## Condenser Water Temperature Reset

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### Description

This energy efficiency measure (EEM) lowers the condenser loop set point temperature to take advantage of free cooling when the outdoor air wet bulb temperature is low enough. By providing cooler temperature condenser water (when available), the compressor is able to operate more efficiently, using less energy to provide the same amount of cooling to the building.

### Modeler Description

This EEM adds EMS logic to the model that actuates the condenser loop setpoint manager. The added logic first checks the outdoor air wet-bulb temperature (OAWBT). If 14.3 °C ≤ OAWBT ≤ 22.7 °C then the condenser loop setpoint temperature is set to OAWBT + 4 °C. If the OAWBT > 22.7 °C, the condenser loop setpoint temperature is set to 26.7 °C. If the OAWBT < 14.3 °C, the condenser loop setpoint temperature is set to 18.3 °C.

### Use Case Types

Retrofit, New Construction

### Arguments

“run\_measure” is a choice argument that determines whether or not the Measure is applied during a given run.

### Initial Condition Message

The initial model contained a condenser loop; this measure is applicable.

### Final Condition Message

OA condenser temperature reset was applied to one condenser loop. The affected condenser loop was named {CondenserLoop Name}. The affected schedule was named {Schedule Name}

### Not Applicable Messages

* No CondenserLoop objects found. EEM not applied.
* EMS control logic modifying the condenser loop setpoint temperature already exists in the model. EEM not applied.
* The SetpointManager object uses a schedule type other than Schedule:Year, Schedule:Compact, Schedule:File, or Schedule:Constant. Due to EMS constraints, this EEM will not be applied.

### Warning Messages

Warn if no applicable plantloops were found.

### Information Messages

### Error Messages

### Code Outline

Modeling strategy taken from “Energy Savings Modeling of Standard Commercial Building Retuning Measures: Large Office Buildings” (1).

Look for a CondenserLoop object and store the Condenser Loop Temperature Setpoint Node Name. Search for a SetpointManager:Schedule object that uses that same node name in the Setpoint Node or NodeList Name field. If an eligible SetpointManager:Schedule object is found (there should be only 1; throw an error if more than 1 is returned), grab the Schedule Name input. Find that schedule, and if it is of type Schedule:Year, Schedule:Compact, Schedule:File, or Schedule:Constant insert the following EMS code:

### EnergyManagementSystem:Sensor,

### T\_WB\_OA, !- Name

### , !- Output:Variable or Output:Meter Index Key Name

### Site Outdoor Air WetBulb Temperature; !- Output:Variable or Output:Meter Name

### EnergyManagementSystem:Actuator,

### Tower\_TempSP\_Actuator, !- Name

### {SetpointManager Setpoint Schedule Name}, !- Actuated Component Unique Name

### {Schedule Type}, !- Actuated Component Type

### Schedule Value; !- Actuated Component Control Type

### EnergyManagementSystem:ProgramCallingManager,

### Tower\_TempReset\_Manager, !- Name

### AfterPredictorAfterHVACManagers, !- EnergyPlus Model Calling Point

### Tower\_TempReset; !- Program Name 1

### EnergyManagementSystem:Program,

### Tower\_TempReset, !- Name

### IF (T\_WB\_OA + 4) >= 18.3, !- Program Line 1

### IF (T\_WB\_OA + 4) <= 26.7, !- Program Line 2

### SET Tower\_TempSP\_Actuator = T\_WB\_OA + 4, !- A4

### ELSE, !- A5

### SET Tower\_TempSP\_Actuator = 26.7,

### ENDIF, !- A7

### ELSE, !- A8

### SET Tower\_TempSP\_Actuator = 18.3, !- A9

### ENDIF; !- A10

### Tests

**This measure applies to:**

1. Large Office
2. Hospital

**This measure does not apply to:**

1. Small Office
2. Medium Office
3. Primary School
4. Secondary School
5. Stand-Alone Retail
6. Strip Mall
7. Supermarket
8. Quick Service Restaurant
9. Full Service Restaurant
10. Small Hotel
11. Large Hotel
12. Outpatient Healthcare
13. Warehouse
14. Midrise Apartment

**Test results:**

### References

1. Energy Savings Modeling of Standard Commercial Building Re-tuning Measures: Large Office Buildings, PNNL 2012, Fernandez, Katipamula, Wang, Huang, Liu



