

10/21/2025

Proper Plumbing: Evaluating HPWH in Building Design

How-To Configure and Evaluate in
EnergyPlus 25.1



EFFICIENCY

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An A2E tutorial on a basic heat-pump-water heater in E+

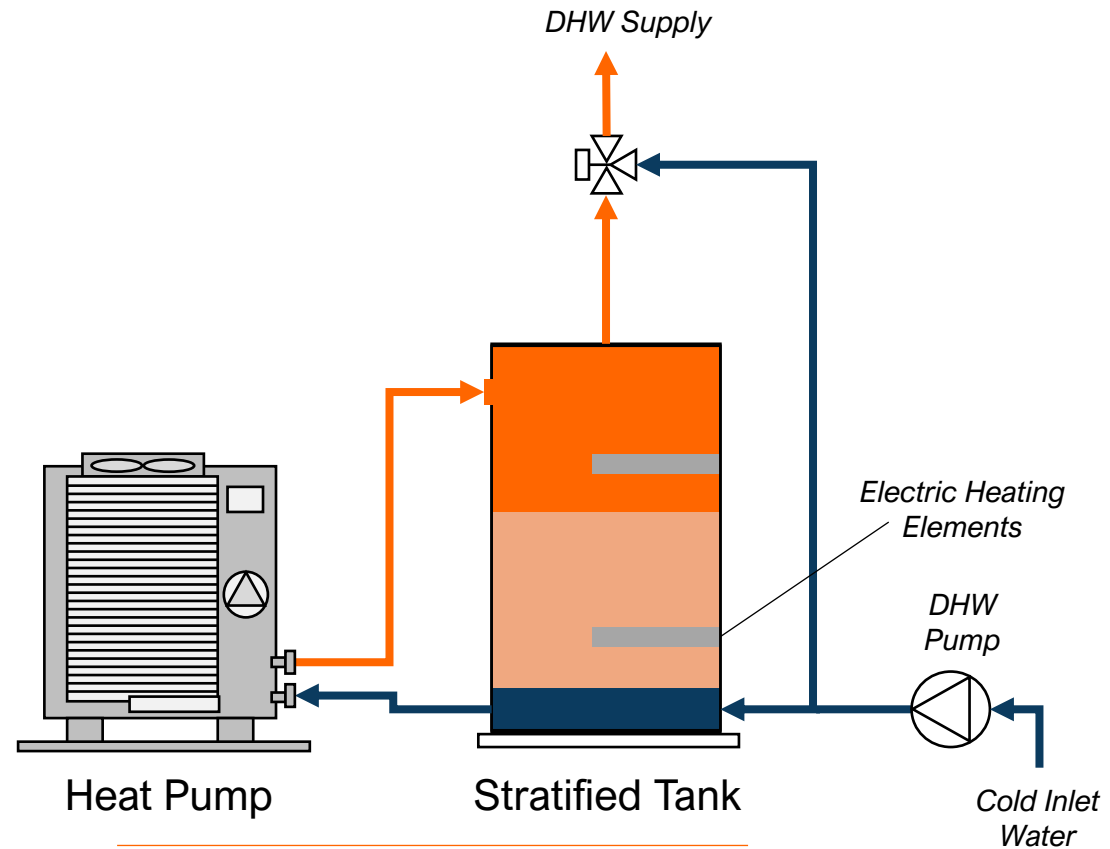


- How can you evaluate a Heat Pump Water Heater in early design phases with limited information?



Heat Pump Water Heaters

(without a building recirculation loop)



**Water Heater Pumped
Condenser System**

Small Commercial, Low-Rise Multi-Family



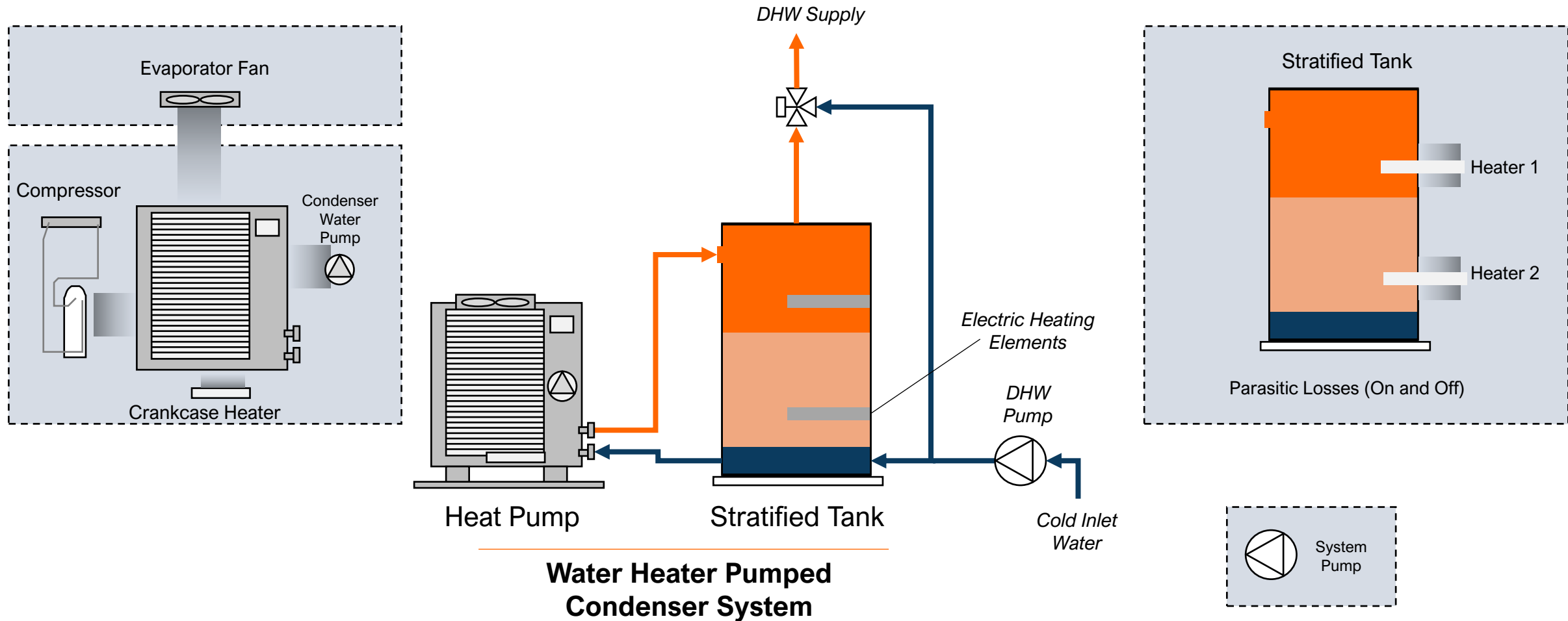
The (big) Problems

- › EnergyPlus HPWH is made up of several components configured in just the right way.
- › EnergyPlus HPWH require inputs be specifically defined, matching the climate, peak load, and operating conditions
- › HPWH often include backup electric heat which must be properly sized

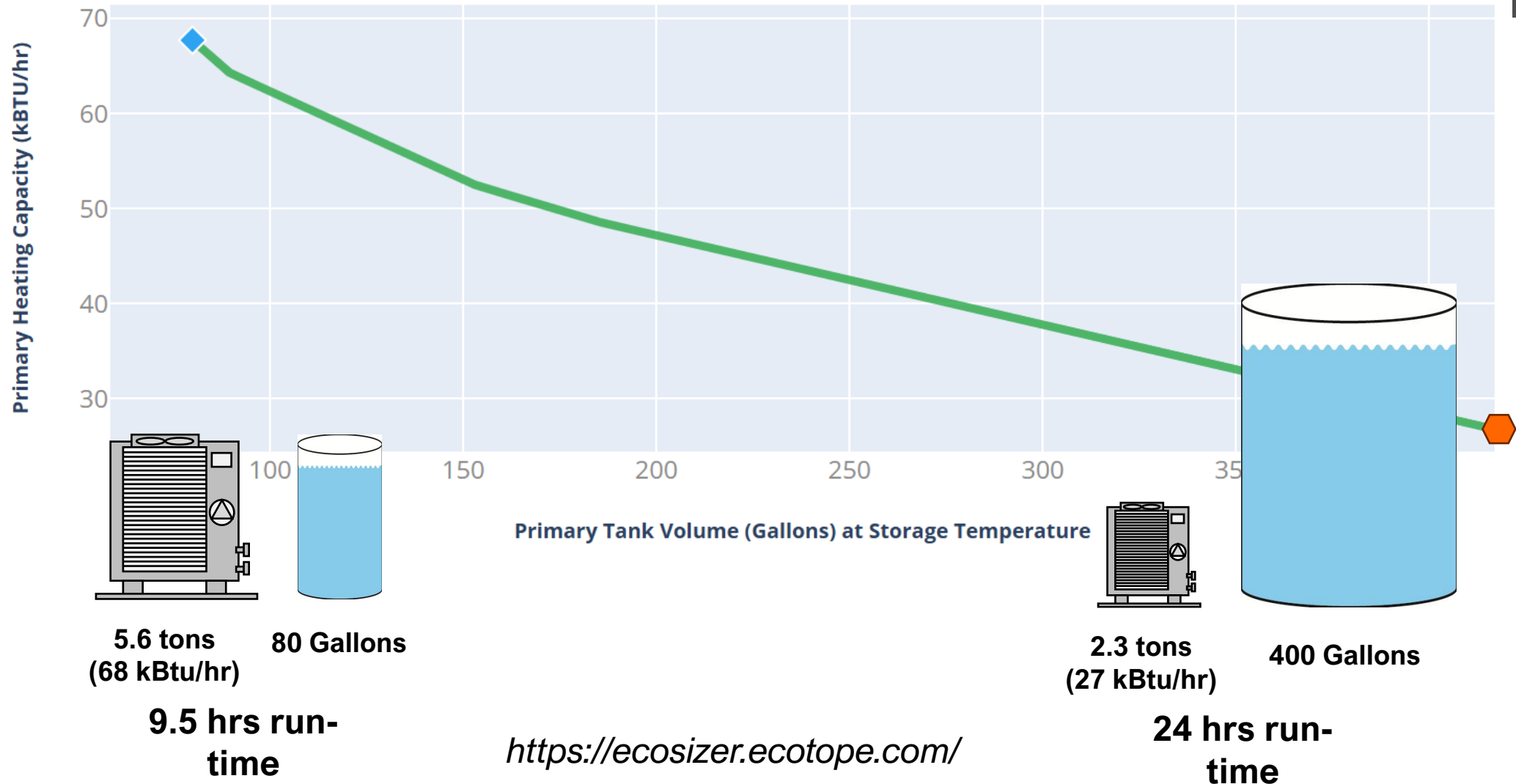
HPWH Review

1. Configuration of this Demo HPWH System
2. Configuration of this HPWH in EnergyPlus Components
3. Applied HPWH Results in Medium Office
 1. HPWH Thermal Source: Outdoor Air
 2. HPWH Thermal Source: Example Zone
4. Mapping Source to a Zone, How to Change EnergyPlus
5. Sizing the HPWH Object, How to Move Buildings
6. HPWH Objects, How to Add and Stitch Into Other Buildings

Heat Pump Water Heater



Sizing Storage to HP Capacity (example)



Sizing Methodology for HPWH Components

1. Find the peak flow rate of DHW
2. Find the peak daily schedule of hours/day DHW is used
3. Pick a duration to size the HP and Tank for
4. Pick the setpoint and delta-T the HPWH will operate at
5. Size the capacities of the system using the A2E toolkit (HP capacity, backup power, crankcase heater, onboard pump)

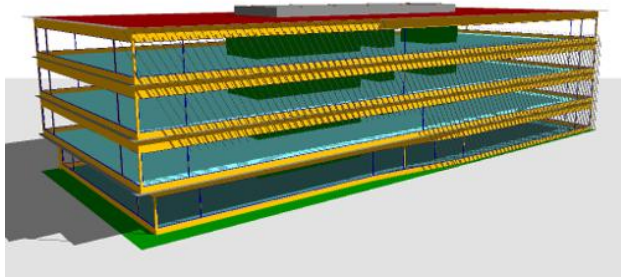


- › Calculate peak-day gallons of HW
- › Pick a desired recovery time in hours (6 hours)

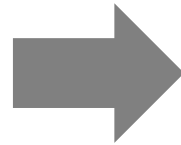
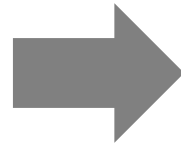
Application	Recovery Time	Rationale
Single family	4–6	Morning/evening peaking
Multifamily	8–12	Draw spread through day
Commercial (office, dorm)	10–16	Continuous recovery possible

- › Determine Daily Heating Energy
- › $\text{Size HP} = \text{Energy} / \text{Hours}$
- › $\text{Size Tank} = \text{Backup Heat, Size, Vol.}$
- › Size Additional Components

Workflow for Evaluating a HPWH



System Architecture



Autodesk HPWH Pre-Simulation EnergyPlus Tool V1.0.0 - Saved

File Home Insert Draw Page Layout Formulas Data Review View Automate Developer Help BLUEBEAM Acrobat

Clipboard Copy Paste Format Painter Font Arial Nova 11 B I U Alignment Merge & Center Number Conditional Formatting Table

B35

EnergyPlus HPWH Pre-Simulation Sizing and Input Guide

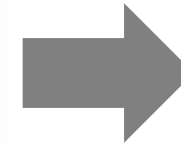
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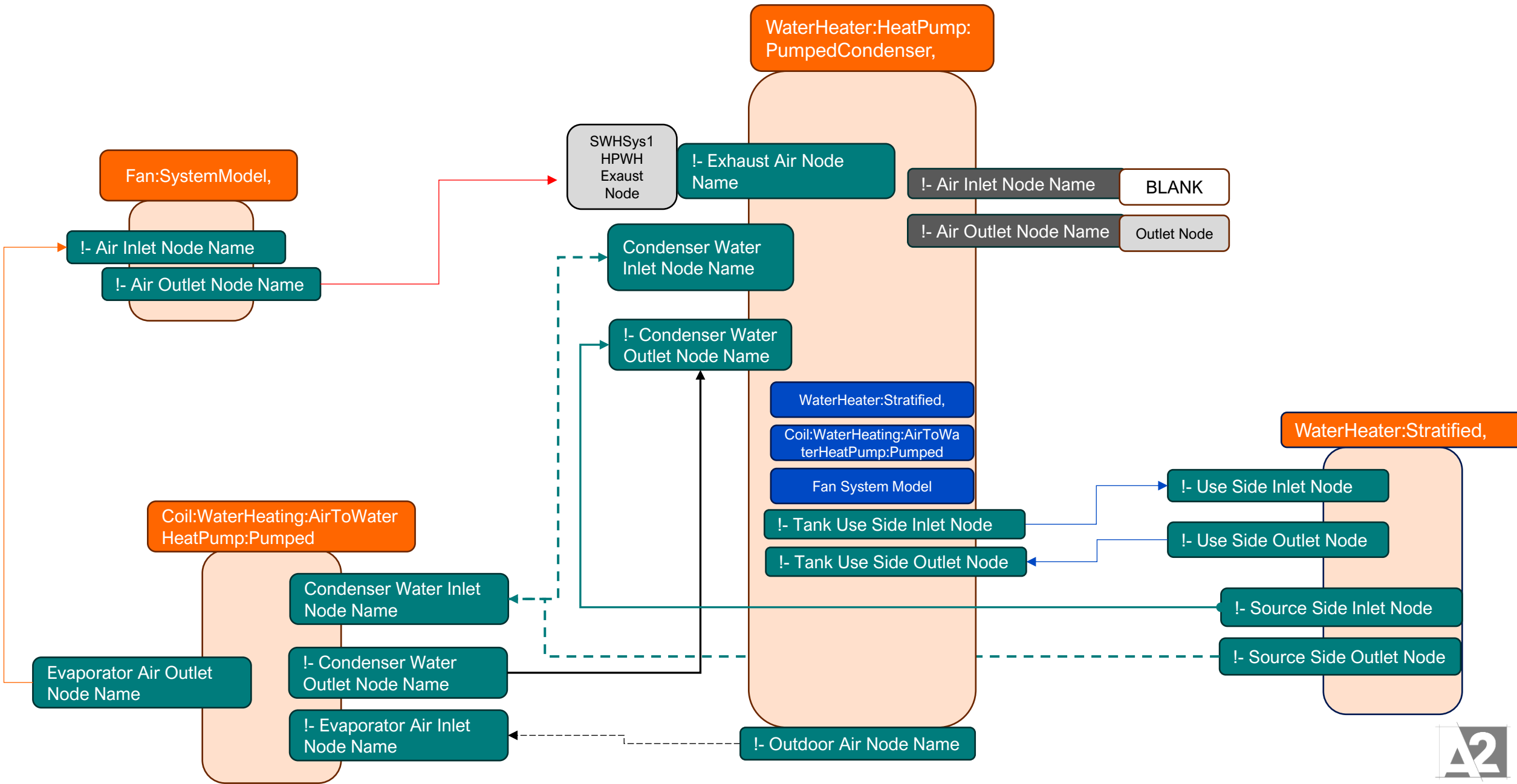
Color Key
Design Parameter Entered in Excel
EnergyPlus Input

Input Description	Units	Value	E+ Input	Notes
Daily Hot Water Draw (gallons)	gallons	258.6		Typical daily hot water use, calculated from flow x schedule fractions for 1
Peak Flow for 1 hour	gallons	51.0		
Target Water Temp (°F)	°F	128	y	Desired delivery temp at fixtures
Loop Design Temperature Difference	Delta-°F	9	y	
DHW Supply Temp	°C	53.3	y	
Lower backup Setpoint	°F	116		Assuming 12°F below the target setpoint
Lower Backup Element Schedule (Heater 2)	°C	46.7	y	
Mains Water Temp (°F)	°F	60		Typical cold water inlet temp, change to site location
Desired Recovery Time (hours)	hours	6		Time window to fully recharge tank
Stratification Efficiency (0.7 - 0.9)	fraction	0.8		Effective usable volume accounting for stratification
COP of Heat Pump rated	(user spec)	3		Coefficient of Performance of HPWH

Coil:WaterHeating:AirToWater:HeatPump:Pumped

Input Description	Units	Value	E+ Input	Notes
Daily Energy (BTU)	BTU	146,641		
Tank Energy for Sizing	BTU	72,308		
Min Tank Volume (gal)	gallons	159.4		Sized at 2.5 hrs of the peak flow. Change as desired, 1.5 to 2.5 recommen
Heat Pump Thermal Output	BTU/hr	24,440	y	
Heat Pump Thermal Output (conversion)	Watts	7,163	y	
Tank:HP:check	no/kW	22.25		





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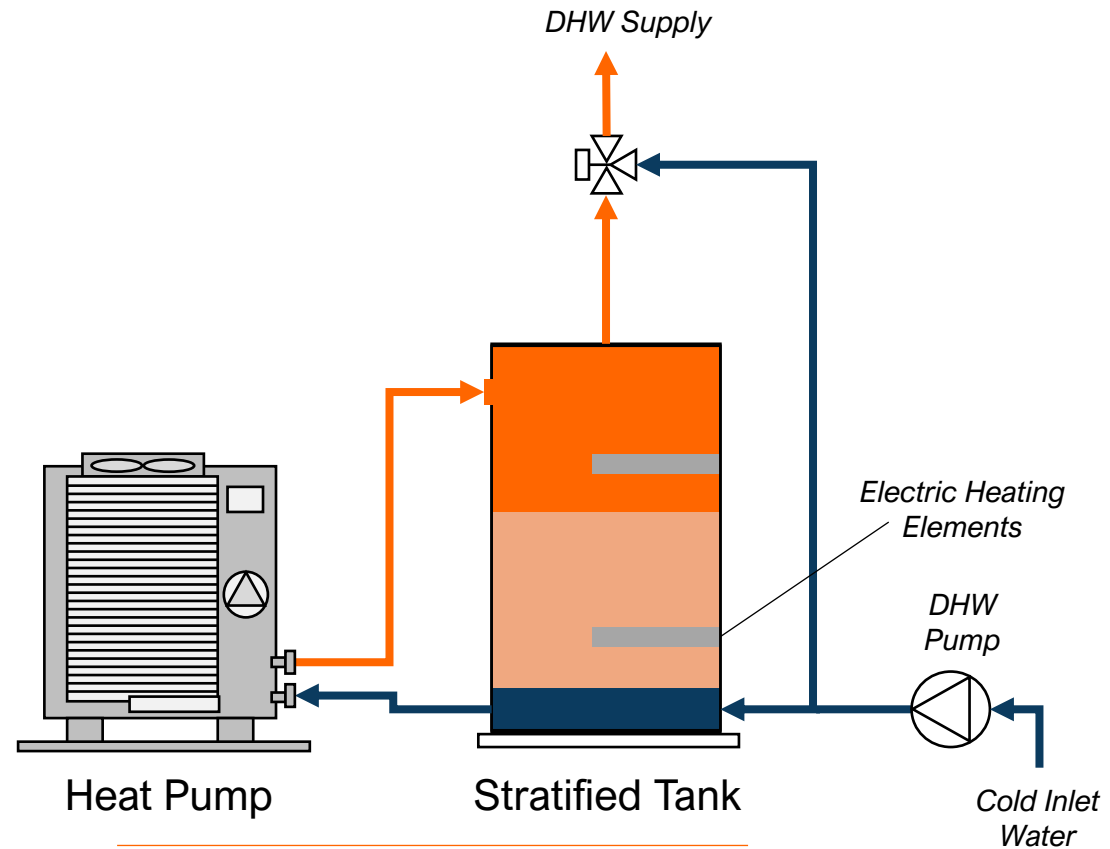
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Moving the HPWH Indoors?



Heat Pump Water Heaters

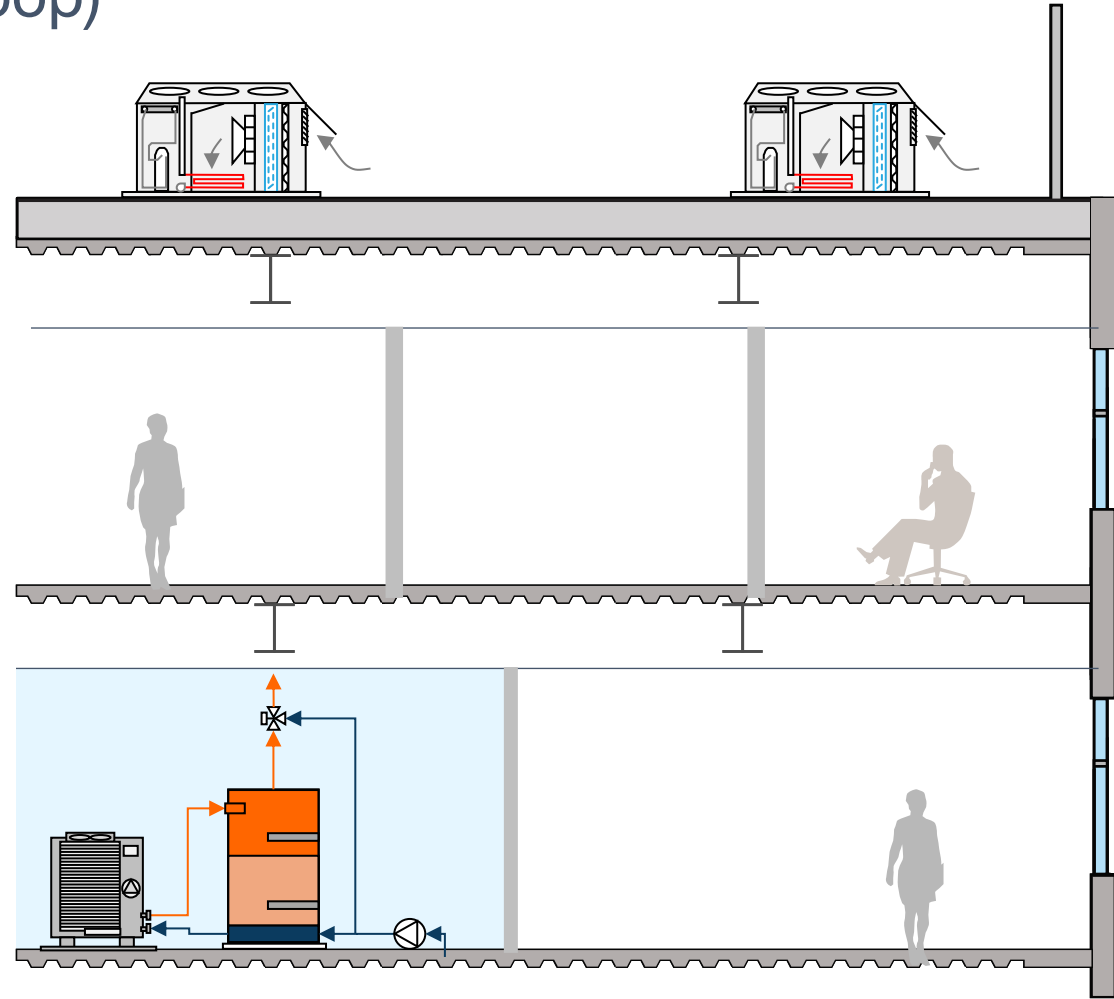
(without a building recirculation loop)

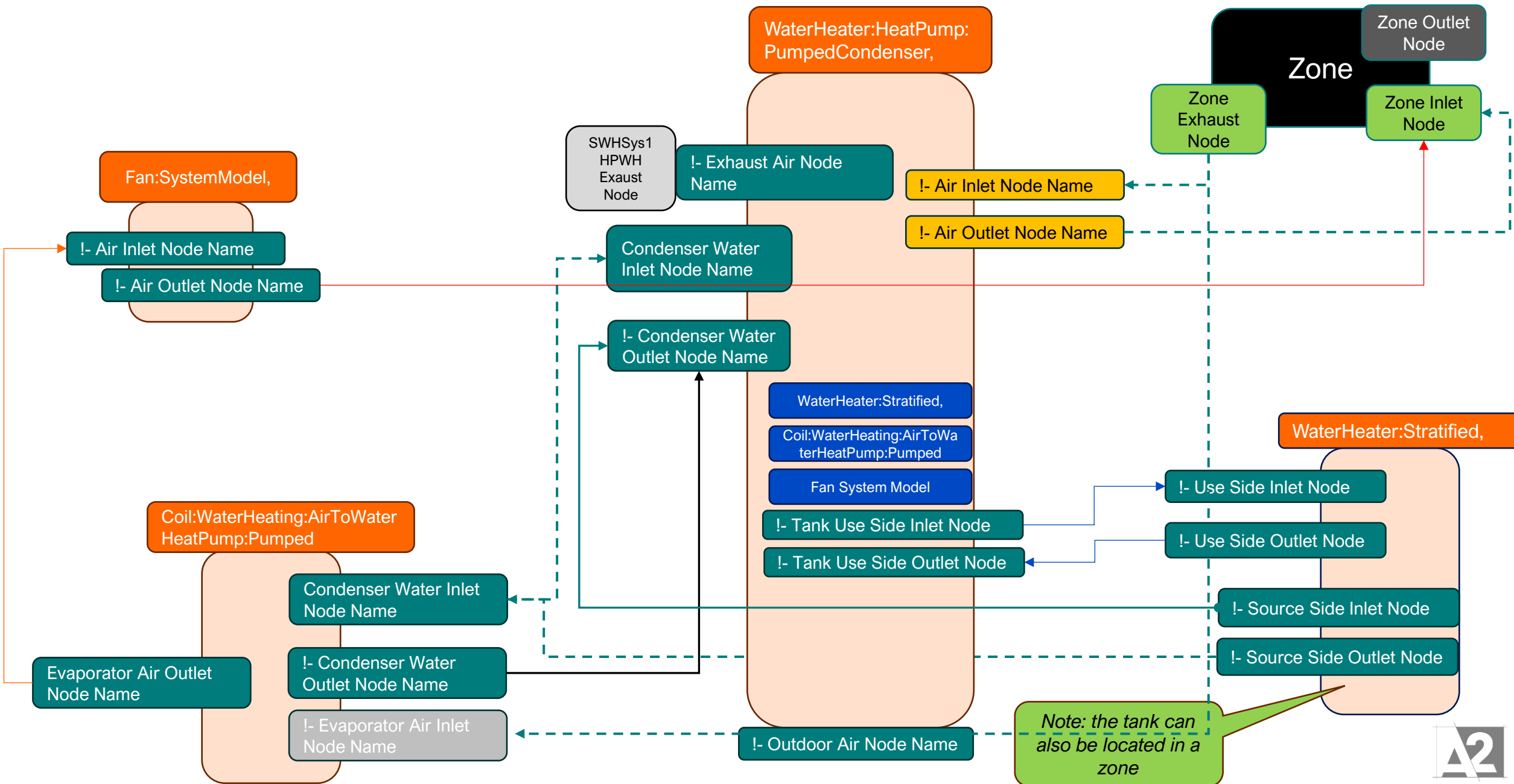


**Water Heater Pumped
Condenser System**

Heat Pump Water Heaters Indoors?

(without a building recirculation loop)





Add a HPWH to a Zone

At the Zone you want to add the HPWH, Add a new Exhaust Node you can name anything for that zone.

This name will be mapped to the HPWH.

HPWH_Outlet_Exhaust Node

[0128] Schedule: Compact
 [0003] Schedule: Constant
 [0018] Material
 [0019] Material: NoMass
 [0004] WindowMaterial: SimpleGlazingSystem
 [0038] Construction
 [0005] Construction: FactorGroundFloor
 [0001] GlobalGeometryRules
 [0018] Zone
 [0079] BuildingSurface: Detailed
 [0024] FenestrationSurface: Detailed
 [0015] InternalMass
 [0015] People
 [0015] Lights
 [0017] ElectricEquipment
 [0012] Daylighting: Controls
 [0024] Daylighting: ReferencePoint
 [0016] ZoneInfiltration: DesignFlowRate
 [0003] Exterior: Lights
 [0015] DesignSpecification: OutdoorAir
 [0002] DesignSpecification: ZoneAirDistribution
 [0001] Sizing: Parameters
 [0015] Sizing: Zone
 [0003] Sizing: System
 [0001] Sizing: Plant
 [0015] ZoneControl: Thermostat
 [0015] ThermostatSetpoint: DualSetpoint
 [0015] AirTerminal: SingleDuct: VAV: Reheat
 [0015] ZoneHVAC: AirDistributionUnit
 [0015] ZoneHVAC: EquipmentList
[0015] ZoneHVAC: EquipmentConnections
 [0001] Fan: SystemModel
 [0003] Fan: VariableVolume
 [0003] Coil: Cooling: DX: TwoSpeed
 [0015] Coil: Heating: Electric
 [0003] Coil: Heating: Fuel
 [0001] Coil: WaterHeating: AirToWaterHeatPump: Pumped
 [0003] CoilSystem: Cooling: DX
 [0003] Controller: OutdoorAir

Select from list of objects

Field	Units	Obj1	Obj2	Obj
Zone Name		Core_bottom	Perimeter_bot_ZN_1	Per 2
Zone Conditioning Equipment List Name		Core_bottom Equipment	Perimeter_bot_ZN_1 Equipment	Per 2 E
Zone Air Inlet Node or NodeList Name		Core_bottom Inlet	Perimeter_bot_ZN_1 Inlet Nodes	Per 2 In
Zone Air Exhaust Node or NodeList Name			HPWH_Outlet_Exhaust Node	
Zone Air Node Name		Core_bottom Air Node	Perimeter_bot_ZN_1 Air Node	Per 2 A
Zone Return Air Node or NodeList Name		Core_bottom Return Air Node	Perimeter_bot_ZN_1 Return Air Node	Per 2 F
Zone Return Air Node 1 Flow Rate Fraction Schedule Name				
Zone Return Air Node 1 Flow Rate Basis Node or NodeList Name				

HPWH Inlet Air Node to Zone

Create a second new node called the “**HPWH Outlet Node Into Zone**” and add it to the NodeList for the specific zone on the INLET to that zone.

```
[0003] Fan:VariableVolume
[0003] Coil:Cooling:DX:TwoSpeed
[0015] Coil:Heating:Electric
[0003] Coil:Heating:Fuel
[0001] Coil:WaterHeating:AirToWaterHeatPump:Pumped
[0003] CoilSystem:Cooling:DX
[0003] Controller:OutdoorAir
[0003] Controller:MechanicalVentilation
[0003] AirLoopHVAC:ControllerList
[0003] AirLoopHVAC
[0003] AirLoopHVAC:OutdoorAirSystem:EquipmentList
[0003] AirLoopHVAC:OutdoorAirSystem
[0003] OutdoorAir:Mixer
[0003] AirLoopHVAC:ZoneSplitter
[0003] AirLoopHVAC:SupplyPath
[0003] AirLoopHVAC:ZoneMixer
[0003] AirLoopHVAC:ReturnPlenum
[0003] AirLoopHVAC:ReturnPath
[0025] Branch
[0005] BranchList
[0002] Connector:Splitter
[0002] Connector:Mixer
[0002] ConnectorList
[0018] NodeList
```

Enter or select node name					
Field	Units	Obj1	Obj2	Obj3	
Name		PACU_VAV_bot_0 ANode List	Core_bottom Inlet Nodes	Perimeter_bot_ZN_ 1 Inlet Nodes	Pi 2
Node 1 Name		PACU_VAV_bot_0 ANode List	Core_bottom VAV Box Outlet Node	Perimeter_bot_ZN_ 1 VAV Box Outlet Node	Pi 2 N
Node 2 Name				HPWH Outlet Node Into Zone	
Node 3 Name					
Node 4 Name					
Node 5 Name					
Node 6 Name					
Node 7 Name					
Node 8 Name					
Node 9 Name					
Node 10 Name					
Node 11 Name					
Node 12 Name					

Mapping the HPWH Condenser to the Zone

Change the PumpedCondenser object INLET Configuration to ZONEAIRONLY

Then change the Air Inlet and Air Outlet Node.

Inlet maps to the node you created for the specific zone on the EXHAUST node location.

Outlet maps to the zone inlet node name we made for the nodelist.

[0003]	Coil:Heating:Fuel
[0001]	Coil:WaterHeating:AirToWaterHeatPump:Pumped
[0003]	CoilSystem:Cooling:DX
[0003]	Controller:OutdoorAir
[0003]	Controller:MechanicalVentilation
[0003]	AirLoopHVAC:ControllerList
[0003]	AirLoopHVAC
[0003]	AirLoopHVAC:OutdoorAirSystem:EquipmentList
[0003]	AirLoopHVAC:OutdoorAirSystem
[0003]	OutdoorAir:Mixer
[0003]	AirLoopHVAC:ZoneSplitter
[0003]	AirLoopHVAC:SupplyPath
[0003]	AirLoopHVAC:ZoneMixer
[0003]	AirLoopHVAC:ReturnPlenum
[0003]	AirLoopHVAC:ReturnPath
[0025]	Branch
[0005]	BranchList
[0002]	Connector:Splitter
[0002]	Connector:Mixer
[0002]	ConnectorList
[0018]	NodeList
[0006]	OutdoorAir:Node
[0003]	OutdoorAir:NodeList
[0005]	Pipe:Adiabatic
[0001]	Pump:ConstantSpeed
[0001]	WaterHeater:Stratified
[0001]	WaterHeater:HeatPump:PumpedCondenser
[0001]	PlantLoop
[0001]	PlantEquipmentList
[0001]	PlantEquipmentOperation:HeatingLoad
[0001]	PlantEquipmentOperationSchemes
[0041]	EnergyManagementSystem:Sensor

Field	Units	Obj1
Name		SWHSys1 HPWH
Availability Schedule Name		PlantHPWHSch
Compressor Setpoint Temperature Schedule Name		SWHSys1 Water Heater Setpoint Temperature Schedule
Dead Band Temperature Difference	deltaC	0.1
Condenser Water Inlet Node Name		SWHSys1 HPWH Water Inlet
Condenser Water Outlet Node Name		SWHSys1 HPWH Water Outlet
Condenser Water Flow Rate	m3/s	autosize
Evaporator Air Flow Rate	m3/s	autosize
Inlet Air Configuration		ZoneAirOnly
Air Inlet Node Name		HPWH_Outlet_Exhaust Node
Air Outlet Node Name		HPWH Outlet Node Into Zone
Outdoor Air Node Name		
Exhaust Air Node Name		
Inlet Air Temperature Schedule Name		
Inlet Air Humidity Schedule Name		
Inlet Air Zone Name		Perimeter_bot_ZN_1
Tank Object Type		WaterHeater:Stratified
Tank Name		SWHSys1 HPWH

Mapping the HP Compressor to the Outlet Node

Map the evaporator air inlet node to the created Zone Exhaust Node we created.

[0018]	Material
[0019]	Material:NoMass
[0004]	WindowMaterial:SimpleGlazingSystem
[0038]	Construction
[0005]	Construction:FfactorGroundFloor
[0001]	GlobalGeometryRules
[0018]	Zone
[0079]	BuildingSurface:Detailed
[0024]	FenestrationSurface:Detailed
[0015]	InternalMass
[0015]	People
[0015]	Lights
[0017]	ElectricEquipment
[0012]	Daylighting:Controls
[0024]	Daylighting:ReferencePoint
[0016]	ZoneInfiltration:DesignFlowRate
[0003]	Exterior:Lights
[0015]	DesignSpecification:OutdoorAir
[0002]	DesignSpecification:ZoneAirDistribution
[0001]	Sizing:Parameters
[0015]	Sizing:Zone
[0003]	Sizing:System
[0001]	Sizing:Plant
[0015]	ZoneControl:Thermostat
[0015]	ThermostatSetpoint:DualSetpoint
[0015]	AirTerminal:SingleDuct:VAV:Reheat
[0015]	ZoneHVAC:AirDistributionUnit
[0015]	ZoneHVAC:EquipmentList
[0015]	ZoneHVAC:EquipmentConnections
[0001]	Fan:SystemModel
[0003]	Fan:VariableVolume
[0003]	Coil:Cooling:DX:TwoSpeed
[0015]	Coil:Heating:Electric
[0003]	Coil:Heating:Fuel
[0001]	Coil:WaterHeating:AirToWaterHeatPump:Pumped

Field	Units	Obj1
Name		SWHSys1 HPw/H DXCoil
Rated Heating Capacity	W	11171
Rated COP	W/W	3.4
Rated Sensible Heat Ratio		0.736
Rated Evaporator Inlet Air Dry-Bulb Temperature	C	21.11
Rated Evaporator Inlet Air Wet-Bulb Temperature	C	22.444
Rated Condenser Inlet Water Temperature	C	54.2222
Rated Evaporator Air Flow Rate	m3/s	autosize
Rated Condenser Water Flow Rate	m3/s	autosize
Evaporator Fan Power Included in Rated COP		Yes
Condenser Pump Power Included in Rated COP		Yes
Condenser Pump Heat Included in Rated Heating Capacity and Rated COP		Yes
Condenser Water Pump Power	W	150
Fraction of Condenser Pump Heat to Water		0.1
Evaporator Air Inlet Node Name		HPw/H_Outlet_Exhaust Node ...
Evaporator Air Outlet Node Name		SWHSys1 HPw/H Fan Inlet
Condenser Water Inlet Node Name		SWHSys1 HPw/H Water Inlet
Condenser Water Outlet Node Name		SWHSys1 HPw/H Water Outlet
Crankcase Heater Capacity	W	0
Maximum Ambient Temperature for Crankcase Heater Operation	C	10
Evaporator Air Temperature Type for Curve Objects		WetBulbTemperature

Mapping the HPWH Condenser Fan to the Zone Inlet Node

Map the fan which is part of the HPWH to the zone inlet node we created.

This fan pushes the heat (or coolth) off the compressor into the zone.

```
[0015] ZoneControl:Thermostat
[0015] ThermostatSetpoint:DualSetpoint
[0015] AirTerminal:SingleDuct:VAV:Reheat
[0015] ZoneHVAC:AirDistributionUnit
[0015] ZoneHVAC:EquipmentList
[0015] ZoneHVAC:EquipmentConnections
[0001] Fan:SystemModel
[0003] Fan:VariableVolume
[0003] Coil:Cooling:DX:TwoSpeed
[0015] Coil:Heating:Electric
[0003] Coil:Heating:Fuel
[0001] Coil:WaterHeating:AirToWaterHeatPump:Pumped
[0003] CoilSystem:Cooling:DX
[0003] Controller:OutdoorAir
[0003] Controller:MechanicalVentilation
[0003] AirLoopHVAC:ControllerList
[0003] AirLoopHVAC
[0003] AirLoopHVAC:OutdoorAirSystem:EquipmentList
[0003] AirLoopHVAC:OutdoorAirSystem
[0003] OutdoorAir:Mixer
[0003] AirLoopHVAC:ZoneSplitter
[0003] AirLoopHVAC:SupplyPath
[0003] AirLoopHVAC:ZoneMixer
[0003] AirLoopHVAC:ReturnPlenum
[0003] AirLoopHVAC:ReturnPath
[0025] Branch
[0005] BranchList
[0002] Connector:Splitter
[0002] Connector:Mixer
[0002] ConnectorList
[0018] NodeList
[0006] OutdoorAir:Node
[0003] OutdoorAir:NodeList
```

Explanation of Object and Current Field

Object Description: Versatile simple fan that can be used in variable air volume, constant volume, on-off. Performance at different flow rates, or speed levels, is determined using separate performance curve or prescribed power fractions at discrete speed levels for two-speed or multi-speed fans.

Field Description:
ID: N2
Default: 0.2

Field	Units	Obj1
Name		SWHSys1 HPWH Fan
Availability Schedule Name		PlantHPWHSch
Air Inlet Node Name		SWHSys1 HPWH Fan Inlet
Air Outlet Node Name		HPWH Outlet Node Into Zone
Design Maximum Air Flow Rate	m3/s	autosize
Speed Control Method		Discrete
Electric Power Minimum Flow Rate Fraction		0
Design Pressure Rise	Pa	100
Motor Efficiency		0.85
Motor In Air Stream Fraction		0
Design Electric Power Consumption	W	autosize
Design Power Sizing Method		TotalEfficiencyAnd Pressure
Electric Power Per Unit Flow Rate	W/(m3/s)	
Electric Power Per Unit Flow Rate Per Unit Pressure	W/((m3/s)-Pa)	
Fan Total Efficiency		0.7

Equipment Control for OA Limits on Compressor

Note that the Compressor for the HPWH can operate down to this limit user specified in the Condenser.

This input will change where the unit relies on the backup electric heater fully. The curve on the compressor that is temperature dependent will still derate the capacity at cold outdoor air however the unit may still be able to partial capacity at low loads.

[0003] AirLoopHVAC:OutdoorAirSystem
 [0003] OutdoorAir:Mixer
 [0003] AirLoopHVAC:ZoneSplitter
 [0003] AirLoopHVAC:SupplyPath
 [0003] AirLoopHVAC:ZoneMixer
 [0003] AirLoopHVAC:ReturnPlenum
 [0003] AirLoopHVAC:ReturnPath
 [0025] Branch
 [0005] BranchList
 [0002] Connector:Splitter
 [0002] Connector:Mixer
 [0002] ConnectorList
 [0018] NodeList
 [0006] OutdoorAir:Node
 [0003] OutdoorAir:NodeList
 [0005] Pipe:Adiabatic
 [0001] Pump:ConstantSpeed
 [0001] WaterHeater:Stratified
[0001] WaterHeater:HeatPump:PumpedCondenser
 [0001] PlantLoop
 [0001] PlantEquipmentList
 [0001] PlantEquipmentOperation:HeatingLoad
 [0001] PlantEquipmentOperationSchemes
 [0041] EnergyManagementSystem:Sensor
 [0022] EnergyManagementSystem:Actuator
 [0020] EnergyManagementSystem:ProgramCallingManager
 [0020] EnergyManagementSystem:Program
 [0001] EnergyManagementSystem:GlobalVariable
 [0001] EnergyManagementSystem:OutputVariable
 [0015] EnergyManagementSystem:InternalVariable
 [0003] AvailabilityManager:NightCycle
 [0003] AvailabilityManagerAssignmentList
 [0001] SetpointManager:Scheduled
 [0009] SetpointManager:MixedAir
 [0003] SetpointManager:Warmest
 [0001] Generator:PVWatts
 [0001] ElectricLoadCenter:Inverter:PVWatts
 [0001] ElectricLoadCenter:Generators
 [0001] ElectricLoadCenter:Transformer
 [0001] ElectricLoadCenter:Distribution
 [0015] WaterUse:Equipment
 [0015] WaterUse:Connections
 [0004] Curve:Quadratic
 [0004] Curve:Biquadratic
 [0001] Output:VariableDictionary
 [0001] Output:Surfaces:List
 [0001] Output:Surfaces:Drawing
 [0001] Output:Constructions
 [0001] Output:Table:SummaryReports
 [0009] Output:Table:Monthly
 [0001] Output:Control:Table:Style

Field	Units	Obj1
Name		SWHSys1 HPWH
Availability Schedule Name		PlantHPWHSch
Compressor Setpoint Temperature Schedule Name		SHWSys1 Water Heater Setpoint Temperature Schedule
Dead Band Temperature Difference	deltaF	0.18
Condenser Water Inlet Node Name		SWHSys1 HPWH Water Inlet
Condenser Water Outlet Node Name		SWHSys1 HPWH Water Outlet
Condenser Water Flow Rate	gal/min	autosize
Evaporator Air Flow Rate	ft3/min	autosize
Inlet Air Configuration		ZoneAirOnly
Air Inlet Node Name		HPWH_Outlet_Exhaust Node
Air Outlet Node Name		HPWH Outlet Node Into Zone
Outdoor Air Node Name		
Exhaust Air Node Name		
Inlet Air Temperature Schedule Name		
Inlet Air Humidity Schedule Name		
Inlet Air Zone Name		Perimeter_bot_ZN_1
Tank Object Type		WaterHeater:Stratified
Tank Name		SWHSys1 HPWH Tank
Tank Use Side Inlet Node Name		SWHSys1 Pump-Water HeaterNode
Tank Use Side Outlet Node Name		SWHSys1 Supply Equipment Outlet Node
DX Coil Object Type		Coil:WaterHeating:AirToWater HeatPump:Pumped
DX Coil Name		SWHSys1 HPWH DXCoil
Minimum Inlet Air Temperature for Compressor Operation	F	24.008
Maximum Inlet Air Temperature for Compressor Operation	F	201.02

Last Missed Item, Link to Zone Equipment

Add the HPWH
Object to the
zone equipment
list in E+

[0003] Schedule:Constant
[0018] Material
[0019] Material:NoMass
[0004] WindowMaterial:SimpleGlazingSystem
[0038] Construction
[0005] Construction:FfactorGroundFloor
[0001] GlobalGeometryRules
[0018] Zone
[0079] BuildingSurface:Detailed
[0024] FenestrationSurface:Detailed
[0015] InternalMass
[0015] People
[0015] Lights
[0017] ElectricEquipment
[0012] Daylighting:Controls
[0024] Daylighting:ReferencePoint
[0016] ZoneInfiltration:DesignFlowRate
[0003] Exterior:Lights
[0015] DesignSpecification:OutdoorAir
[0002] DesignSpecification:ZoneAirDistribution
[0001] Sizing:Parameters
[0015] Sizing:Zone
[0003] Sizing:System
[0001] Sizing:Plant
[0015] ZoneControl:Thermostat
[0015] ThermostatSetpoint:DualSetpoint
[0015] AirTerminal:SingleDuct:VAV:Reheat
[0015] ZoneHVAC:AirDistributionUnit
[0015] ZoneHVAC:EquipmentList
[0015] ZoneHVAC:EquipmentConnections
[0001] Fan:SystemModel
[0003] Fan:VariableVolume
[0003] Coil:Cooling:DX:TwoSpeed
[0015] Coil:Heating:Electric

Field	Units	Obj1	Obj2	Obj3
Name		Core_bottom Equipment	Perimeter_bot_ZN_1 Equipment	Perimeter_bot_ZN_2 Equipment
Load Distribution Scheme		SequentialLoad	SequentialLoad	SequentialLoad
Zone Equipment 1 Object Type		ZoneHVAC:AirDistributionUnit	ZoneHVAC:AirDistributionUnit	ZoneHVAC:AirDistributionUnit
Zone Equipment 1 Name		Core_bottom VAV Box	Perimeter_bot_ZN_1 VAV Box	Perimeter_bot_ZN_2 VAV Box
Zone Equipment 1 Cooling Sequence		1	1	1
Zone Equipment 1 Heating or No-Load Sequence		1	1	1
Zone Equipment 1 Sequential Cooling Fraction				
Zone Equipment 1 Sequential Heating Fraction				
Zone Equipment 2 Object Type			WaterHeater:HeatPump:PumpedCondenser	
Zone Equipment 2 Name			SWHSys1 HPWH	
Zone Equipment 2 Cooling Sequence			2	
Zone Equipment 2 Heating or No-Load Sequence			2	
Zone Equipment 2 Sequential Cooling Fraction				
Zone Equipment 2 Sequential Heating Fraction				
Zone Equipment 3 Object Type				
Zone Equipment 3 Name				
Zone Equipment 3 Cooling Sequence				
Zone Equipment 3 Heating or No-Load Sequence				
Zone Equipment 3 Sequential Cooling Fraction				

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