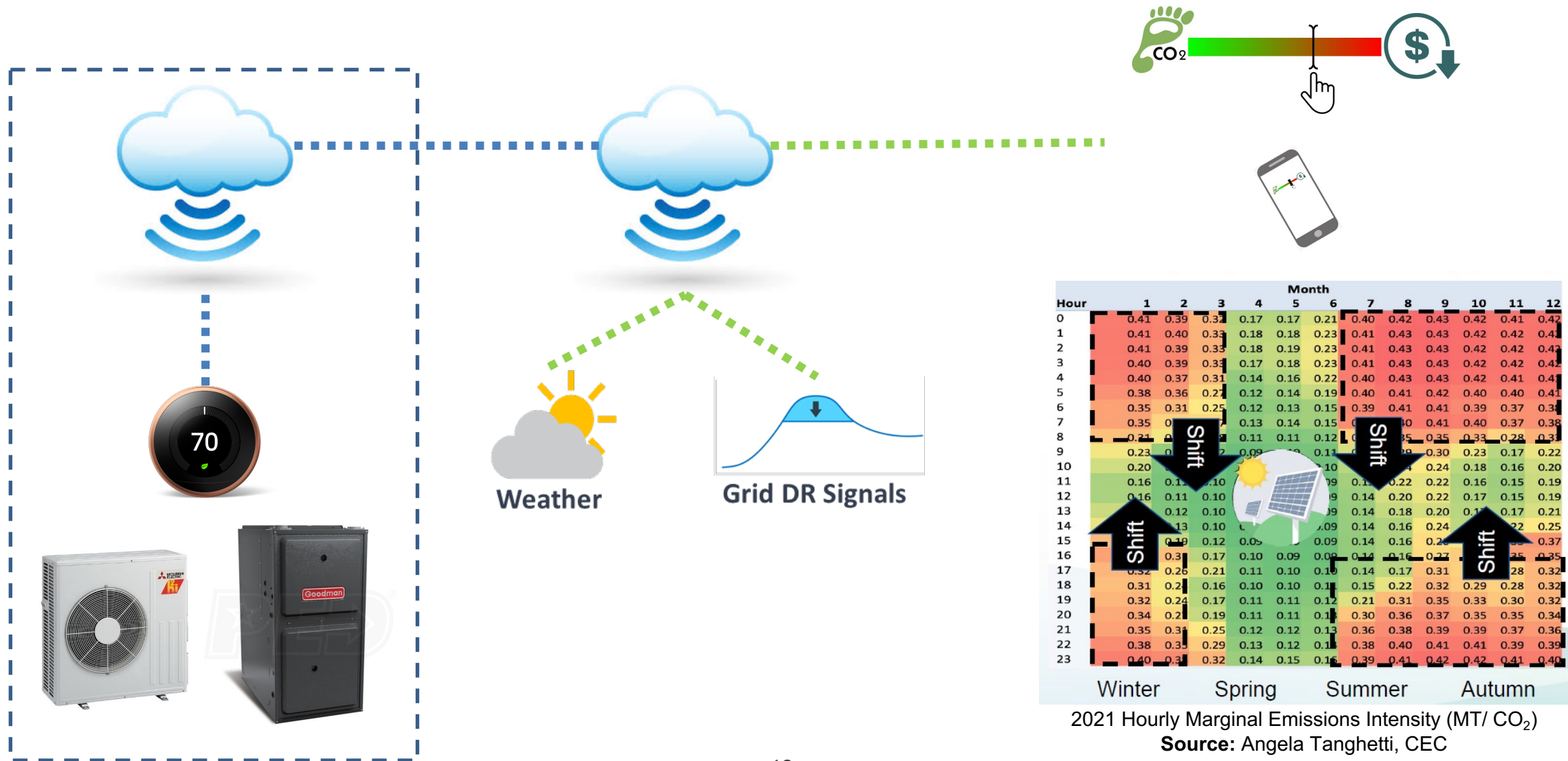


Hybrid Controls – Cost Cutoffs

Example Only



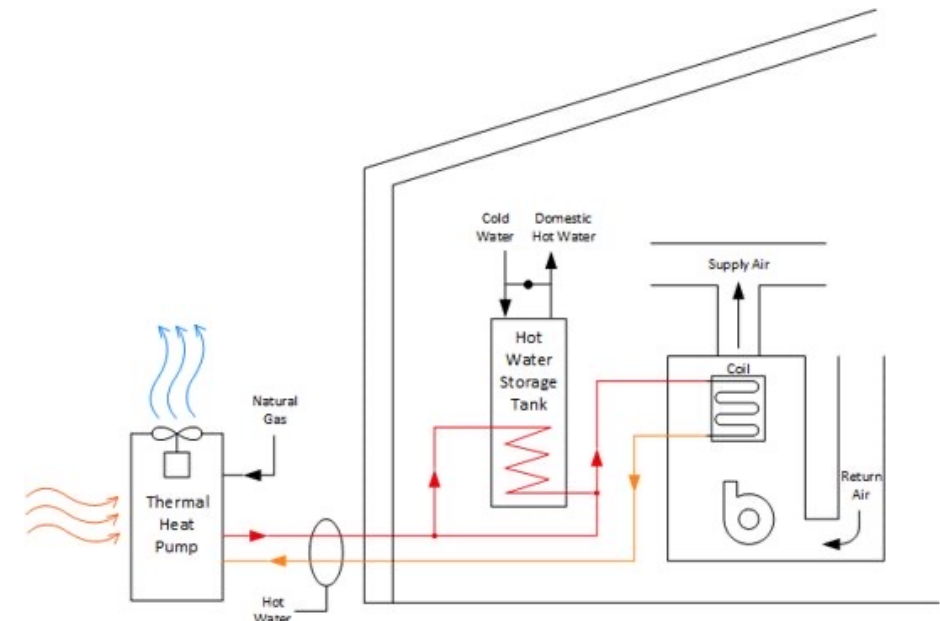
Smart(er) Hybrid HVAC Control



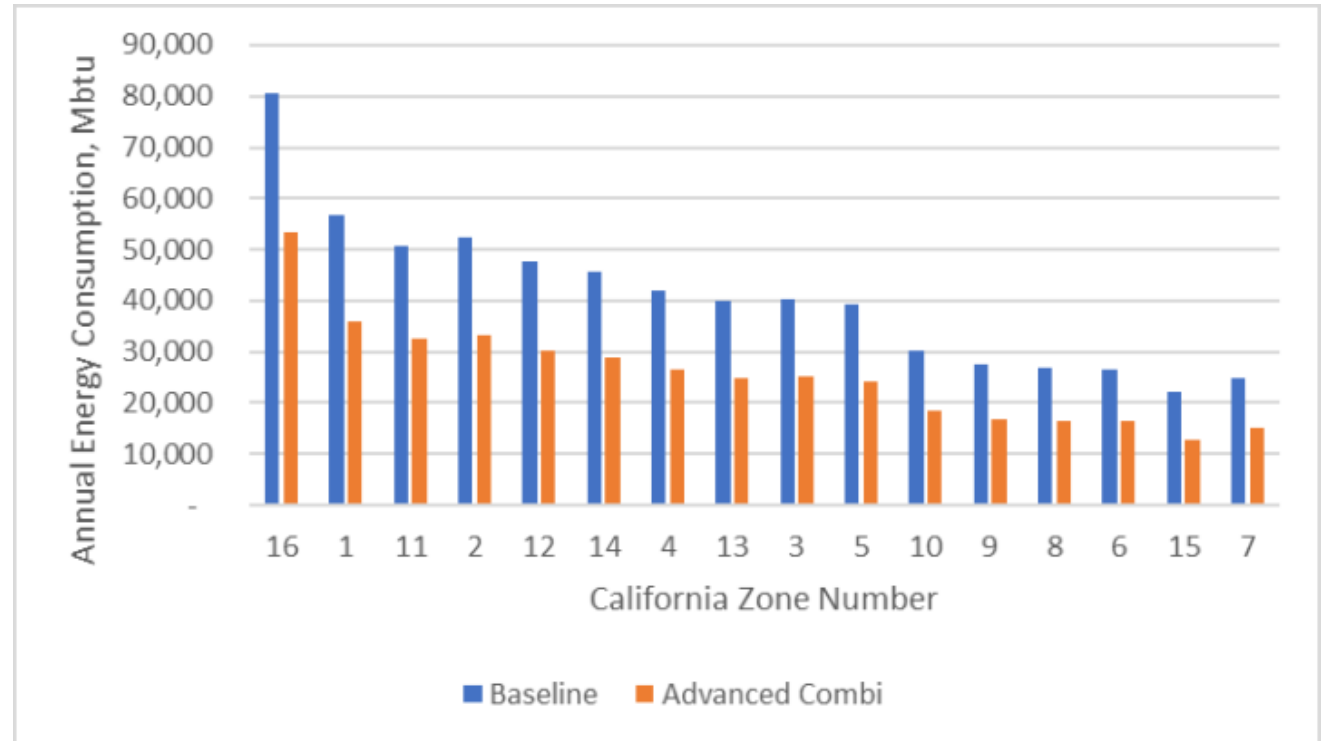
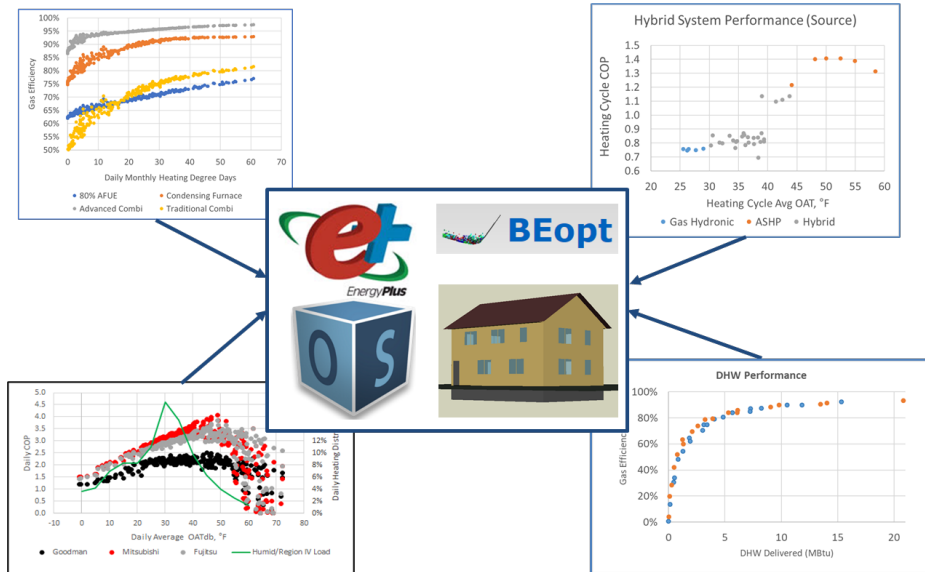
Advanced Combi Performance with Thermal Heat Pumps

Small-scale THPs, available overseas and near-commercial here, have many advantages:

- > Best-in-class operating efficiency (primary basis- 140 AFUE)
- > Good part-load and cold climate performance
- > Typically, do not require backup heating and can continue operation during defrost
- > Opportunities for peak load management
- > Commonly use natural refrigerants/working fluids with low/no GWP/ODP
- > NOx and GHG emissions decreased by half or greater and combustion 'sealed' or occurs outdoors (IAQ & venting)



California Measure Development: Tankless Combi Gas Energy Savings



Tankless Combination Space and Water Heater, Residential

- Measure ID: SWWH030
 - WH- Service and Domestic HW
 - Effective: July 10, 2020
 - Base Case: 80% AFUE Furnace and 0.64 UEF WH
 - EUL: 20 years
 - Eligibility:
 - Existing and new SFH
 - All Climate Zones



Source: <https://www.caetrm.com/measure/SWWH030/01/>

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