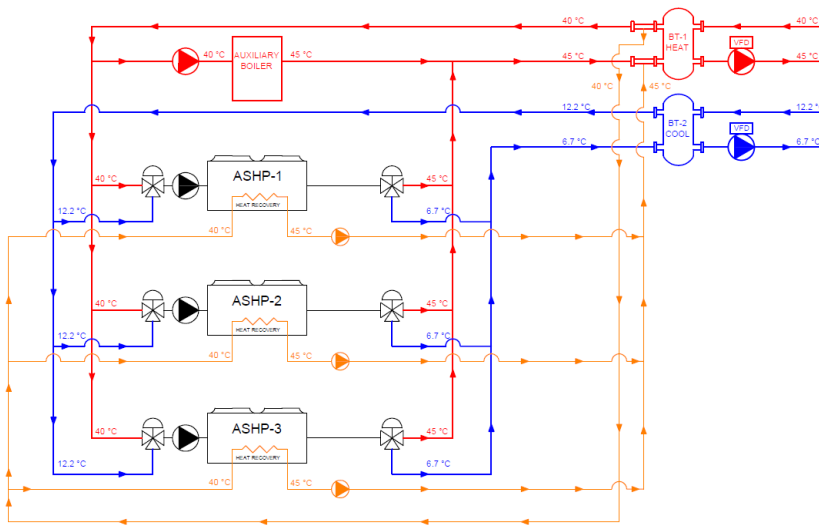


## HYBRID 4-PIPE AIR-TO-WATER HEAT PUMP CENTRAL PLANT

# HOW IT WORKS



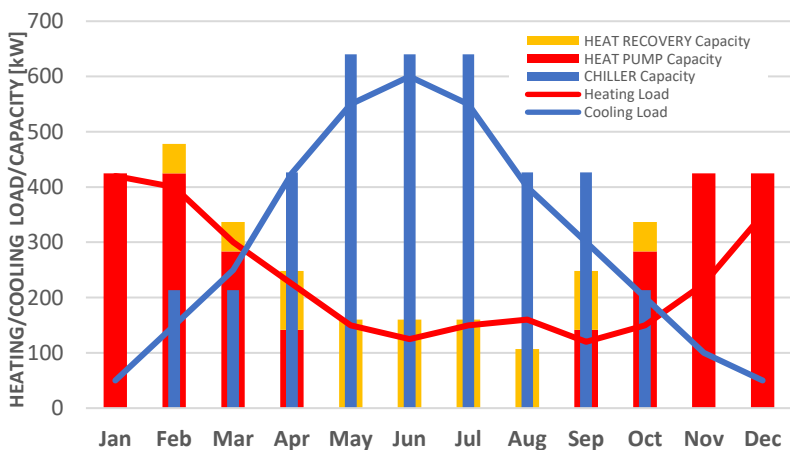
The Possibilities are endless when it comes to applying Air-to-Water Heat Pumps in hydronic systems, that's why we call them Applied Products! The application series of Applied How it Works is intended to describe some Application information on how they can be best used to save Energy and Operating Costs while reducing Carbon Emissions.

### Description:

- **Cooling in Summer, Heating in Winter, with Dynamic Control in Shoulder Season** or low-load periods to meet Heating/Cooling loads independently according to Building Loads with a flexible Hybrid Plant.
- **Central Plant Sized for Peak Cooling Load:** Units stage operating modes to prioritize cooling. Units not needed as chillers are available as heat pumps. Cooling available as low as -10 °C OAT and heating as low as -15 °C.
- **Maximize ASHP Heating Application:** Heating Capacity from ASHP determined based on desired ASHP Supply Temperature, Bivalence Point Cut-out to be implemented.
  - Auxiliary Boiler sized for peak heating conditions at design temperature for local climate to provide building heat when ASHP can't run do to ASHP OAT cut-out, or when all units are in cooling mode.
- When ASHPs are available for heating, Heat Pumps provide Hot Water to offset any Boiler usage. Boiler tops up any missing heating capacity.
- While some units are in Cooling mode, when Heat Recovery is available, Desuperheater energy can be recovered and used to offset any boiler use or redundant heat pump operation for no additional cost.
- Hybrid Plant Design ensure Boiler use is minimized and runs only when truly required as "final stage" of heat.
- Implementing Partial Heat Recovery assists in summer to recover free heating energy when units are operating in cooling during summer peak periods to further reduce Aux. Boiler Usage.

HYBRID HEAT PUMP CENTRAL PLANT IN 4-PIPE HYDRONIC SYSTEM UTILIZING PARTIAL HEAT RECOVERY



### Target Application Building/Mechanical System Types:

- Any 4-Pipe Hydronic System where both Heating and Cooling is available year-round.
- New Construction or Retrofit Buildings: Hotels, Schools, Office & Commercial Buildings, Hospitals, Multi-Unit Residential Buildings (MURBS), Sporting Facilities
- Low-Cost Alternative to 4-Pipe Simultaneous Heating & Cooling Heat Pump Class of Equipment with simplified operation and better system Efficiency