

DEEP DIVE INTO HEAT PUMP WATER HEATERS

as a decarbonization strategy

California Energy
Design Assistance

We provide intelligent decarbonization analysis;
you make informed energy decisions





Rich Peske

CEDA Lead Project Manager, Willdan

01 How energy efficiency programs help with adoption

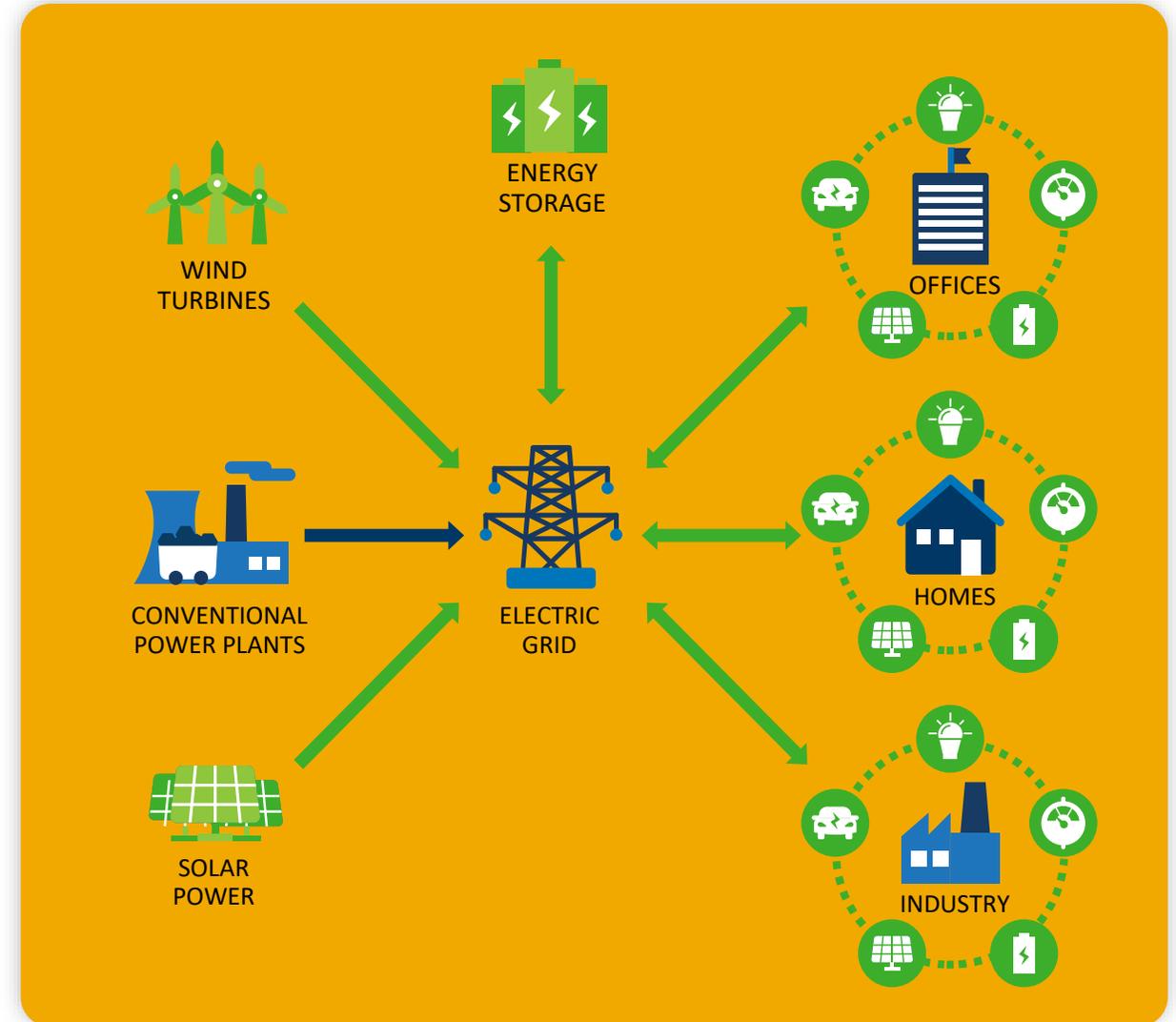
02 Deep Dive into heat pump water heaters with Nyle Manufacturing

03 Open up for Q&A

EVOLVING EE PROGRAMS WITH THE GRID

The Grid of 2030

- Electricity production is distributed and varies based on weather.
- Distributed generation and storage means electricity is produced on both sides of the electric meter.
- Transmission and distribution are multi-directional.



- Advance the market to achieve California's aggressive decarbonization goals
- Promote electrification and all-electric buildings
- Reduce long term energy costs and emissions
- Drive adoption of high-performance measures
- Make buildings true grid resources
- Educate the market

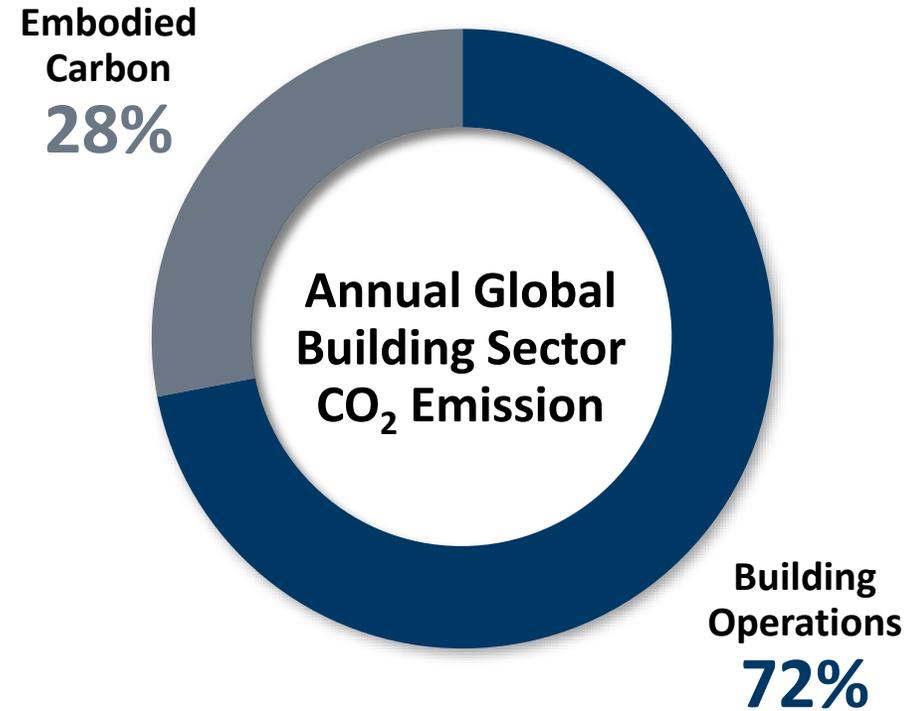
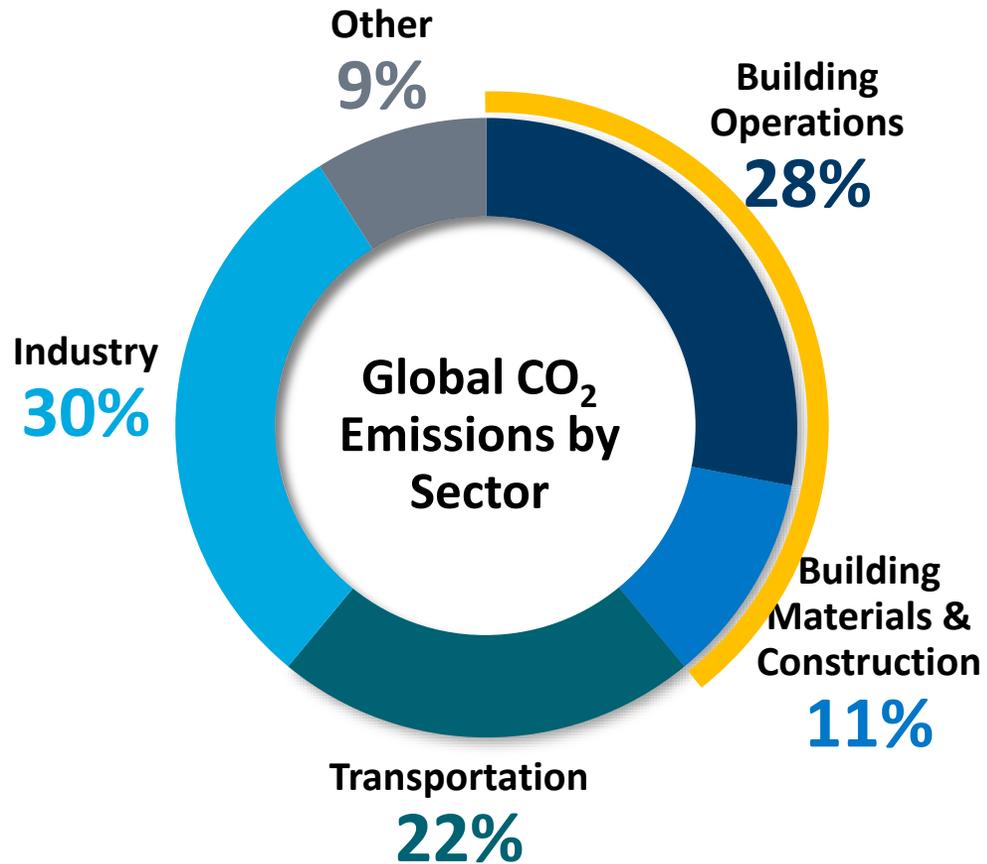
Overall Goals

Increase supply and demand for all-electric and high-performance measures

Build relationships with the A/E/C community

Drive Innovation

BUILDING CONTRIBUTION TO CARBON EMISSIONS



Source: Architecture 2030, EPA International Energy Outlook

BUILDINGS WITH HIGH OPERATING CARBON

- Slow the transition to clean energy
- Are less adaptable and resilient, causing...
 - Faster depreciation
 - Decreased profits
- Vulnerable to future policy changes
 - Higher utility rates
 - Carbon taxes
- Potential to become stranded assets



WHAT IS CEDA?

The California Energy Design Assistance (CEDA) program promotes the **electrification and decarbonization** of new building construction or major renovation. CEDA works in collaboration with project teams to reduce energy demand, consumption, and carbon emissions.

CEDA serves **commercial, public, high-rise multifamily, industrial, and agricultural** projects in:

- Pacific Gas & Electric (PG&E)
- Southern California Edison (SCE)
- SoCalGas (SCG)
- San Diego Gas & Electric (SDG&E) service areas.





- New construction projects and/or major alterations
- Projects in design phase
- Owner pays/will pay the Public Purpose Program surcharge on the account where the Energy Efficiency (EE) measures are installed
- No double-dipping incentives with other ratepayer EE programs for the same measures
- Allow access to project site at project completion for verification of installed measures

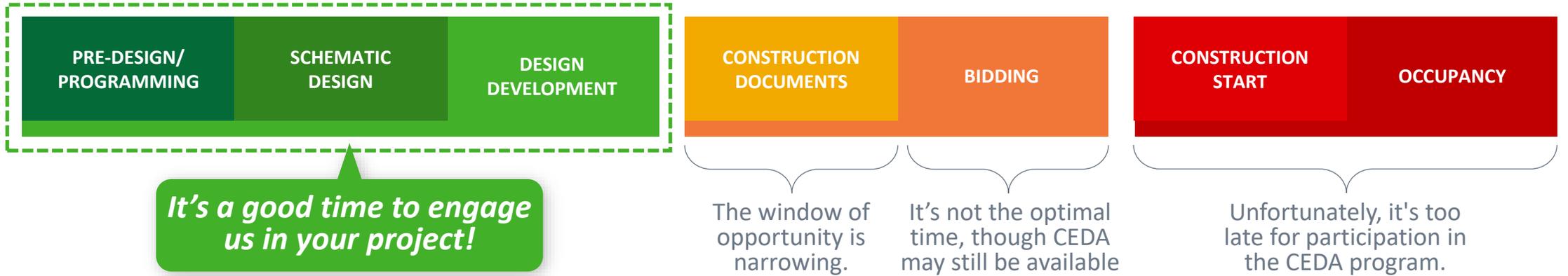
WHY PARTICIPATE IN CEDA?

- Receive complimentary custom **decarbonization** analysis to identify and evaluate opportunities
- Gain analysis of **energy costs and paybacks**
- Receive **financial incentives** to help offset the costs of decarbonization measures for qualified projects
- Demonstrate commitment to high performance building practices and design

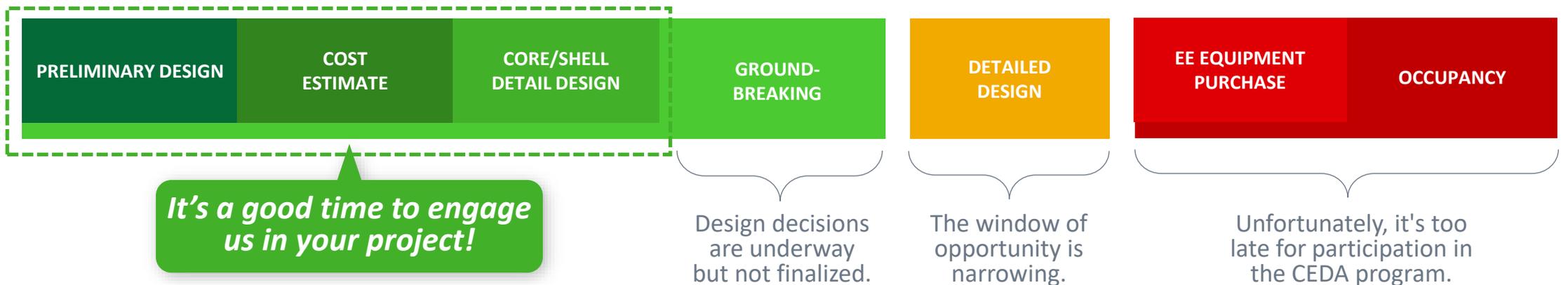


ENROLLMENT TIMING

TRADITIONAL DESIGN/BID/BUILD PROCESS



FAST-TRACK OR DESIGN/BUILD PROCESS



1



Enrollment

You provide schematic information about your building through our Energy Design Assistance application

2



Discovery

Together we perform real-time evaluation of decarbonization measures and bundle potential whole-building strategies for further analysis

3



Results

You determine the measures that best align with your project goals, from which estimated savings, incentives and inducements are calculated

4



Verification

We confirm your project was constructed to plan and issue a final report confirming savings, incentives and inducements as applicable

5



Savings

Enjoy continual energy savings, helping to actualize decarbonization goals and being a grid partner

DESIGN TEAM INCENTIVES

Design teams are stretched thin on time and budget, but that doesn't mean decarbonization needs to be put on the back burner.

CEDA is now offering design team incentives on top of the incentives your project will get for implementing decarbonization measures. It's a win-win!

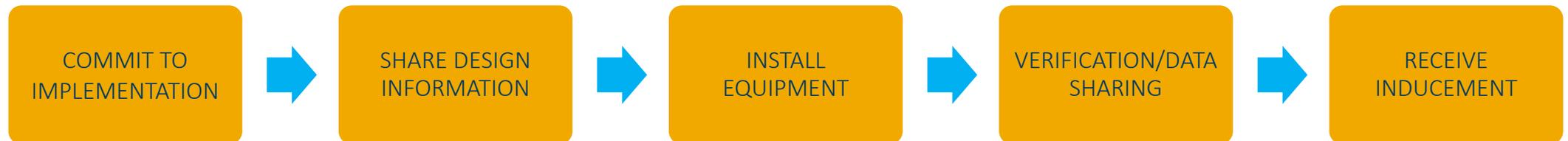


CEDA offers inducements to reward buildings of the future that implement high-performance measures and electrification.

Heat Pump Water Heaters are eligible for inducements!



Inducements Process:



HIGH-PERFORMANCE MEASURES

Examples of high-performance measure types to help your teams evaluate carbon and EE opportunities ... and available inducements



Space heating system

Heat pumps, VRF systems, controls, heat pump chillers and heat pumps for VAV reheat systems



Service water heating

Central heat pump water heaters, distributed heat pump water heaters, water heater controls and distribution systems



Plug Loads

Heat pump clothes dryers, induction cook tops, electric commercial kitchens



Process Loads

Heat pump pool heaters, high temp heat pumps for industrial processes, microwave or other electric drying processes

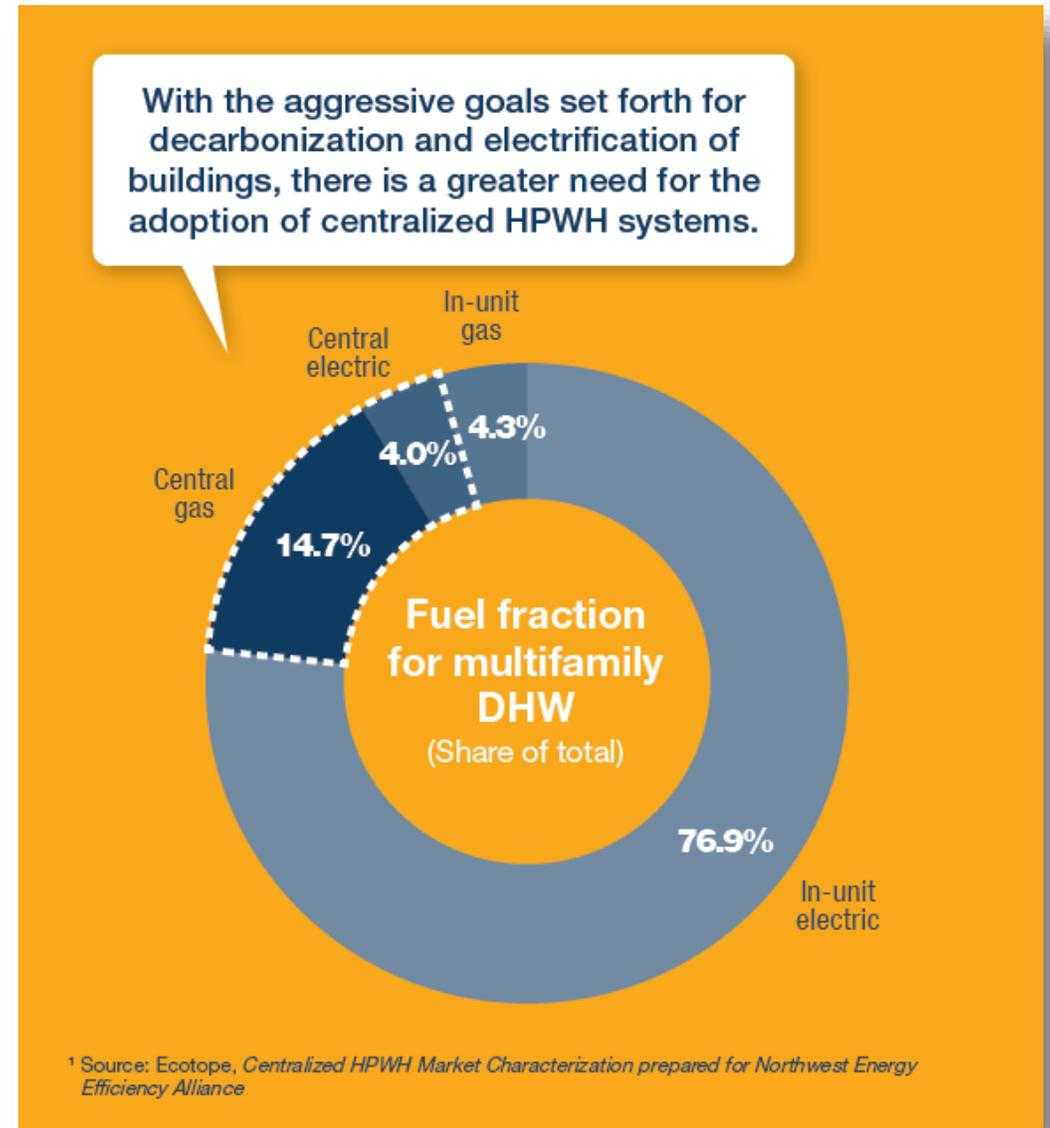


Refrigerant Systems

Low GWP refrigerants for heat pumps, VRF, chillers, water heaters, reduced refrigerant leakage

What are the benefits?

- Proven high-efficiency design
- Potential lower cost with avoidance of natural gas infrastructure
- Able to support time-of-use rates and grid flexibility (load shifting)
- Some are plug-and-play or skid-mounted designs
- Options to utilize low GWP refrigerants



TRENDS WE ARE SEEING IN CEDA



Water heating is the biggest carbon usage in apartments and school facilities



In the next 5 years 460 Million Square Feet of new construction apartments are expected to be built in the state of California



START YOUR DECARBONIZATION JOURNEY!



CaliforniaEDA.com



855.502.3914



*Pacific Gas and
Electric Company*[®]

The California Energy Design Assistance (CEDA) program is funded by California utility customers and administered by Pacific Gas and Electric Company (PG&E) and supported by the state's other investor-owned utilities, (IOUs) under the auspices of the California Public Utilities Commission. Customers who choose to participate in this program are not obligated to purchase any additional goods or services offered by Willdan or any other third party.



ELECTRIFYING HOT WATER

CENTRAL HEAT PUMP WATER HEATING SYSTEMS IN COMMERCIAL BUILDINGS

OPTIMIZED EQUIPMENT CONFIGURATIONS

DIVERSE ENVIRONMENTS

AIR-SOURCE

C and E-Series

Outside Air

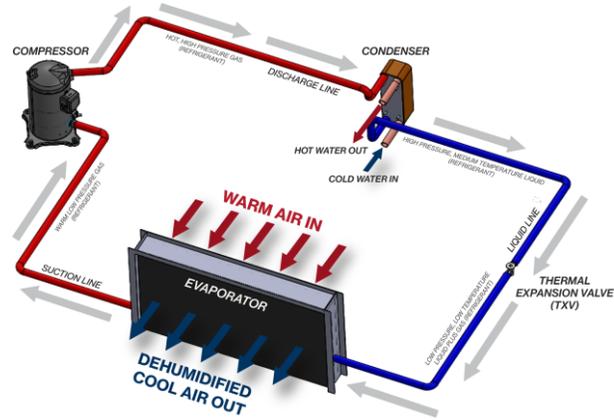
10°F+

Exhaust Air Recovery

32°F - 65°F

Hot Mechanical Spaces

80°F - 120°F



WATER-SOURCE

CW and CWM-Series

Geothermal

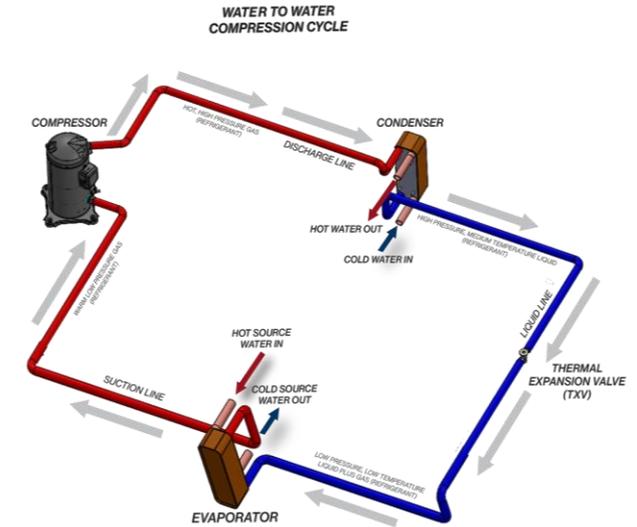
30°F - 40°F

Condenser Water

60°F - 70°F

Hydronic Hot Water

90°F - 120°F



THE C-SERIES

AIR-SOURCE

- 90, 185, 250 MBH (26, 54, 72 kW) Nominal Capacities
- 40°F – 120°F Ambient Air Temperature Range
- 35°F Minimum Ambient Air Temperature with CWP
- 160°F Maximum Hot Water Temperature – Most Models
- Scroll Compressors – Up to 185 MBH
- Reciprocating Compressor – 250 MBH



THE C-SERIES

WATER-SOURCE & MODULAR WATER-SOURCE

- Single-Pass and Multi-Pass
- Combined Cooling COP as High as 13
- 125, 185, (36, 54, kW) Nominal Capacities
- 270 (79 kW) Nominal Capacities (Modular)
- 40°F – 120°F Source Temperature Range
- 30°F Minimum Source Temperature with Antifreeze
- 160°F Maximum Hot Water Temperature – Most Models
- Scroll Compressors



THE E-360

LOW-AMBIENT AIR-SOURCE

- Purpose Built for Cold Climate Operation
- Industry Leading Defrost
- Single Pass: 45-100F of Rise
- 360 MBH Nominal Capacity
- 10°F – 120°F Ambient Air Temperature Range
- R513A Low-GWP Refrigerant
- 160°F Maximum Hot Water Temperature
- Reciprocating Compressor
- 120 Volt Dedicated Backup Power Input



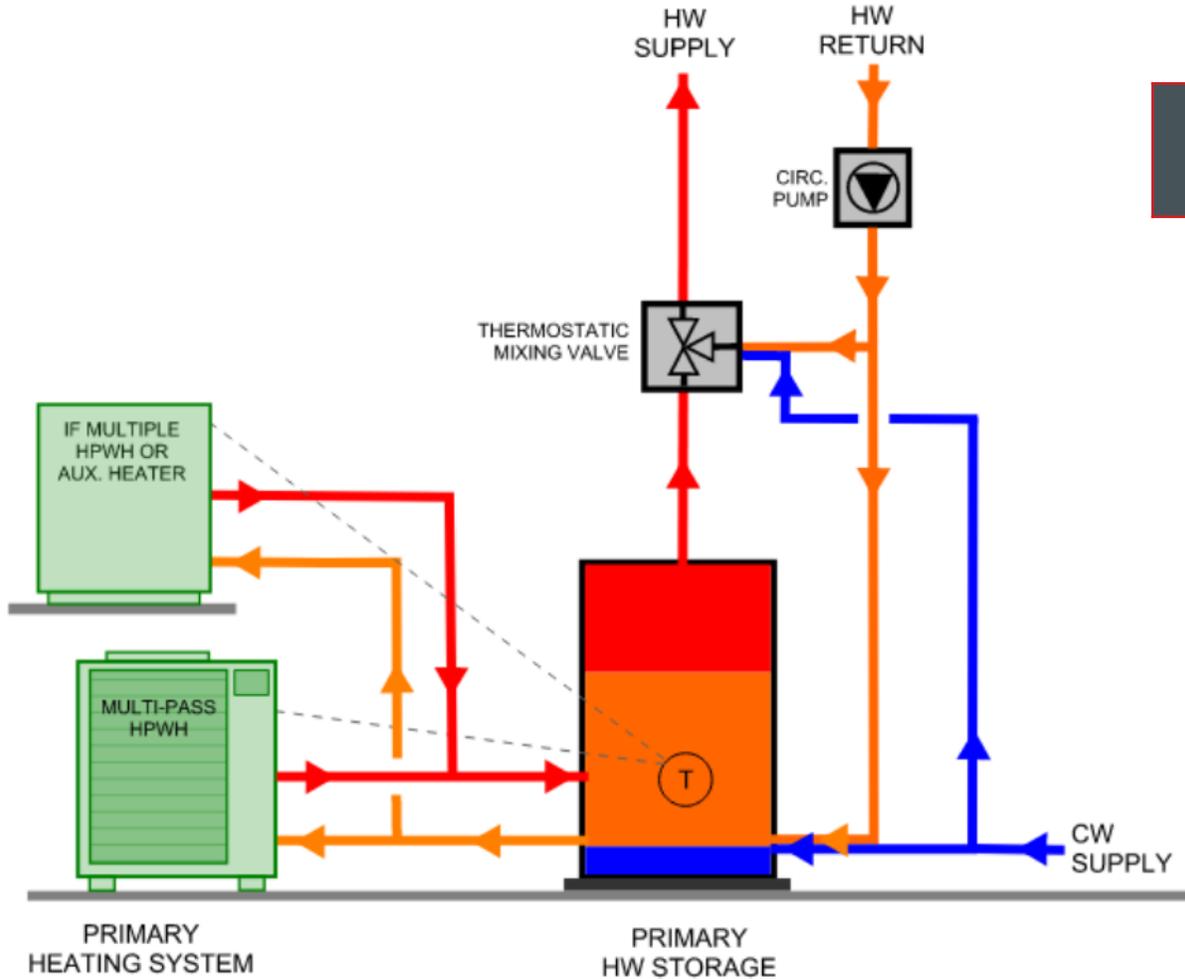
FACTORY LEAD TIMES

Current: 18 Weeks

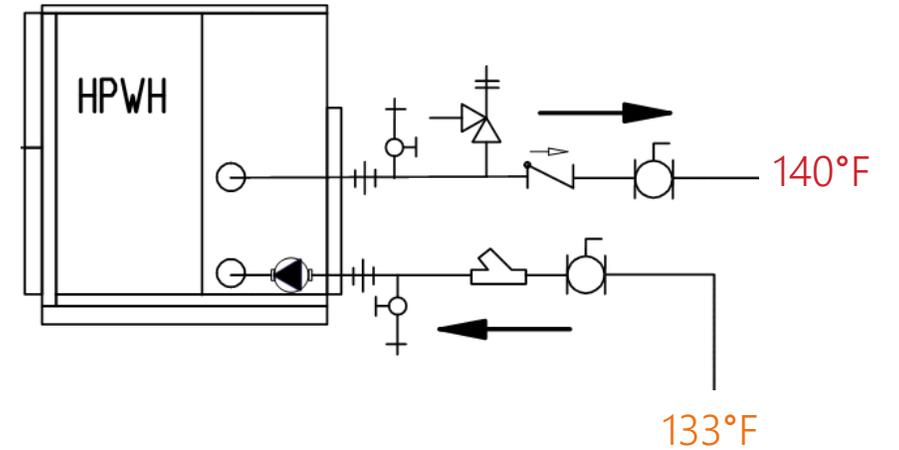
Target: 8 Weeks



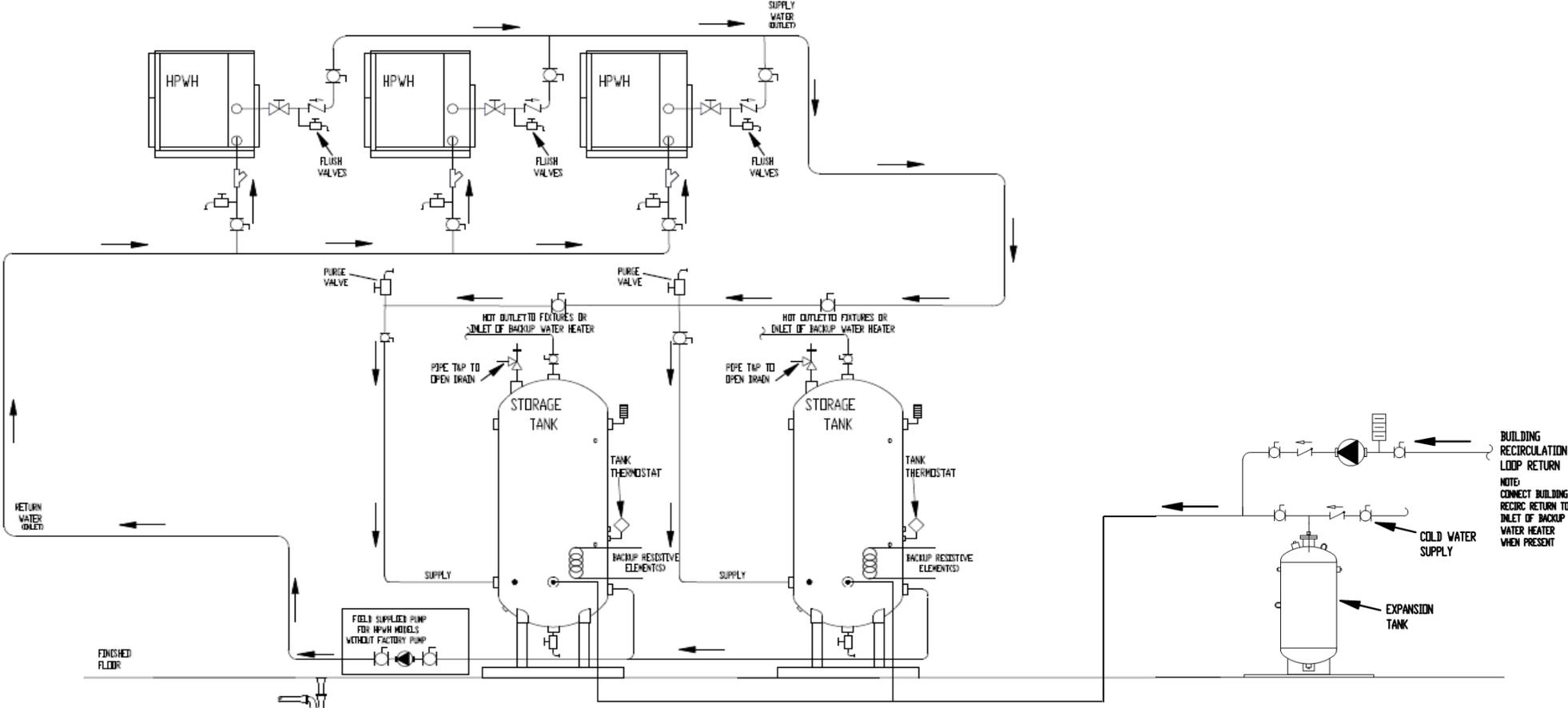
MULTI-PASS CONFIGURATION



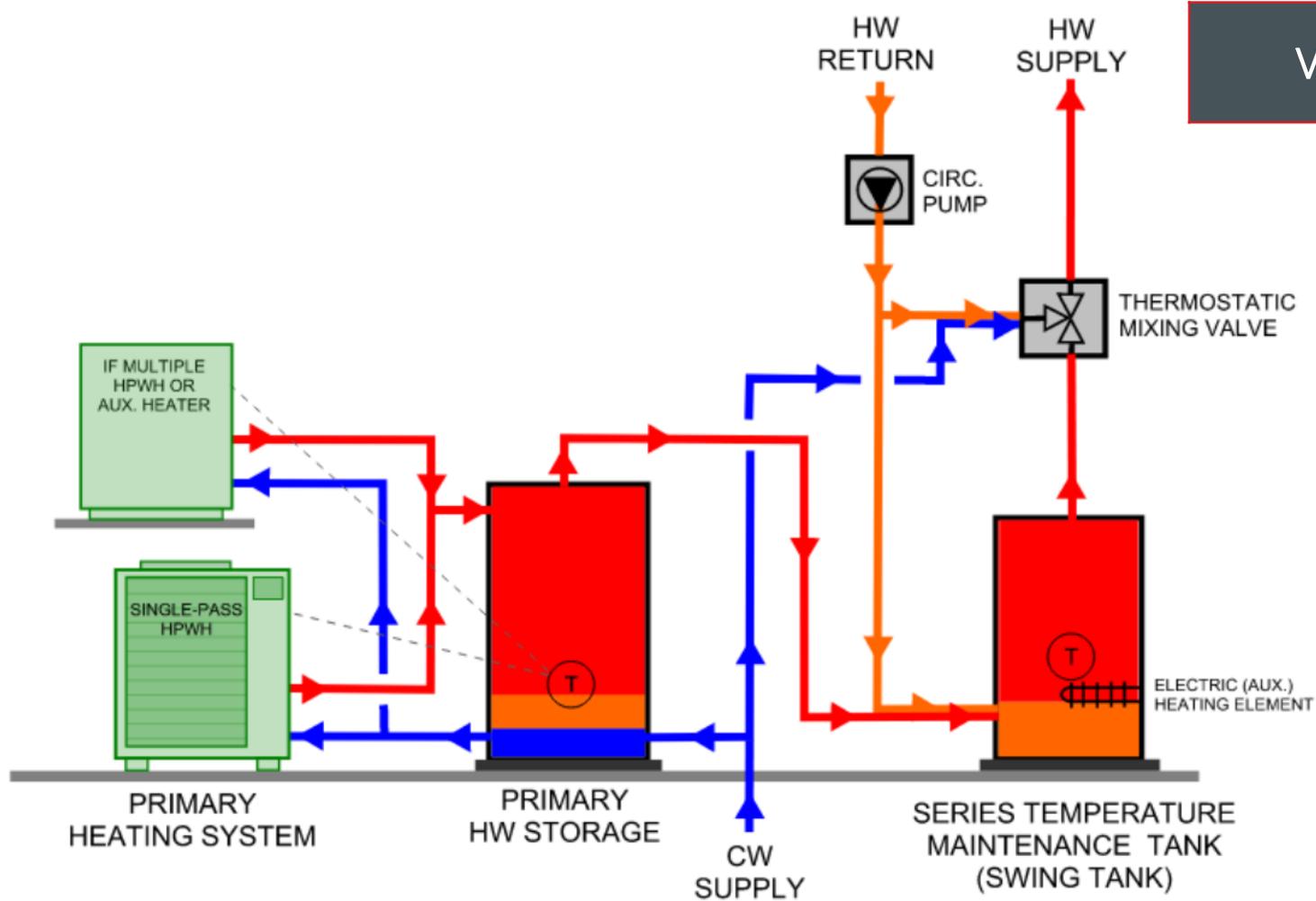
HIGH GPM FIXED FLOW	VARIABLE OUTPUT CAPACITY
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MULTI-PASS PIPING DIAGRAM

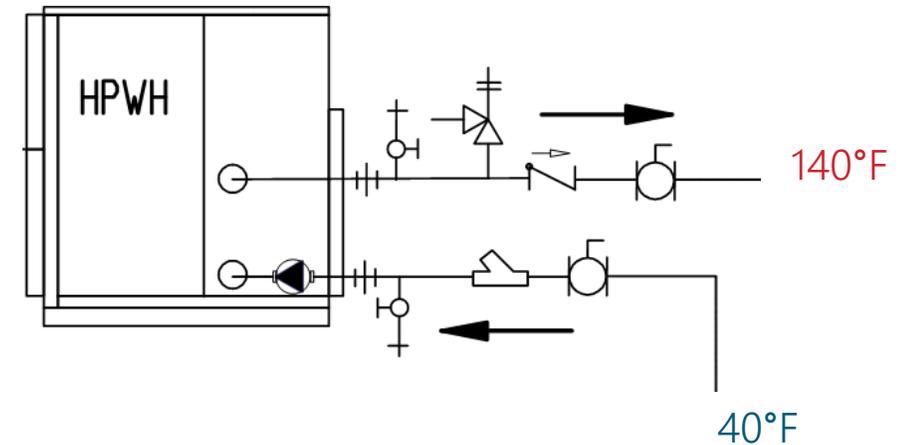


SINGLE-PASS CONFIGURATION



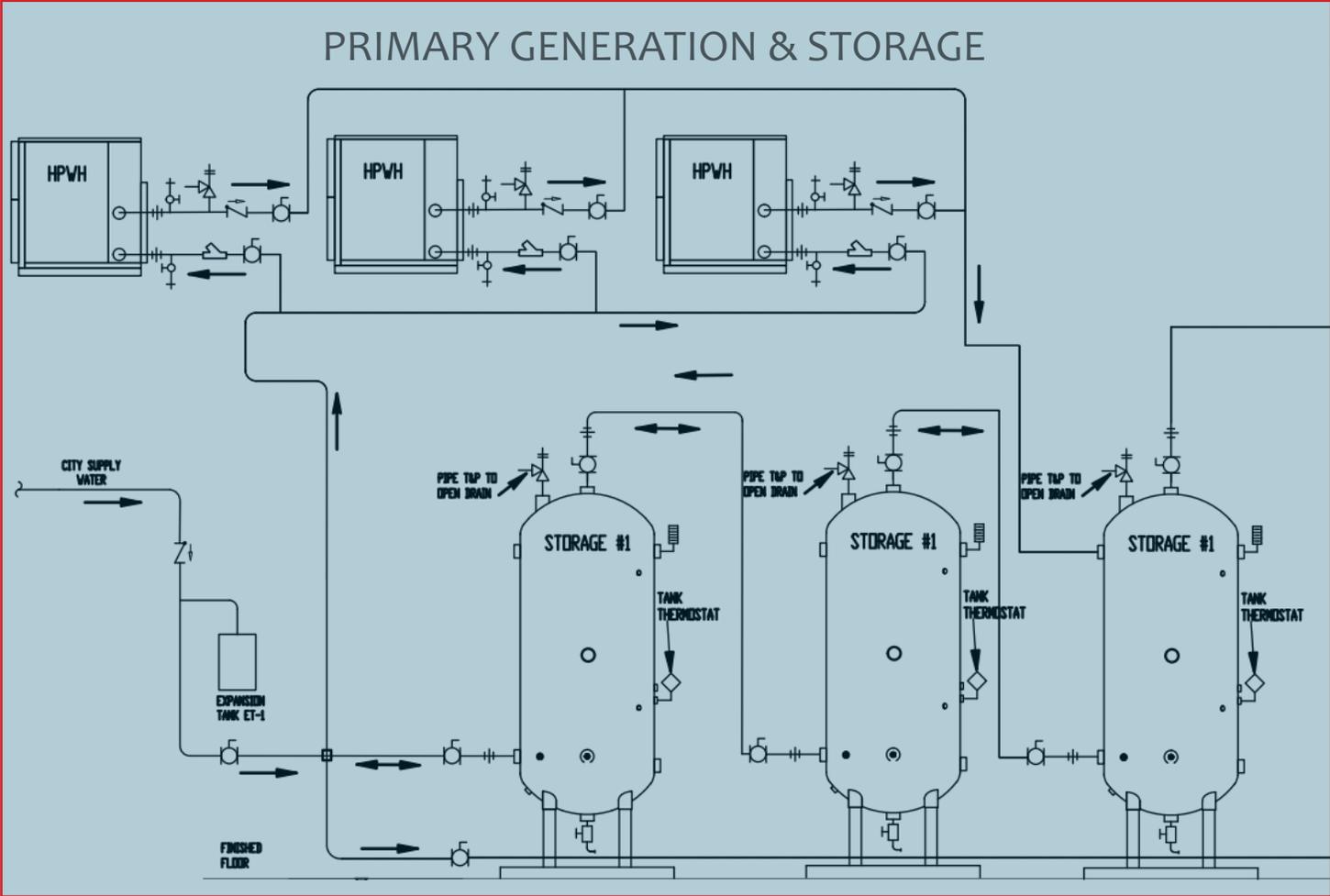
VARIABLE FLOW

FIXED OUTPUT TEMPERATURE

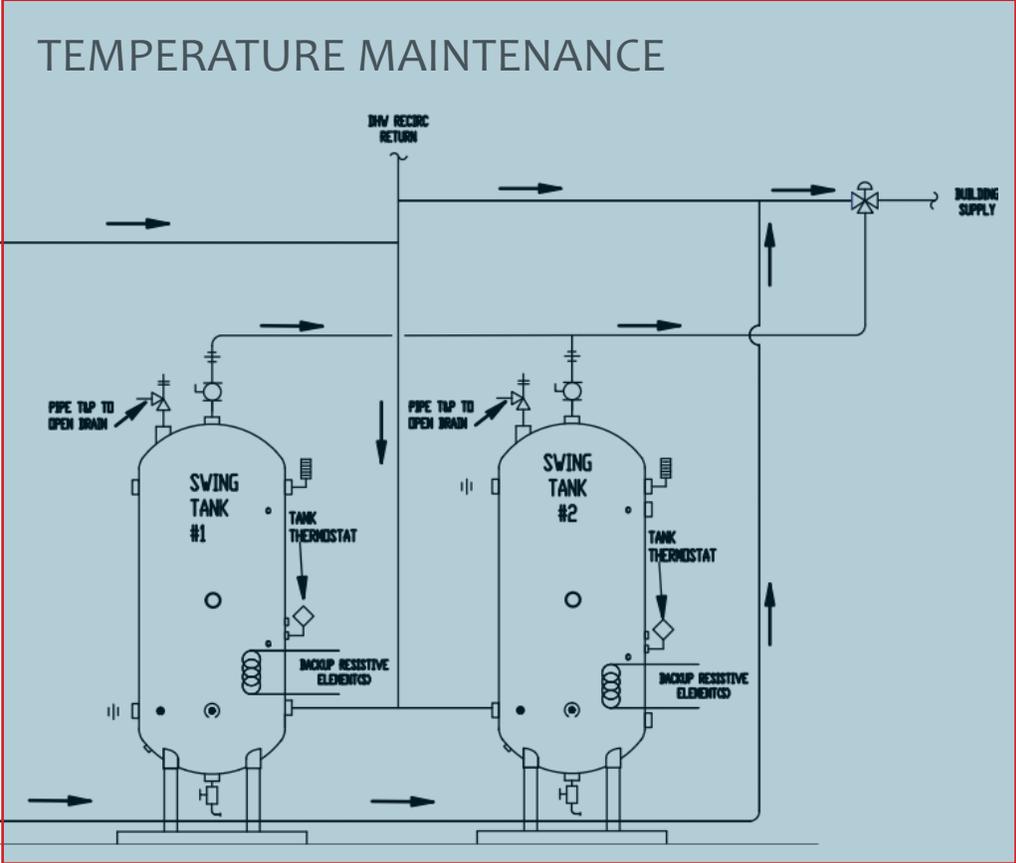


SINGLE-PASS PIPING DIAGRAM

PRIMARY GENERATION & STORAGE

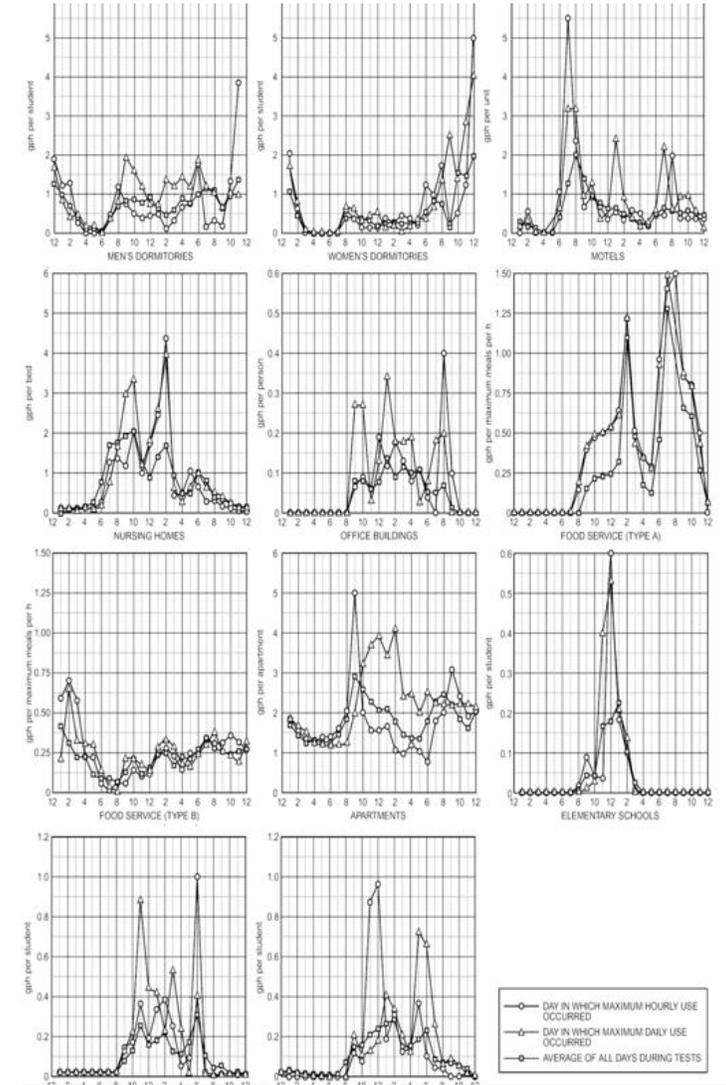
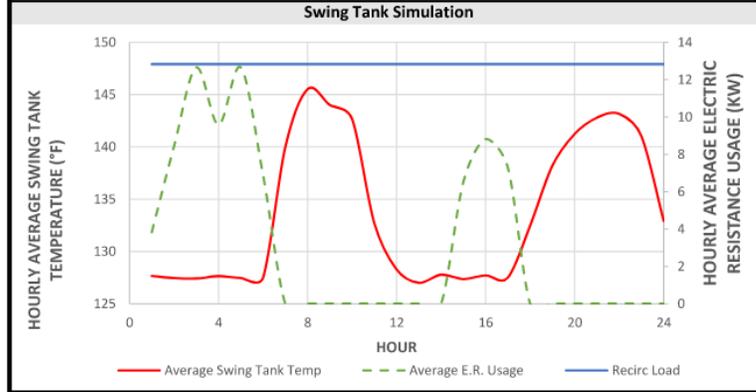
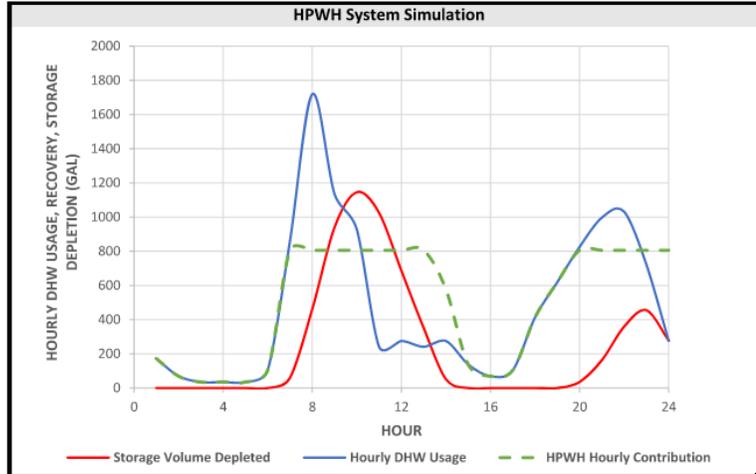


TEMPERATURE MAINTENANCE



PRECISE & DEFENSIBLE SIZING

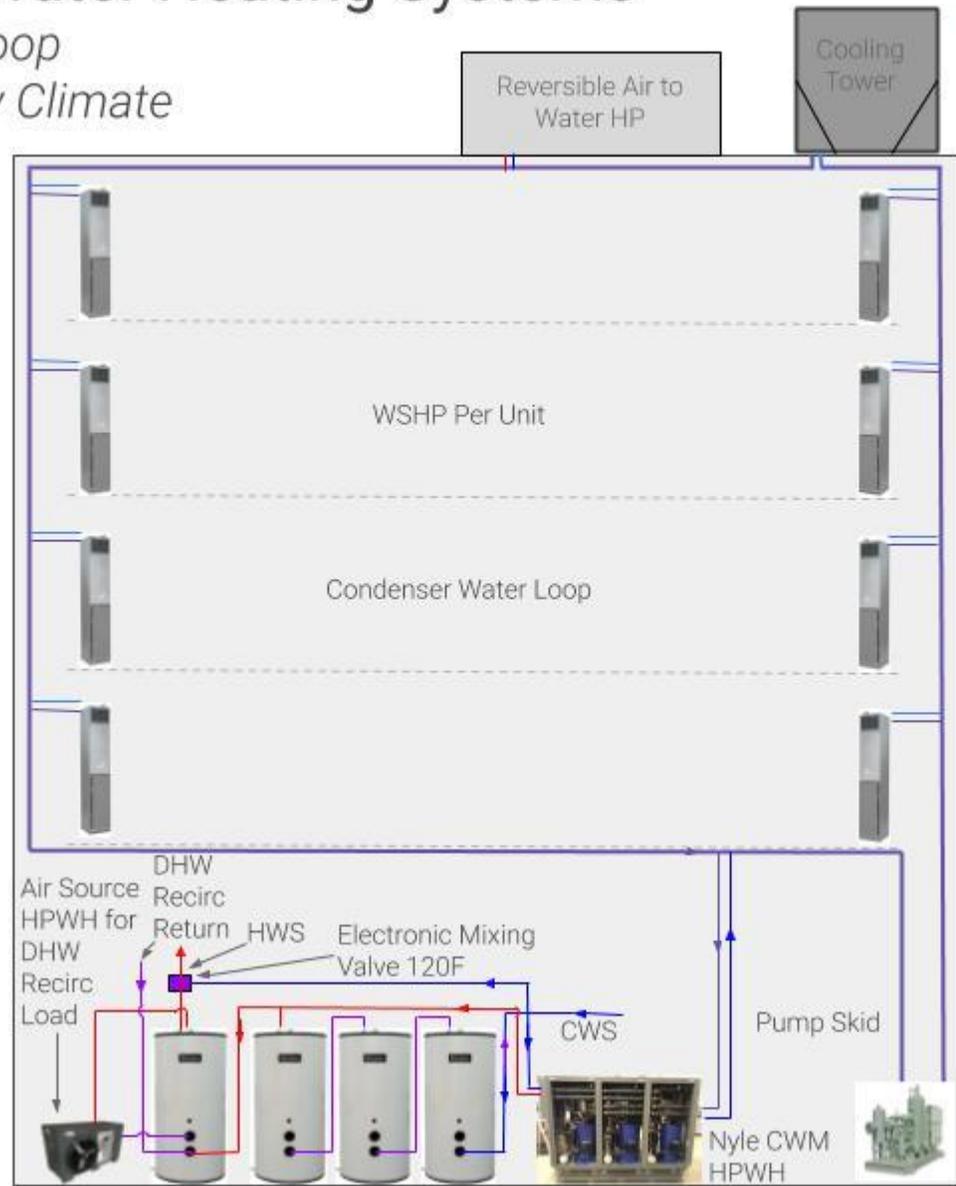
HPWH System Sizing - Single Pass - Swing Configuration	
Project: _____	Date: 4.18.23
Designer: Chris Ebener	
DHW Load Parameters	
Load Type: Ecosizer Apartments	
# of Occupants: 377	(assumes 30 GPD per occupant)
DHW Circulation Heat Loss: 43,785 BTU/hr	
Swing Tank Volume: 120 Gallons	
HPWH System Inputs	
Recommended HPWH Recovery: 460,023 BTU/hr at cold design condition	
Minimum HPWH Recovery: 470,000 BTU/hr at cold design condition	
Maximum HPWH Recovery: 351,000 BTU/hr at hot design condition	
Water Temperatures	
Domestic Cold Water Temp: 50 °F	
Storage / HPWH Delivery Temp: 150 °F	
Usage Temp: 120 °F (Default for ASHRAE load shapes: 120°F)	
Sizing Outputs	
HPWH Recovery: 470,000 BTU/hr	
Storage Running Volume (Above Aquastat): 1,550 gal	
Storage Cycling Volume (Below Aquastat): 140 gal	
Total Storage: 1,700 gal	
Swing Tank Heating Capacity: 23 kW	
Total Daily Swing Tank Element Usage: 77 kWh	
Total Daily DHW Draw: 11,310 GPD	
Max Storage Depletion: 1,212 Gallons	
Peak DHW Demand Event: 1,719 GPH	



All Electric Multi-family 10 - 500+ Units DHW by Nyle Water Heating Systems



Condenser Water Loop
Heat Recovery - Any Climate
Winter COP: 4.0
Summer COP: 8.0



HOT WATER STORAGE TANKS

Round Jacketed	Square Jacketed	Swing Tanks
80 – 940 Gallons	1,250 – 2,500 Gallons	119-Gallon
No Element	No Element	12 kW Element
ASME Construction		
Glass-Lined or Cement-Lined		
Custom Tank Configurations Stainless Steel Custom Port Sizes & Locations		



FACTORY FABRICATED SKID SYSTEMS



Air-Source	Water-Source	Hybrid
Storage Tanks & Temperature Maintenance		
Hydronic Accessories, P&T Instrumentation		
Master Mixing Valve		
Master Power & Control Panel		
Expansion Tank		
Piping, Valves, Fittings		

Hundreds of Proven Installations



UCSF Student Housing



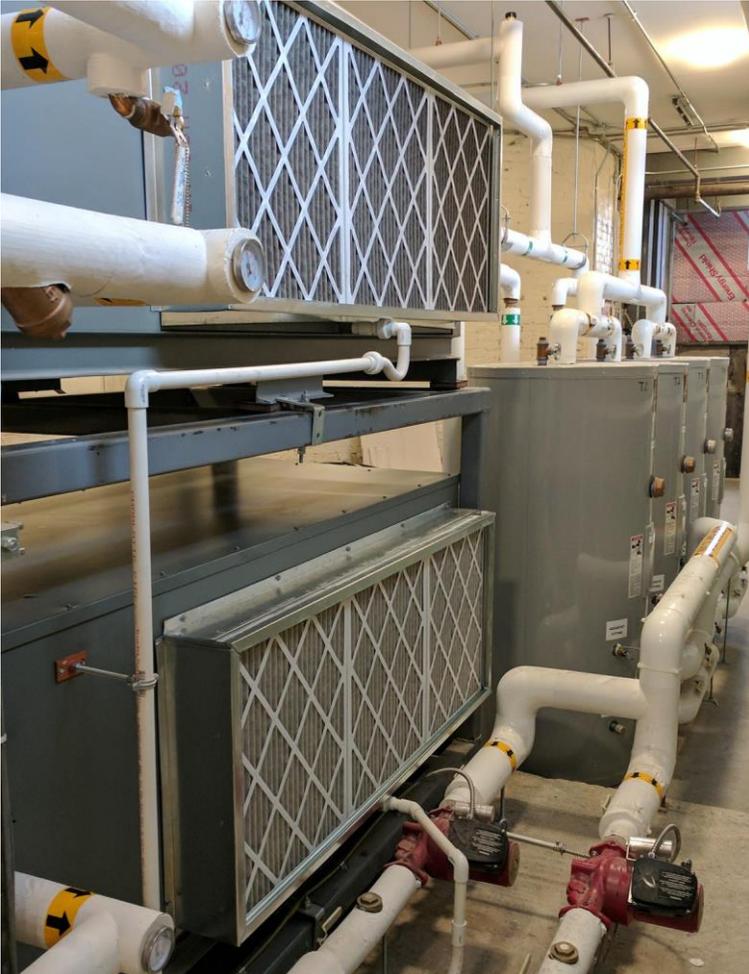
- 300+ Occupants
- (4x) C250A Heat Pumps
- 1,050 MBH Capacity
- 394 GPH Recovery
- MCP Staged Central Pump
- 140° Stored Water
- 4,000 Gallons Storage

PARKING GARAGE

- (2x) C185A Heat Pumps
- 365 MBH Capacity
- 487 GPH Recovery Rate
- 40°F Minimum Air Temperature
- 50°F Entering DCW
- 140°F Storage
- Single-Pass Configuration
- Ducted Discharge Air



HOT MECHANICAL ROOM



- (2x) C125A Heat Pumps
- 135 MBH Capacity
- 104 MBH Cooling Capacity
- 80°F Source Air Temperature
- 40°F Entering DCW
- 140°F Storage Temperature

RECLAIMED ENERGY



- (2x) C185W Heat Pumps
- Source = Chilled Water Return
- Load = Hot Water Reheat Coils
- 168 MBH Heating Capacity
- 118 MBH Heat of Extraction
- Chiller Base Loading



Thank You

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<http://heatwater.com>

