## Absorption Heat Pump

### Description

Unlike a standard heat pump with an electric compressor, absorption heat pumps utilize thermal energy to drive a heat-pump cycle where a refrigerant is cyclically absorbed and desorbed from a secondary fluid. Absorption heat pumps can be designed as heating-only, cooling-only, or reversible (both heating and cooling) although cooling efficiencies are typically less than those for vapor-compression systems. Depending on the configuration of the heat pump, thermal energy that drives the absorption cycle can be supplied by a gas-fired burner, process steam, solar thermal collector, or waste-heat stream.

### Modeler Description

This assumes that each heating coil is replaced by an absorption heat pump. Cooling coils are ignored, since typical efficiencies are lower than traditional vapor compression technologies. Find every natural gas heating coil in the model and increase the nominal efficiency from the current value, typically about 80%, to 110%. Current products cannot achieve these levels of performance in coils this small, but this modeling is for potential analysis and can be updated as the technology changes

### Use Case Types

Retrofit, New Construction

### Arguments

No arguments

### Initial Condition Message

The initial model contained X natural gas heating coils.

### Final Condition Message

The efficiency of the following systems was increased to 110%: #{sys\_1}, #{sys\_2}...

### Not Applicable Messages

Not applicable if no DX cooling or heating coils 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. <http://energy.gov/sites/prod/files/2014/03/f12/Non-Vapor%20Compression%20HVAC%20Report.pdf>