## Supply Air Temperature Reset Based On Outdoor Air Temperature

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### Description

Some buildings use a constant supply-air (also referred to discharge-air) temperature set point of 55°F. When a building's supply fan system is operational, the supply-air temperature set point value should be automatically adjusting to internal/external conditions that will allow the supply fan to operate more efficiently. The simplest way to implement this strategy is to raise supply-air temperature when the outdoor air is cold and the building is less likely to need cooling. Supplying this warmer air to the terminals decreases the amount of reheat necessary at the terminal, saving heating energy.

### Modeler Description

For each multi-zone system in the model, replace the scheduled supply-air temperature setpoint manager with an outdoor air reset setpoint manager. When the outdoor temperature is above 75°F, supply-air temperature is 55°F. When the outdoor temperature is below 45°F, increase the supply-air temperature setpoint to 60°F. When the outdoor temperature is between 45°F and 75°F, vary the supply-air temperature between 55°F and 60°F.

### Use Case Types

Retrofit, New Construction

### Arguments

No arguments

### Initial Condition Message

The initial model contained XX multi-zone systems which had constant supply-air temperature setpoints.

### Final Condition Message

The following systems had outdoor-air temperature based supply-air temperature reset applied: #{sys\_1}, #{sys\_2}...

### Not Applicable Messages

Not applicable if no multi-zone VAV systems with constant supply-air temperature were found.

### Warning Messages

### Information Messages

### Error Messages

### Code Outline

* Check each AirLoopHVAC to determine whether it is a multi-zone system or not.
  + Count the number of thermal zones and make sure > 1

If the system is a multi-zone system:

* Check if it has OAT-based reset already

If the multi-zone system doesn’t have OAT-based reset already:

* Replace the setpoint manager with a SetpointManager:OutdoorAirReset with the following settings:

low\_oat = 45°F

high\_oat = 75°F

sa\_temp\_at\_low\_oat = 60°F

sat\_temp\_at\_high\_oat = 55°F

### Tests

**This measure applies to:**

1. Large Office
2. Medium Office
3. Primary School
4. Secondary School
5. Large Hotel
6. Hospital

**This measure does not apply to:**

1. Small Office
2. Stand-Alone Retail
3. Strip Mall
4. Supermarket
5. Quick Service Restaurant
6. Full Service Restaurant
7. Small Hotel
8. Outpatient Healthcare
9. Warehouse
10. 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