



EMERGING TECHNOLOGIES SHOWCASE WEBINAR: SMART RESIDENTIAL THERMOSTATS

Reid Hart, PNNL

Peter Criscione, E Source

January 23, 2013

Question and Answer session

Q: Are there controllers that have a "learning" function allowing them to adjust settings based on a building's patterns and energy savings?

A: I am not aware of any products doing that now. It would be great though, instead of a programmable thermostat, to have a controller with an occupancy sensor that would detect when people are around and then self-program over time. There has been some talk about this for the future.

Q: How do (or how well) do these controls integrate with building EMS?

A: The integrated controllers we were looking at – KMC, Innotech, Reliable, Alerton and others like it – are set up as network controllers. They can be connected with a gateway. Those controllers could then be an extension of an existing or new DDC system for one or multiple buildings. Honeywell is working on an interface box for the Jade Economizer that would allow the Jade controller to be queried or controlled by the DDC system. There are other web thermostats that potentially have that capability through a gateway. For instance, Catalyst has a separate DDC upgrade that can be put in that allows you to remotely look at and change setpoints on all the individual units. Catalyst controllers can be installed stand alone or as a DDC system with the upgrade.

The Catalyst, Enerfit and Digi-RTU all have the capability to tap into an existing building automation system, using either a BACnet or Modbus interface, although it's not yet clear how well they work together. In addition, Catalyst's top of the line software package can function as a building automation system on its own, with the capacity to control loads other than just the HVAC system.

Q: For 5-tons or less, does the second group of products have a reasonable payback?

A: The payback is right on the line and depends on actual loading of the building and use, not so much on the system size. Smaller units aren't drawing as much energy so the savings potential is smaller. Around 5 tons is more or less the line between a reasonable payback or not. With the really small units, the price will need to go down from about \$2000 installed cost (unit and interface) to \$1000 installed cost. For example, you can put in the KMC for about \$2000. Smaller than that, you may go with a Jade economizer upgrade, although installing that with a good programmable thermostat can cost around \$2200 as well. The cost is higher when using a variable speed drive. The price will most likely go down as technology advances. And the web-based thermostats are lower. The key will be if the product cost gets down low enough. We're still at the emerging stage as these technologies come onto the market,

and prices are expected to drop from where they are now, but it's ultimately hard to predict how much they'll decrease. That may be the key determinant on if we can apply them to the below 5 ton market.

Q: Have you seen the Belimo ZIP Economizer?

A: It appears to be similar to the Jade although it has a little bit more fault detection capability. It's just now being made available on the market. It's another example of doing a digital economizer, but we're not aware of the price point.

We're not aware of any packaged products that combine single zone VAV with controls for DCV and advanced economizer operation other than the ones discussed during this webinar. However, there are probably digital controllers other than the four mentioned in this presentation that could work for implementing variations of the premium ventilation package. It's just a matter of someone developing the algorithms to do the package or not. Most digital controllers can control a separate VSD.

Q: We can't assume a device (i.e. VFD or advanced thermostat) installed will be set up or programmed to obtain the EE expected. We need to figure out ways to assure they are. Manufacturers, Installers and EE Program all have a stake in this so owner/operators understand the implications. Do you agree?

A: Yes, we definitely agree. Nothing can be taken for granted. We've learned over the last decade that rooftop units are often not taken care of correctly or are just ignored. Even when intentions are good and a maintenance program exists, that doesn't necessarily mean that it's being implemented properly. Units that we thought were operating very well are not. One promise from some of the controllers that have built-in monitoring and fault detection and diagnostics capability is that they can help ensure that maintenance is done properly, and to some degree, that the controllers were installed correctly. The fact that you're getting data back allows you to compare the performance of the as-is system, including the controller, to what's expected – but you still need a human to be looking at the data and alarms. These features allow us to check on the health of the system, to track things over time and adjust things if they get out of whack.

Q: Does E Source have a tech paper on the controllers for the smaller units that are less than 10T?

A: E Source doesn't have any reports that cover the premium ventilation package, though we do have one on the advanced economizer controls – this and other resources for the premium ventilation and single zone VAV controllers are listed on the Resources and References slides in the presentation. There is also a study that's available at the BPA site that some of the results in the presentation were based on – http://www.bpa.gov/energy/n/emerging_technology/PremVent.cfm. It includes information about the units in the presentation and different configurations, and one of the appendices shows the full sequence of operations that can be applied to other units. The paper also discusses the acceptance testing and describes a process that was developed that can be applied in about 30-45 minutes on the roof to make sure that RTUs are set up and operating properly with good documentation for utility programs.

Other comments

BPA has an emerging technology field test underway with pre-defined savings. They are not including the Digi-RTU or the Enerfit because they're not available in the PNW. Otherwise, if you have a rooftop unit that you'd like to try this out on, contact Mira Vowles or visit the Field Test webpage at http://www.bpa.gov/energy/n/emerging_technology/RTUFieldTest.cfm.

Comment from attendee: Digi-RTU is available in the Pacific NW.