DOCKETED	
Docket Number:	20-RENEW-01
Project Title:	School Energy Efficiency Stimulus Program
TN #:	236641
Document Title:	Eubanks Engineering Research Comments - Comments on HVAC assessment guidelines, from an HVAC engineer
Description:	N/A
Filer:	System
Organization:	Eubanks Engineering Research
Submitter Role:	Public
Submission Date:	2/4/2021 4:55:21 PM
Docketed Date:	2/4/2021

Comment Received From: Eubanks Engineering Research
Submitted On: 2/4/2021
Docket Number: 20-RENEW-01

Comments on HVAC assessment guidelines, from an HVAC engineer

see attached

Additional submitted attachment is included below.

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By Brent Eubanks, PE of Eubanks Engineering Research. I am a licensed HVAC engineer with 20 years of experience in designing and commissioning HVAC systems in new and existing buildings. The following are my comments upon reviewing the draft guidelines. Contact me at greenengineer@lorax.org.

- Assessment and Maintenance should include checking the equipment schedule. Whether it's BAS, timeclock, or a human operator, it should be verified that the operating hours of the HVAC system match the occupancy hours of the building. Fixing scheduling errors is always the most cost effective and impactful energy efficiency measure.
- Filtration is a very high priority, so it is important to precisely define " without adversely impacting equipment". I believe that, for any system currently at MERV 9 or less, better filters should be required if it can be done with minor modifications to existing equipment (e.g. a new filter rack), or a new motor. If the AHU would actually have to be replaced entirely (e.g. a new fan wheel) to support the better filters, then that should go in the assessment report. Such replacements should be prioritized.
- The State should consider providing guidelines about what are appropriate clean-filter and dirty-filter pressure drops. Not all filters are created equal, and many of them have higher-than-necessary pressure drop, which wastes energy.
- The filter assessment should also verify that the filter frames and seals are in good condition, and that filter bypass is no more than what is typically expected. Good filters + bad seals = bad air. The TAB contractor (who does the ventilation testing) could do this.
- The callout for economizer damper and economizer operation is good. Economizers are critical energy saving equipment, and are often neglected and nonfunctional.
- The guidelines state what to do if original design documentation is not available. Speaking from experience, program managers should expect that this documentation <u>will not</u> be available for the majority of buildings more than 10 years old.
- Paragraph (3)(a)(1) needs to clarify what is means to disable the DCV system. Specifically, if tthe DCV controls are to be disabled, outdoor air control should be set to the *design outdoor airflow*. Without that specificity, they could disable the DCV and set the minimum outside air, which would be worse than doing nothing.
- The coil inspection should include checking for coil valve leak-by. The test is to look for temperature rise across the coil when the plant is active but the coil valve is supposed to be shut. This can be a huge energy savings, and is relatively easy to fix if found.
- When reviewing the control system (for campuses with BAS), look for simultaneous heating and cooling (both valves activated at the same time in the same AHU). That's another big energy waster that's easy to overlook, but easy to fix if found.
- The reliability and accuracy of CO2 sensors depends greatly on the manufacturer. In my experience, many sensors are inaccurate or mis calibrated out of the box. Thus any work which would install new CO2 sensors should include a verification/commissioning component, to ensure that the sensors providing reasonable outputs. High accuracy is not required, but bad sensors should be identified and fixed. High readings (over 1000 PPM) in a room that has been unoccupied for hours, or readings below 400PPM (ambient) at any time, indicate a faulty sensor that needs to be recalibrated or replaced.