

Title 24 2013 Compliance Software: CBECC-Com

**“California Building Energy Code Compliance
for Commercial Buildings”**

Defining Central Plant Systems

■ Objective: **Create Plant System**

1. Create Boiler
2. Create Chiller
3. Create Cooling Tower
4. Create VAV System

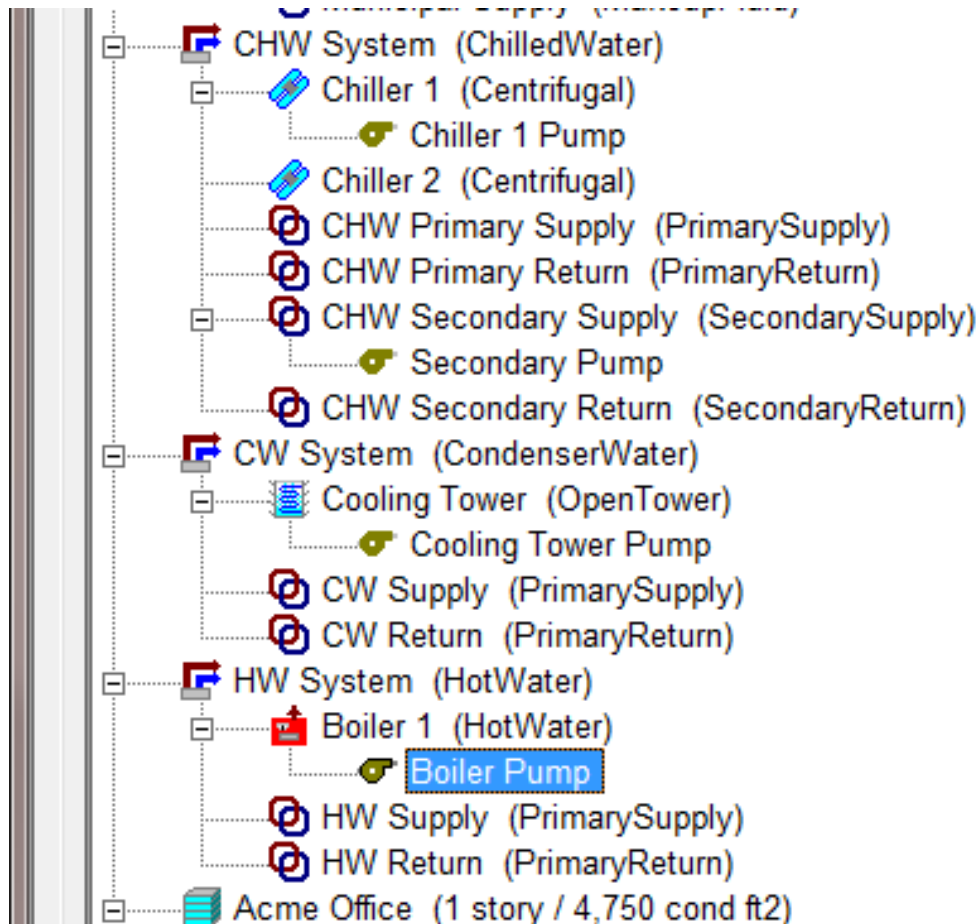
Training Module 12: Create HotWater System

- ❖ Create a new Fluid System , name it HW System and select type “HotWater”
- ❖ Create Fluid Segments- HW Supply of type “Primary Supply” and HW Return of type “primary Return”.
- ❖ Right-click on Fluid System Name (HW System) then select Create > Boiler
- ❖ A new dialog box opens – fill in the Boiler Name (Boiler 1) and then click OK.

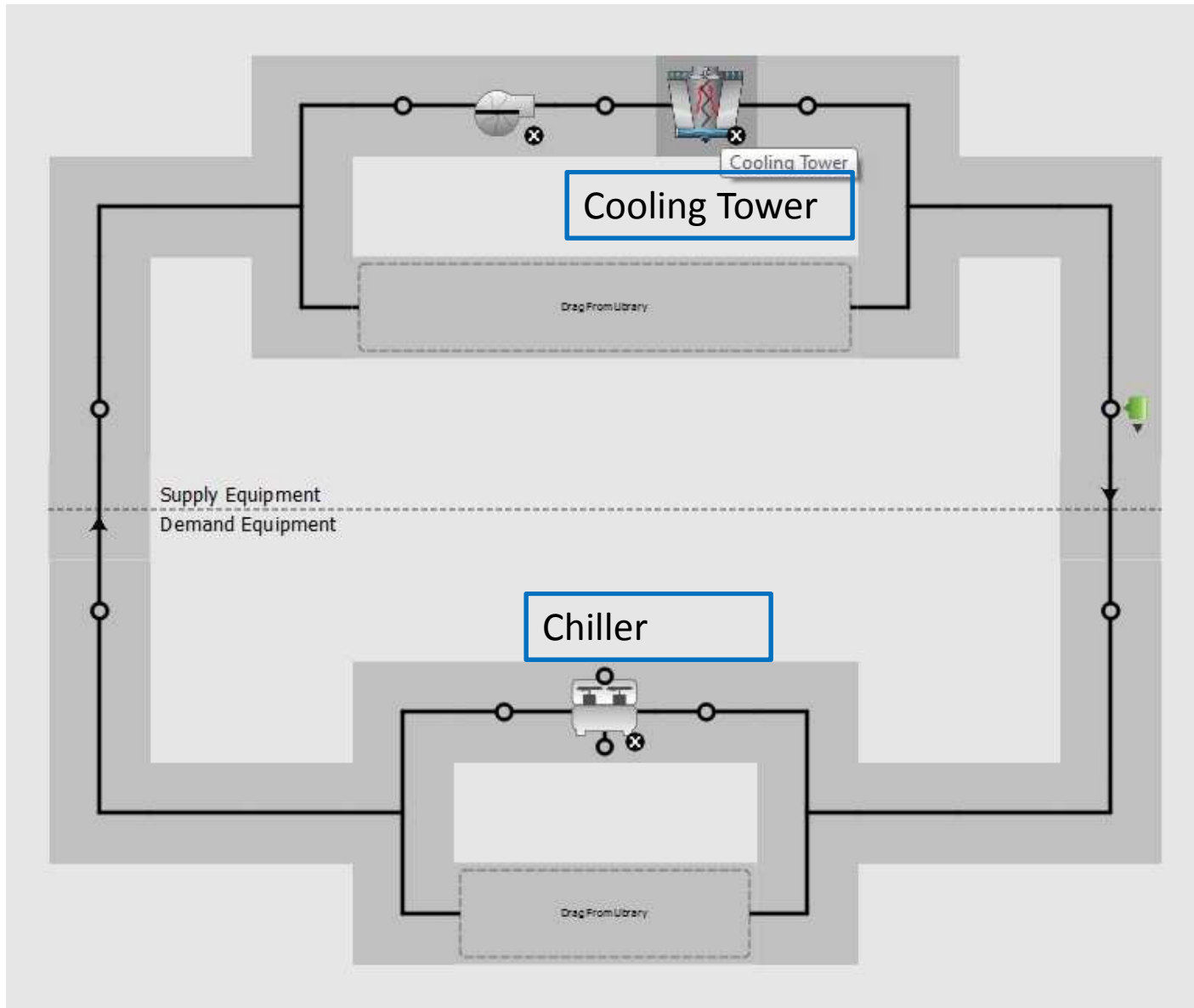
The screenshot shows the 'Building Model Data' dialog box with the 'Boiler Data' tab selected. The 'Currently Active Boiler' dropdown is set to 'Boiler 1'. The 'Name' field is 'Boiler 1', 'Type' is 'HotWater', 'Fuel' is 'Gas', and 'DraftType' is 'Condensing'. The 'Inlet FluidSeg' is 'HW Return' and 'Outlet FluidSeg' is 'HW Supply', both highlighted with a red box and a blue arrow pointing to a yellow callout box labeled 'Assign Fluid Segments'. The 'Status' is 'New', 'Des. Entering T.' is 140.0 °F, and 'Des. Leaving T.' is 180.0 °F. Other fields include 'Rtd. Capacity', 'UnlRatMin', 'Draft Fan HP', 'AFUE', 'Thermal Eff.', 'Combustion Eff.', and 'Fuel at Full Ld.'. The 'HasBypass?' checkbox is unchecked. The 'OK' button is at the bottom right.

Training Module 12: Create HotWater System

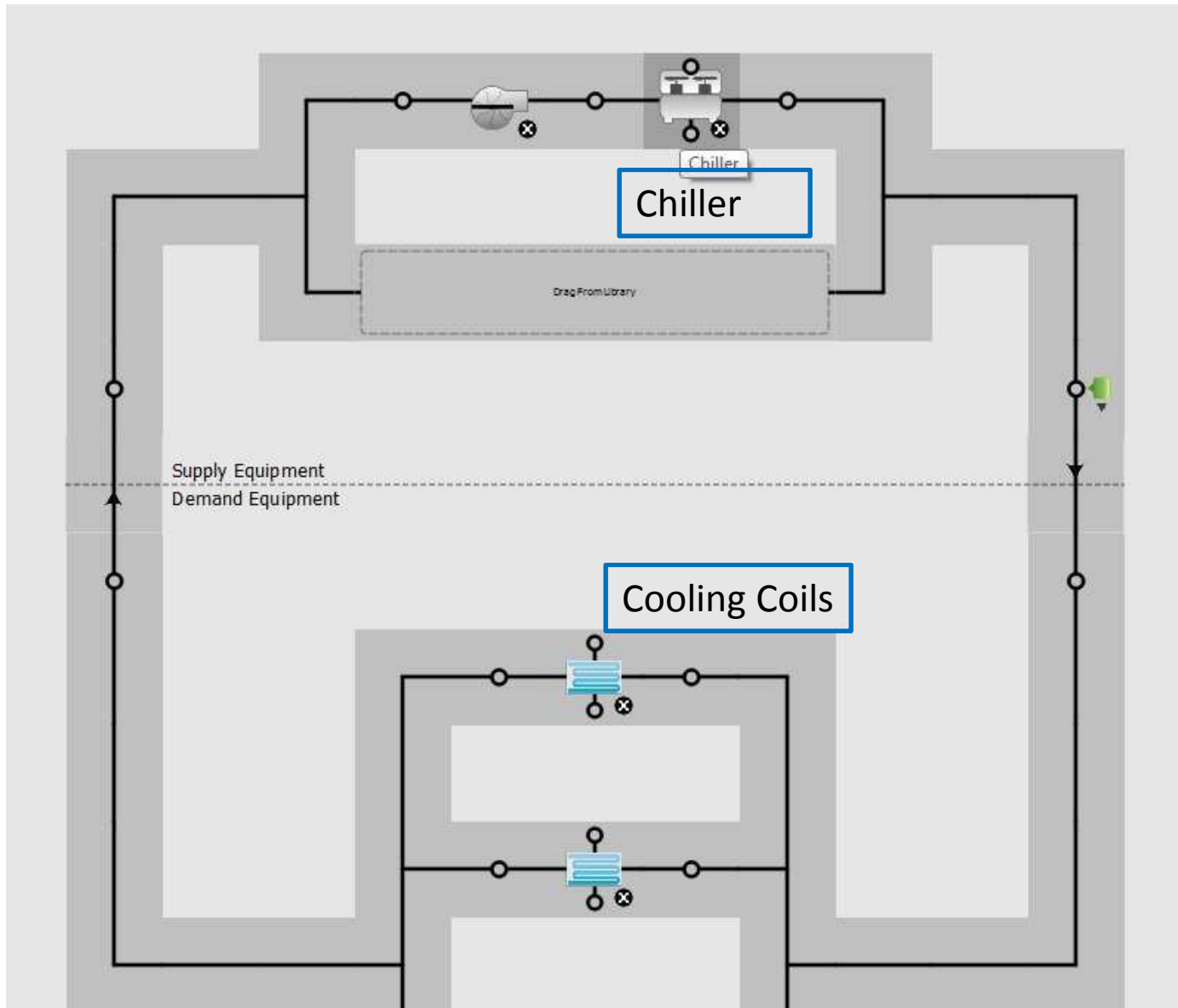
- ❖ Right-click on Boiler Name (Boiler) then select **Create > Pump**
- ❖ A new dialog box opens – fill in the Pump Name (Boiler Pump) and click OK.
- ❖ Below is a tree view of all elements of the Plant Systems.



Training Module 12- EnergyPlus Representation- Condenser Water Loop

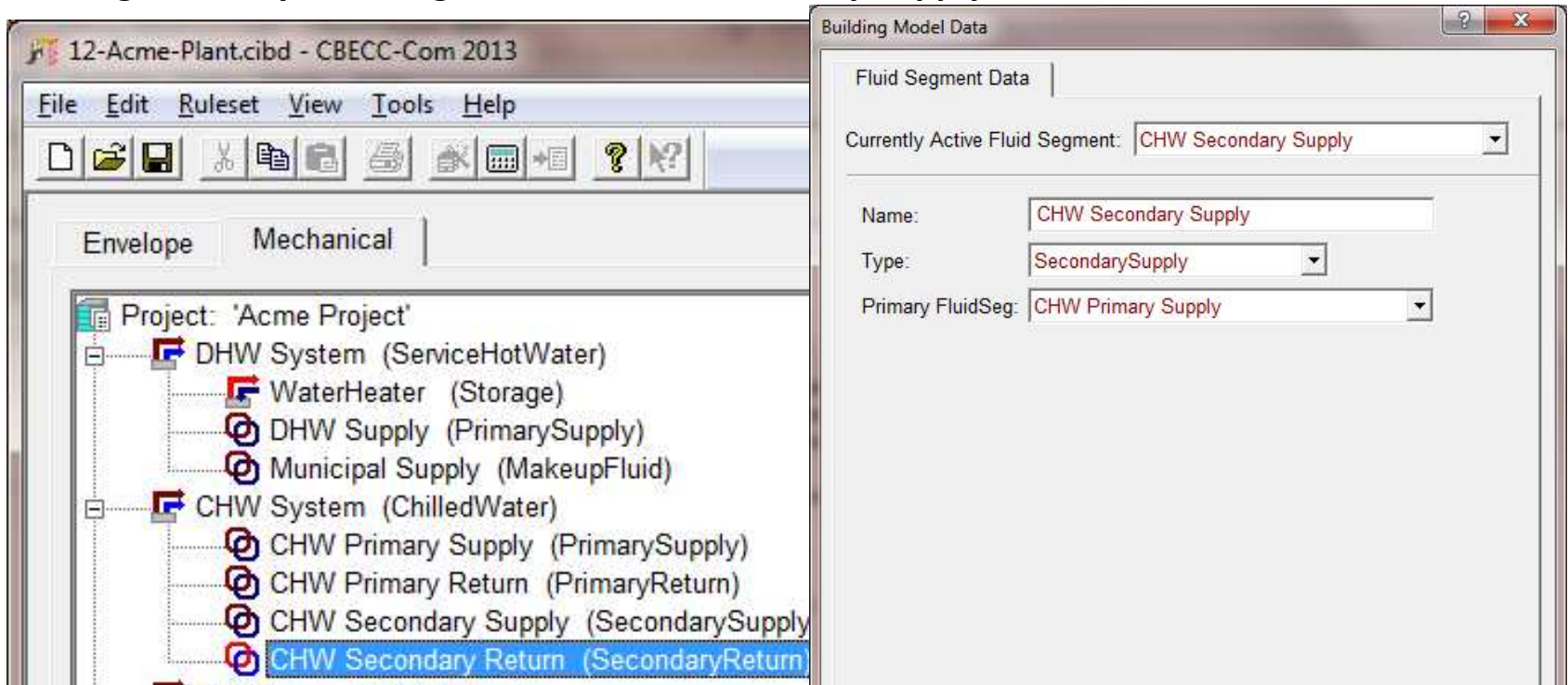


Training Module 12- EnergyPlus Representation- Chilled Water Loop



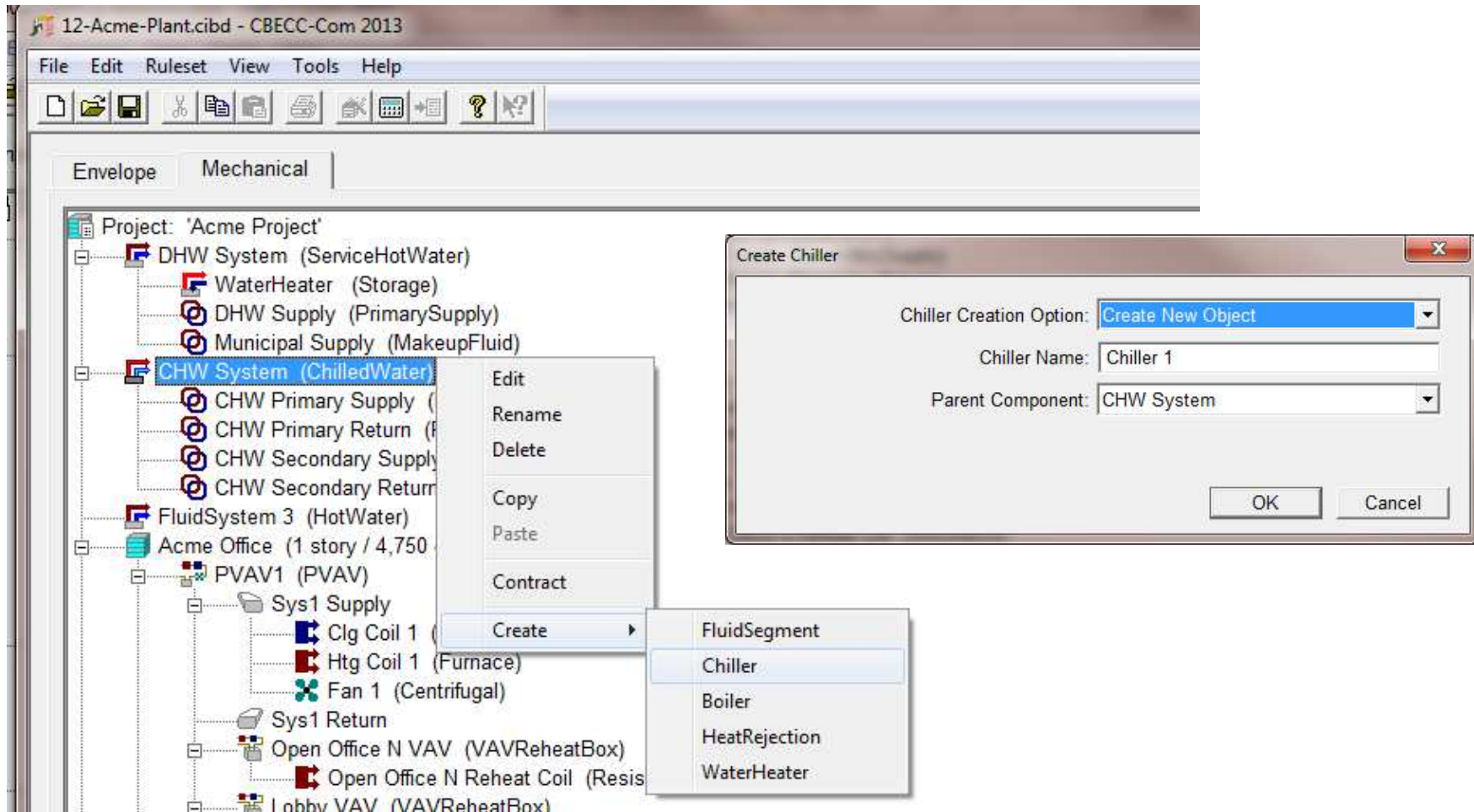
Training Module 12: Create Chilled Water System

- ❖ Create Fluid System as explained in Module 10. Name the Fluid System as CHW System and select type Chilled Water.
- ❖ Create Fluid Segment as explained in Module 10. Name the segment as CHW Primary Supply and select type “Primary Supply”. Fluid Segment data box will appear, click ok.
- ❖ Repeat above step and create CHW Primary Return, CHW Secondary Supply and CHW Secondary Return Segments.
- ❖ Assign Primary Fluid Segment for CHW Secondary Supply and Return



Training Module 12: Create Chiller

- ❖ Right-click on FluidSystem Name (CHW System) then select Create > Chiller
- ❖ A new dialog box opens – fill in the Chiller Name (Chiller1) and then click OK



Training Module 12: Create Chiller

- ❖ Assign Fluid Segments
- ❖ Typical view of the Chiller Data Screen

Building Model Data

Chiller Data

Currently Active Chiller: Chiller 1

Name: Chiller 1

Type: Centrifugal

Condenser Type: Fluid

Input Fuel: Electric

Rtd. Capacity: Btu/h

EntTemp -Dsgn: 64.0 °F -Rated: 54.0 °F

LvgTemp -Dsgn: 44.0 °F -Rated: 44.0 °F

kW/ton: 0.590 - IPLV: 0.400

Status: New

Evap. Inlet FluidSeg: CHW Primary Return

Evap. Outlet FluidSeg: CHW Primary Supply

Evap. Has Bypass?

Cond. Inlet FluidSeg: CW Supply

Cond. Outlet FluidSeg: CW Return

Min Unload Rat: 0.100 frac

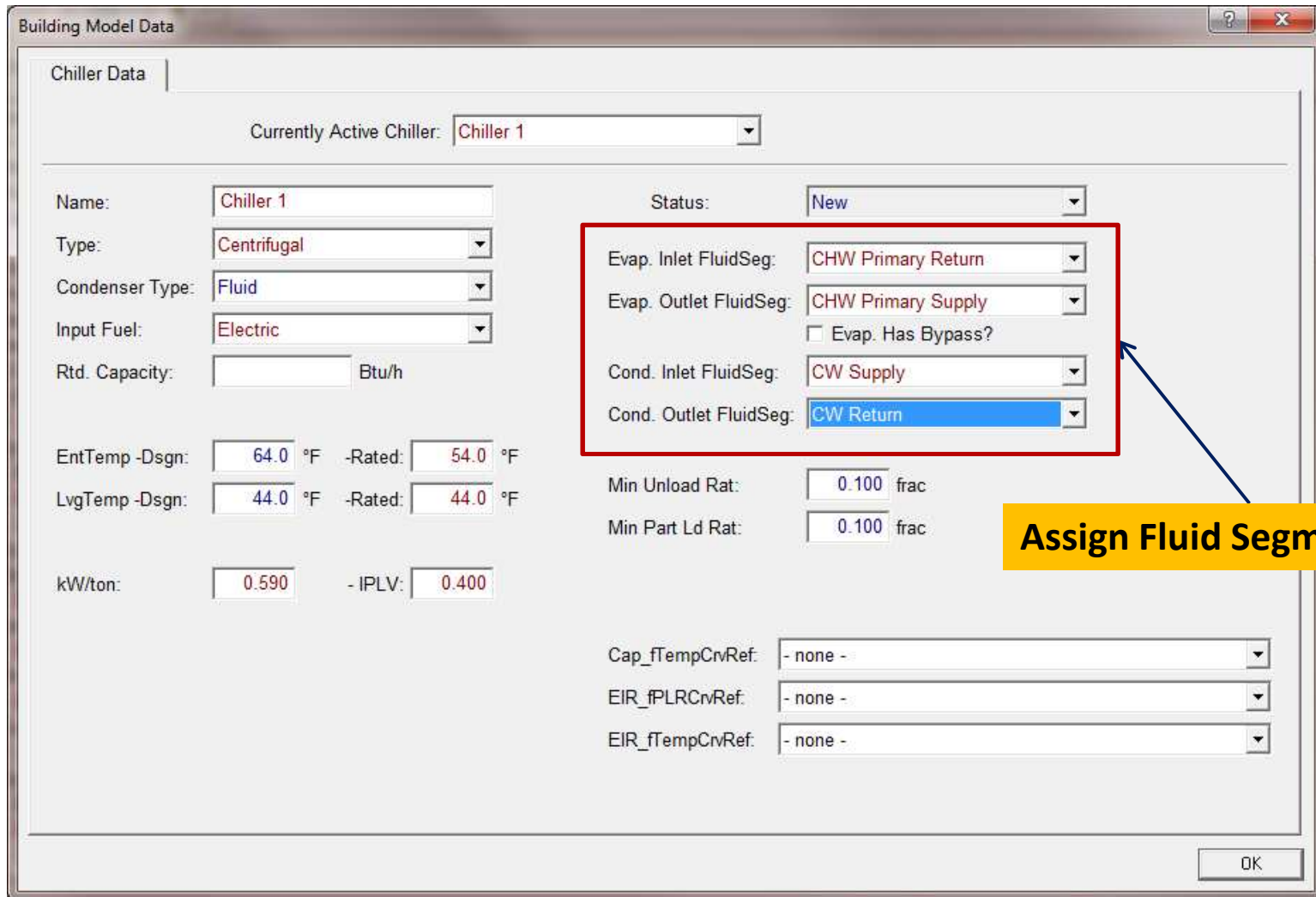
Min Part Ld Rat: 0.100 frac

Cap_fTempCrvRef: - none -

EIR_fPLRCrvRef: - none -

EIR_fTempCrvRef: - none -

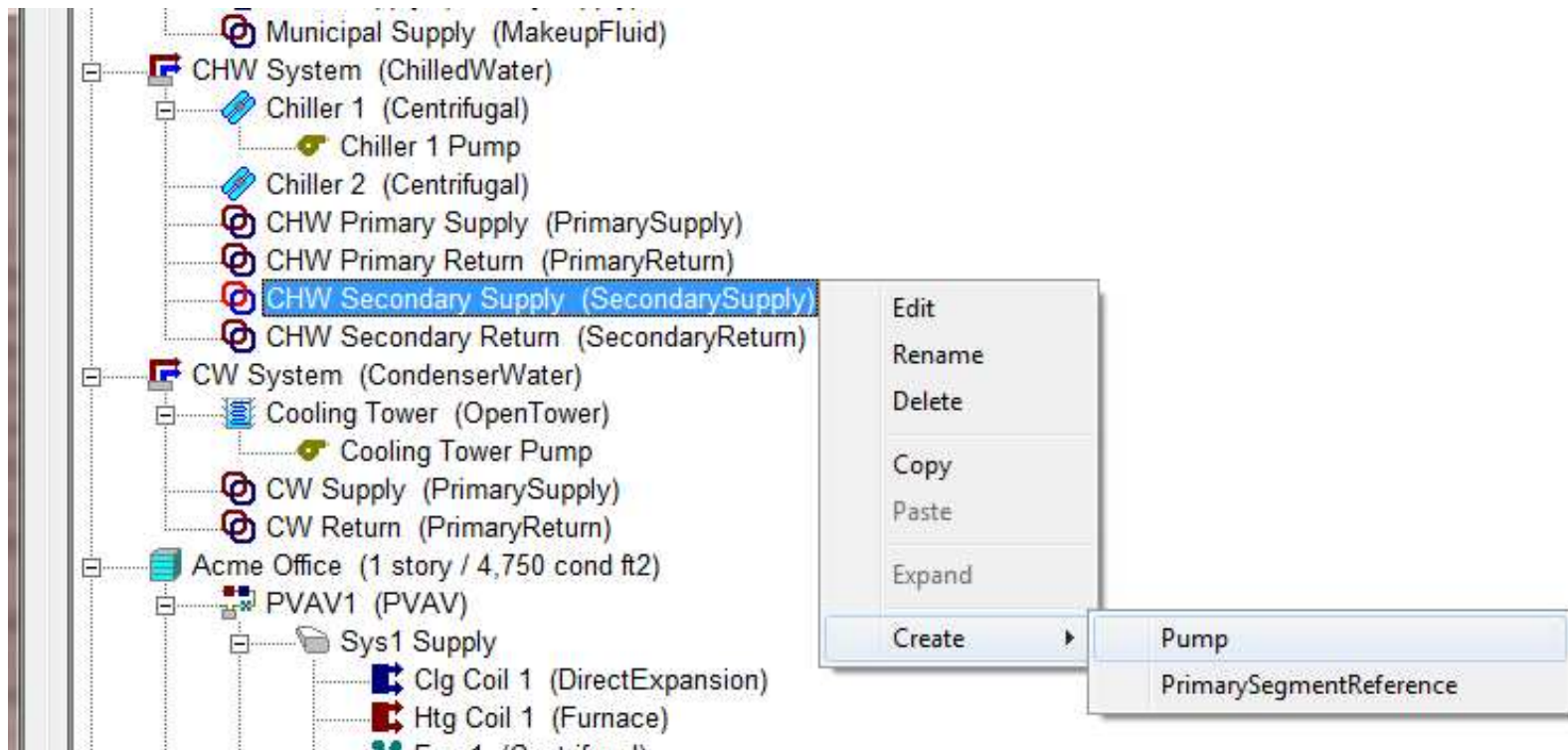
OK



Assign Fluid Segments

Training Module 12: Create Chiller Pumps

- ❖ Right-click on Chiller Name (Chiller 1) then select **Create > Pump**
- ❖ A new dialog box opens – fill in the Pump Name (Chiller1 Pump) and click OK.
- ❖ Create a Secondary Pump for the Chilled Water System by right-clicking on CHW Secondary Supply then select **Create > Pump**
- ❖ A new dialog box opens – fill in the Pump Name (Secondary Pump) and click OK.



Training Module 12: Create Chiller Pumps

- ❖ Select “Variable Speed” Speed Type for the Secondary Pump.

The screenshot shows a software window titled "Building Model Data" with a "Pump Data" tab. The "Currently Active Pump" dropdown is set to "Secondary Pump". The "Name" field contains "Secondary Pump". The "Operation" dropdown is set to "OnDemand" and the "Status" dropdown is set to "New". The "Speed Type" dropdown is set to "VariableSpeed". The "Design Flow Rate" and "Minimum Flow Rate" fields are empty, with units of "gpm". The "Motor Eff." field is 0.930, "Impeller Eff." is 0.700, "Pump Head" is 75.0 ft H2O, and "Nameplate Motor HP" is 40 hp. The "Power" field is empty with units of "kW", and "Power Per Flow (Ref)" is empty with units of "W/gpm". The "Pwr_fPLR Curve Name" dropdown is set to "- none -". An "OK" button is located at the bottom right of the dialog.

Field	Value	Unit
Currently Active Pump	Secondary Pump	
Name	Secondary Pump	
Operation	OnDemand	
Status	New	
Speed Type	VariableSpeed	
Design Flow Rate		gpm
Minimum Flow Rate		gpm
Motor Eff.	0.930	
Impeller Eff.	0.700	
Pump Head	75.0	ft H2O
Nameplate Motor HP	40	hp
Power		kW
Power Per Flow (Ref)		W/gpm
Pwr_fPLR Curve Name	- none -	

Training Module 12: Create Condenser Water System

- ❖ Create Fluid System as explained in Module 10. Name the Fluid System as CW System and select type Condenser Water.
- ❖ Create Fluid Segment as explained in Module 10. Name the segment as CW Supply and select type “Primary Supply”. Fluid Segment data box will appear, click ok. Repeat and create CW Return Fluid Segment of type “Primary Return”
- ❖ Right-click on FluidSystem Name (CW System) then select Create > HeatRejection
- ❖ A new dialog box opens – fill in the HeatRejection Name (Cooling Tower) and then click OK

Building Model Data

Heat Rejection Device Data

Currently Active Ht Rejection Device:

Name:

Type:

Rated Capacity: Btu/h

Number of Cells:

Tower Air Flow: cfm

Fan Type:

Total Fan HP: hp

Condenser water flow rate: gpm

Modulation Control:

Low Speed Air Flow Ratio:

Minimum Speed Ratio:

Status:

Inlet FluidSeg Name:

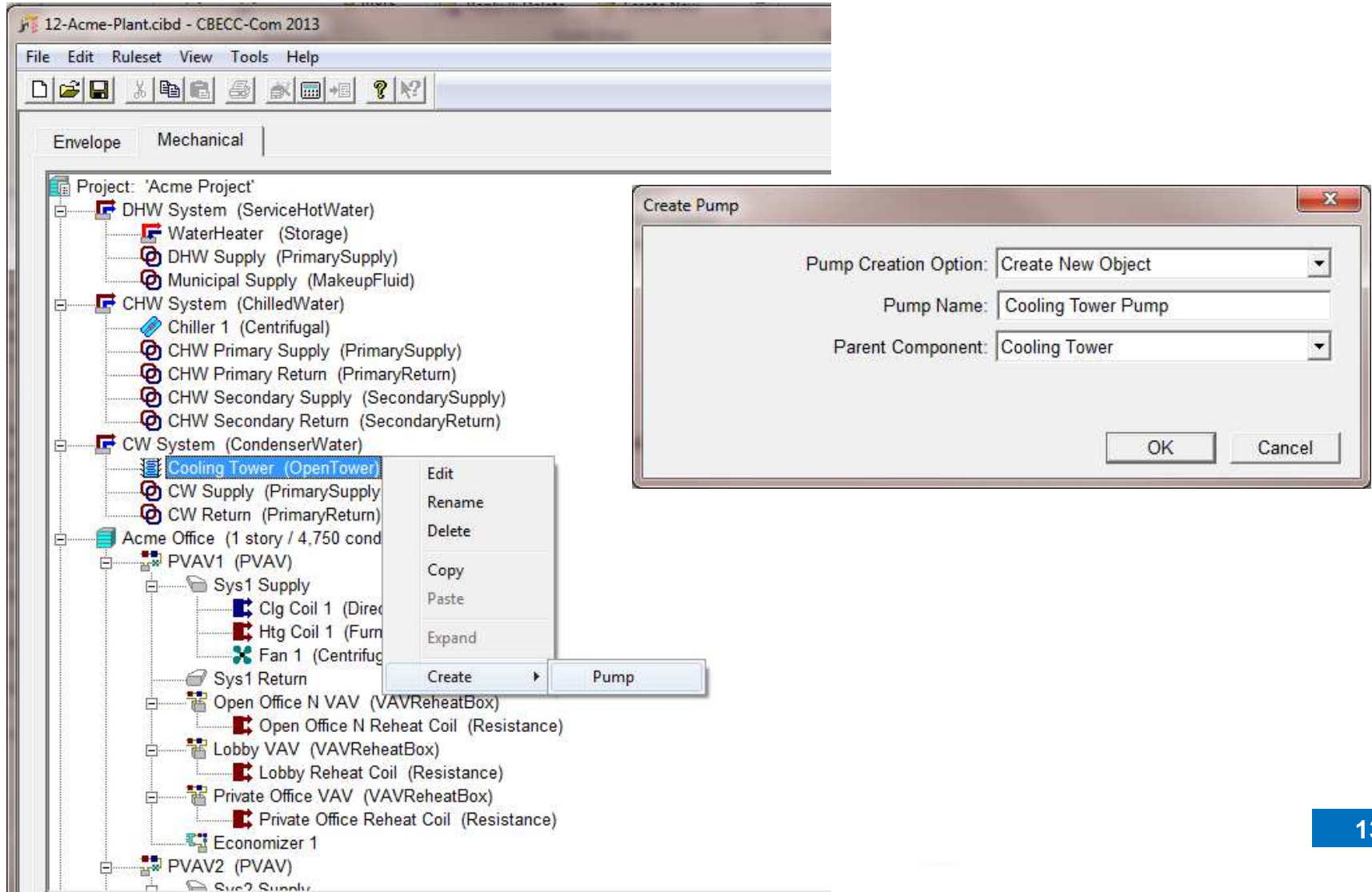
Outlet FluidSeg Name:

OK

Assign Fluid Segments

Training Module 12: Create Cooling Tower Pump

- ❖ Right-click on HeatRejection Name (Cooling Tower) then select **Create > Pump**
- ❖ A new dialog box opens – fill in the Pump Name (Cooling Tower Pump) and then click OK



Training Module 12: Create Cooling Tower Pump

❖ Typical view of Pump Data Screen.

Building Model Data

Pump Data

Currently Active Pump: Cooling Tower Pump

Name: Cooling Tower Pump

Operation: OnDemand Status: New

Speed Type: ConstantSpeed

Design Flow Rate: [] gpm Minimum Flow Rate: [] gpm

Motor Eff: 0.940

Impeller Eff: 0.700

Pump Head: 60.0 ft H2O

Nameplate Motor HP: 75.0 hp

Power: [] kW

Power Per Flow (Ref): [] W/gpm

Pwr_fPLR Curve Name: - none -

OK

Training Module 12: Mechanical Schedule

COOLING TOWER SCHEDULE

Rated Capacity (Btuh)	Tower Air Flow (cfm)	Total fan hp	Condenser Water Flow (gpm)
202,842	2,812	0.70	41

CHILLER SCHEDULE

Type	Rated Capacity (Btuh)	kW/ton	IPLV
Centrifugal	170,100	0.590	0.40

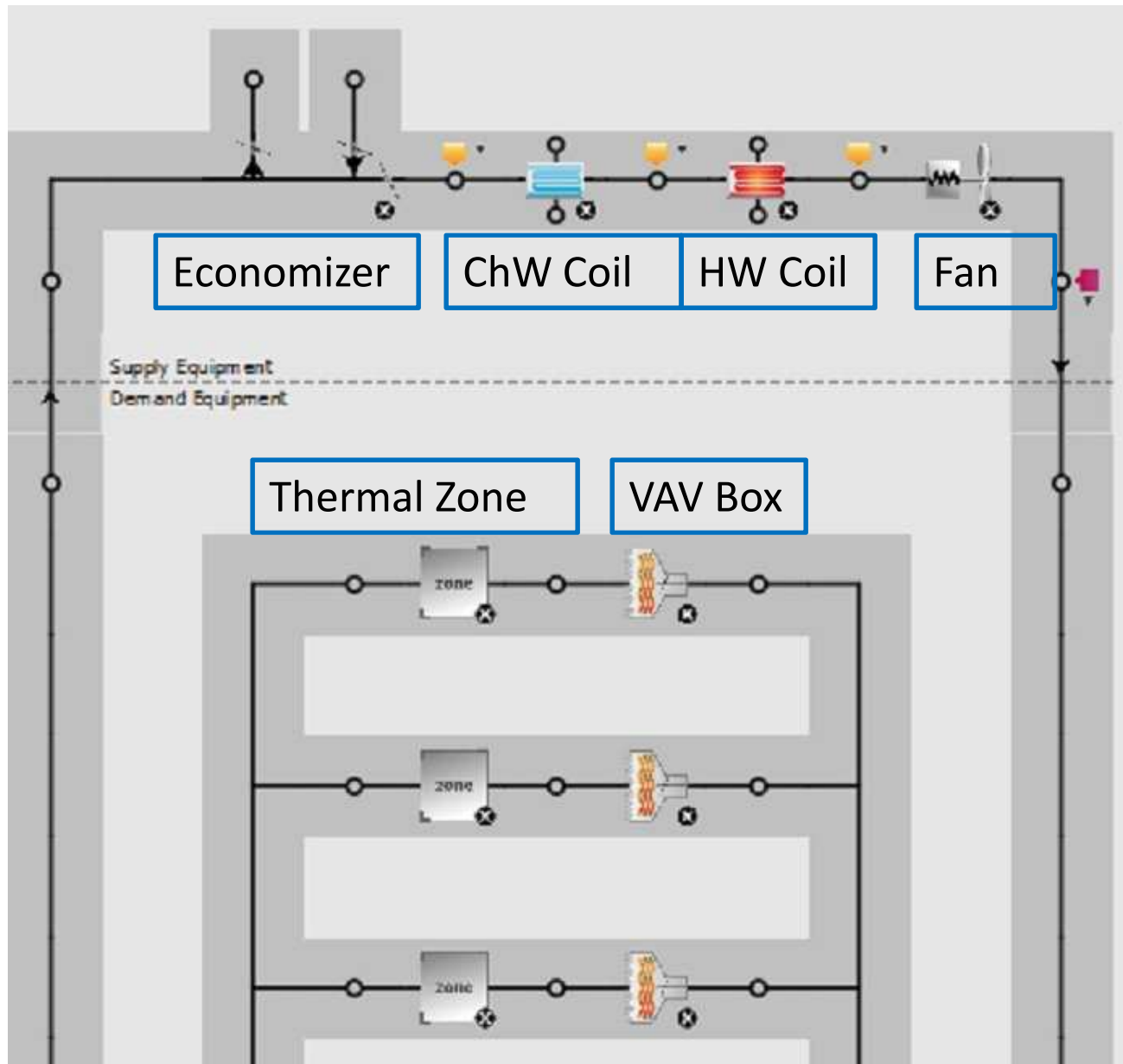
BOILER SCHEDULE

Type	Rated Capacity (Btuh)	Thermal Eff
Condensing	67,000	0.822

PUMP SCHEDULE

Name	Design Flow Rate (gpm)	Motor Eff	Impeller Eff	Pump Head (ft H2O)	Motor HP
Chiller 1 Pump	17.0	0.855	0.70	40.4	0.3
ChW Secondary Pump	17.0, (5.1-min flow)	0.855	0.70	75	0.5
Cooling Tower Pump	41	0.855	0.7	45	0.8
Boiler Pump	3.3	0.855	0.70	60.4	0.1

Training Module 12: Create VAV System



Training Module 12: Create VAV System

- ❖ Create Air System – see Module 7 for details.
- ❖ Name as VAV 1 and select type VAV

Building Model Data

Air System Data

Currently Active Air System: **VAV1**

Name: **VAV1** Availability Schedule: **- none -**

Type: **VAV** Status: **New** Night Cycle Control: **CycleOnCallAnyZone**

Sub Type: **- specify -** Count: **1** Ventilation Control: **AverageFlow** Design OA Flow: **424** cfm

Control Zone: **VAV** Control Type: **DDCToZone**

Description: **SZAC** Reheat Control: **DualMaximum**

Design Supply Exhaust: **55.0** °F Heating: **60.0** °F Supply Flow: **3,000** cfm

Net Capacity*: **87,000** Btu/h Heating: **89,680** Btu/h Design Flow/Area: **1.000** cfm/ft2

Design Flow/Ton: **400.0** cfm/ton

* Reflects capacity of a single system if Count is >1

Fan Position: **DrawThrough**

Supply Temp Control: **WarmestResetFlowFirst**

Fixed Supply Temp: °F

Setpoint Temp Sch: **- none -**

Reset Supply High: **62.0** °F @ Outdoor Temp: °F

Reset Supply Low: **55.0** °F @ Outdoor Temp: °F

OK

Training Module 12: Create VAV System

- ❖ Create Air Segment, Cooling Coil and Heating Coil – see Module 7 for details.
- ❖ Select “Chilled Water” as Cooling Coil Type .
- ❖ Assign Fluid Segments

Building Model Data

Cooling Coil Data | Performance Curves

Currently Active Cooling Coil: Clg Coil 1

Name: Clg Coil 1

Type: ChilledWater

Status: New Component Qty: 1

SEER: Input Code Minimum

EER: 11.5

Inlet FluidSeg: CHW Secondary Supply

Outlet FluidSeg: CHW Secondary Return

Capacity (For single system/terminal if Component Qty > 1)

Rated Gross Capacity: 87,000 Btu/h

Design Flow Rate: 8.7 gpm

Assign Fluid Segments

OK

Training Module 12: Create VAV System

- ❖ Select “Hot Water” as Heating Coil Type .
- ❖ Assign Fluid Segments
- ❖ Create Fan and Economizer- See Module 7 for details.

The screenshot shows the 'Building Model Data' dialog box with the 'Heating Coil Data' tab selected. The 'Currently Active Heating Coil' is 'Htg Coil 1'. The 'Name' is 'Htg Coil 1', 'Type' is 'HotWater', 'Status' is 'New', and 'Component Qty' is '1'. The 'Inlet FluidSeg' is 'HW Supply' and the 'Outlet FluidSeg' is 'HW Return'. A red box highlights these two fields, with a blue arrow pointing to a yellow box labeled 'Assign Fluid Segments'. Below these fields are 'Capacity (For single system/terminal if Component Qty > 1)', 'Rated Gross Capacity: 40,000 Btu/h', and 'Design Flow Rate: 2.0 gpm'. An 'OK' button is at the bottom right.