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November 9, 2009 ~ Monday Morning Minutes:

Boiler Outdoor Reset and its Affect on Condensing Boiler Efficiencies (part 1) By Brad Notter with edit by Norm Hall

Last week we concluded the discussion about the value of turndown ratios in condensing boiler applications. Today we will begin with outdoor reset which also has a positive effect on efficiency.

The design conditions of a boiler system are, in large part, based on outdoor weather condition. The outdoor design point can range from -12 degrees F in the Upper Peninsula of Michigan to +2 for Findlay Ohio. The heat loss of your building is the greatest when the outdoor temp is at your areas outdoor design temperature. Your boiler plant is usually designed to deliver the maximum temperature, example 180 degrees, at this condition.

Terminal units such as AHU coils, Fan Coils, and finned tube radiation are selected to provide the design heat load given the design supply temperature at a selected ΔT. Your building will stay warm when the heat loss of the building is equal to or less than the heat output of your terminal devices. Sizing the heating plant for the outdoor design condition will keep your building warm for those few coldest days: the rest of the year less load is needed. In effect, the rest of the year the boiler plant and terminal unit potential are oversized since you need less heat (BTUs) to stay warm. If the terminal devices in your system are supplied with a lower supply temperature, giving a lower average temperature, they will put out lower BTUs.

This lowering of the heating supply water as the outdoor temperature increases is called Outdoor Reset. This is one method of matching the heat generated to the heat loss of the building. The rate at which you lower the boiler supply temp as the outdoor temp increases is called the Reset Ratio. For example if you lower the boiler supply temp 1 degree for every 1 degree rise of outdoor temperature would be a 1:1 ratio. If you had an outdoor design temperature of 0 degrees and had a 1:1 reset ratio, you would only need 150 degree supply water at 30 degrees outdoor temperature.

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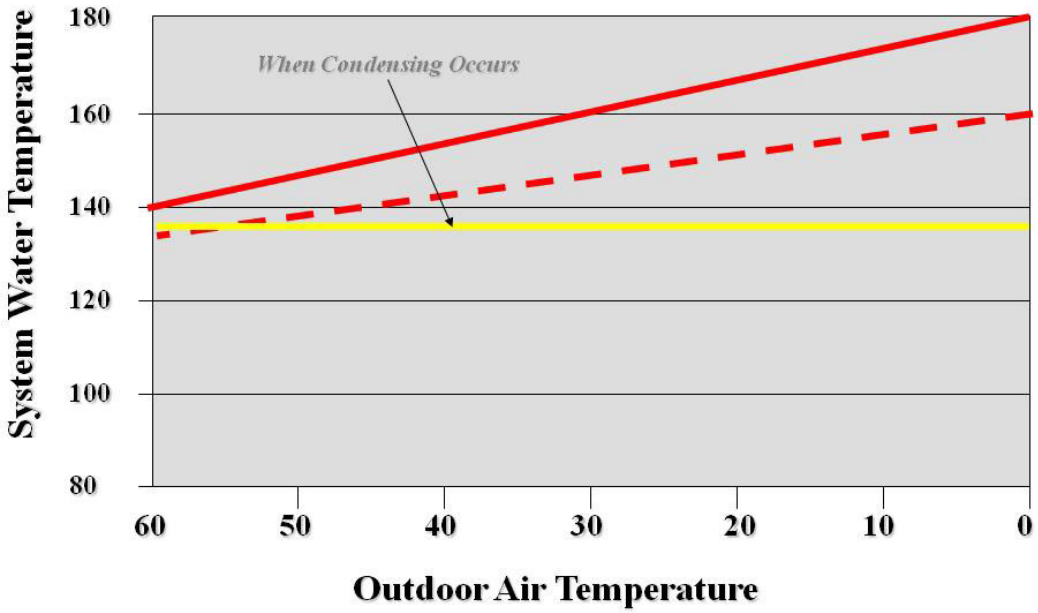
Example Reset schedule



Using outdoor reset in your building allows the heat generated to equal the heat loss, and operating your boiler at a lower temperature will save you money $$$. The challenge is to make sure the boiler can handle the lower return temperatures and this is the topic of next week's discussion.