

Case Study

A Revised Control Strategy to Reduce CO₂ in an Under-Ventilated Classroom

The Problem

AEI reviewed classroom ventilation for a New England school when classes resumed in the fall of 2015. Most classrooms in the school maintained CO₂ levels below the 1000ppm setpoint, but one classroom recorded levels above 1500ppm two to three times per week. Even though this level is not considered a direct health risk, it does indicate the classroom may be under-

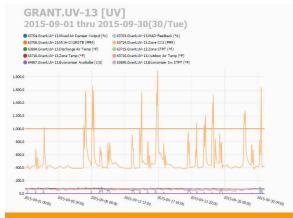


ventilated. The CO_2 levels in this classroom were frequently higher than the classroom setpoint of 1000ppm and outside the 1000 to 1200 ppm range most facilities try to attain. Even though increasing the ventilation rate would result in increased costs to condition the air, it was necessary to identify the cause of the high CO_2 levels.

Solution

AEI analytic & visualization tools were used to review the 15 minute Building Automation System (BAS) trend data and identify the root cause of the higher than desired CO_2 levels. The outside air dampers were not directly controlling to maintain the CO_2 setpoint of 1000ppm. The dampers were observed to be operating in an "economizer mode" to cool the classroom when the space temperature became too warm and outside air temperatures were favorable for "free cooling".

The addition of outside air to cool the classroom did help reduce the classroom CO_2 levels, but the outside air



dampers were not directly controlling to the CO_2 setpoint. A revised BAS control strategy was implemented to allow the outside air dampers to meet the requirements of both (1) CO_2 setpoints and (2) economizer mode setpoints.

Even if your outside air dampers don't have feedback sensors to indicate damper position, AEI analytics can (1) confirm outside air dampers are providing free cooling when appropriate, (2) verify minimum space ventilation levels are maintained, (3) verify spaces are not over-ventilated and (4) identify CO_2 sensors that may need calibration. Excessive ventilation in winter months in New England typically results in excessive use of fossil fuels.

The following article provides a good discussion of the importance of maintaining minimum classroom ventilation rates:

http://www.airtesttechnologies.com/support/reference/CO2&SchoolClassrooms.pdf



Building Energy Efficiency with AEI

Take Back Control with AEI SoftStart™

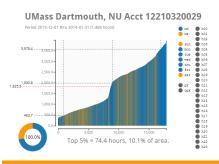
AEI energy data analytics help you take back control of your facility's energy use. The first step is an inexpensive main meter AEI SoftStart[™] review using the data collected by your time-of-use (TOU) facility meters. Even with just the main meter, we can:

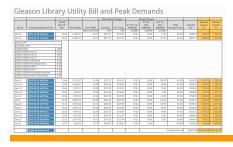
- Profile your facility's energy use by time of day, day of week, season/ season, year/year, including weather normalization,
- Show dynamic demand visualizations that quickly identify your peak demands during the year,
- Calculate the Energy Use Intensity (EUI) of your buildings and compare them to each other and to the DOE national database.

From these analytics, we can start to understand how your buildings operate:

- Do your buildings set back appropriately during unoccupied hours?
- What are the base, heating and cooling loads of the buildings?
- What are the top peak demand moments in the billing period? How does your peak demand compare to the average load?
- How do your buildings perform relative to each other per square foot, and to the national averages for similar building types?

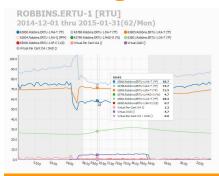
An AEI SoftStart review is the inexpensive way to answer these questions and others, pointing you in the right direction to choose the next best steps toward energy efficiency.





With BAS Data, Deeper Insights and Savings

With the Building Automation System (BAS) data from your facility, AEI kicks into high gear and goes well past what the main meter has told us. We'll dig deep into the air handlers, chillers, boilers and other assets to see that they are operating efficiently and to plan. We'll discover the typical inefficiencies such as simultaneous heating and cooling, excessive ventilation, VFDs in override, and hundreds of other performance indicators. We'll identify the simple and quick ROI O&M savings opportunities, and also give you the reference data for making capital improvement decisions. How well do your current assets perform against an ideal cost-to-operate model? We'll tell you all this and more, and in plain English. Commissioning a new BAS? We can qualify the installation to be sure it's been properly configured.



Lower Costs and Maintained Savings over Time

AEI is with you through the entire life cycle of your building, from early main meter insight, through renovations, and all the way to steady-state continuous commissioning. As your energy management partner, AEI and its CEMs deliver reporting and insight to your secure and private web portal. Your engineers and ours share a low-cost reference desk where your data is presented in logical and meaningful ways that are tuned to your staff's needs.

For more information, please visit our web site at <u>www.aeintelligence.com</u>, write to us at <u>info@aeintelligence.com</u>, or call us at +1 (978) 758-8883.

Operating Hours for Air Handlers Discharge and Return Air Fans, Including RTUs Report AN10002 Data Date Range Wes 2014-1101 (htt: The 2016-12-31 (720 days)

