

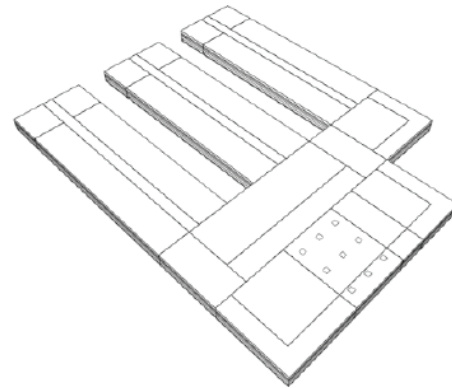
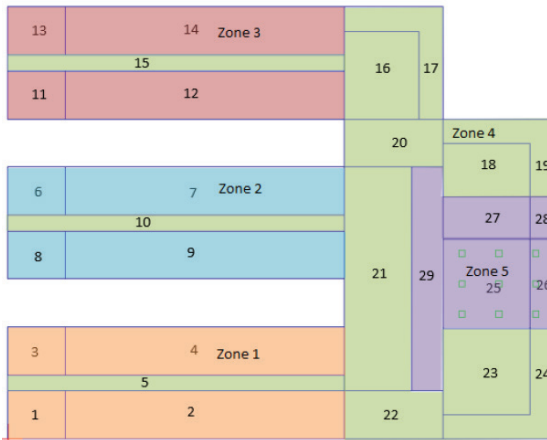
### ANALYSIS OBJECTIVE

The objective of the study, performed by a certified Building Energy Modeling Professional, was to determine the energy savings of applying a displacement induction ventilation system (DIV) in conjunction with a DOAS unit only versus:

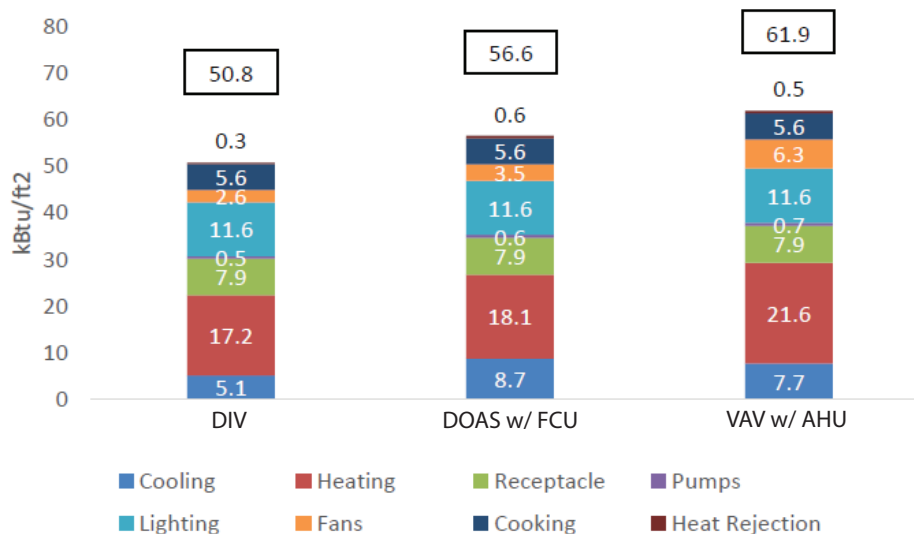
- Fan coil units paired with a DOAS unit
- AHU-VAV

### THE MODEL: Building + HVAC System

For the displacement induction ventilation system, the following below is used. Each room is labeled with the corresponding name and zone in the table preceding. Classrooms (zones 1, 2, and 3) use the displacement induction ventilation system (DIV) while zone 4 uses an active chilled beam system (ACB), and zone 5 has packaged single units for each room with DX cooling (PSZ-DX). Only the classroom HVAC system was varied from AHU-VAV to DOAS-FCU to DOAS-DIV



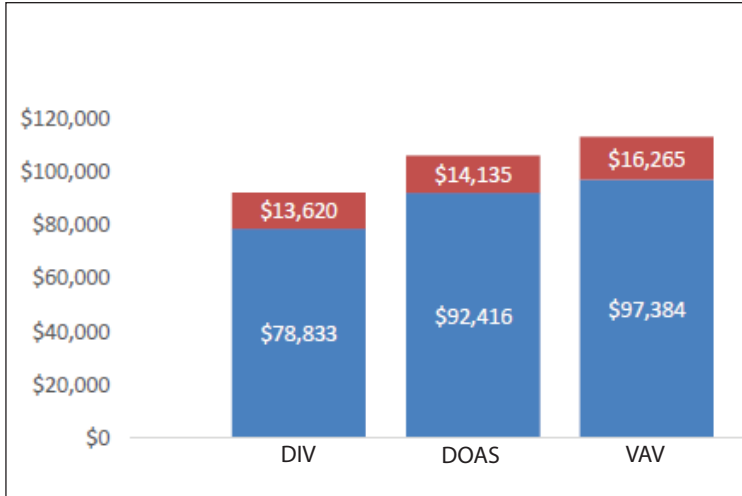
### BREAKDOWN OF BUILDING ENERGY USE INTENSITY: Minneapolis, MN



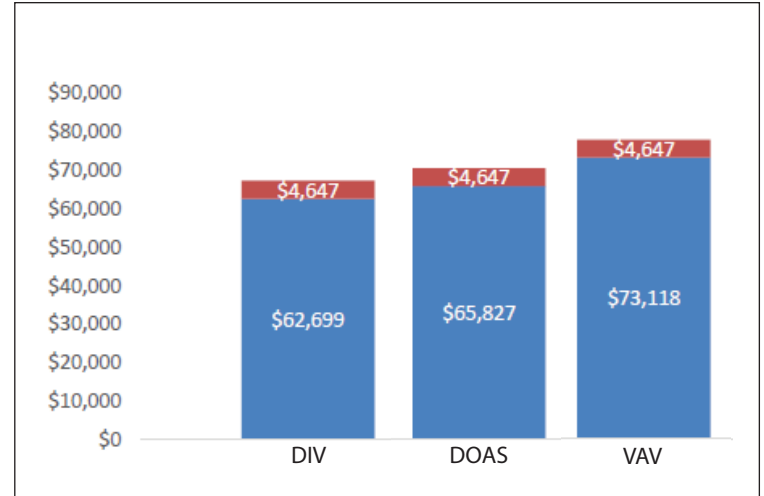
## THE SAVINGS DELIVERED

DIV = DOAS-QLCI  
DOAS = DOAS-FCU  
VAV = AHU-VAV

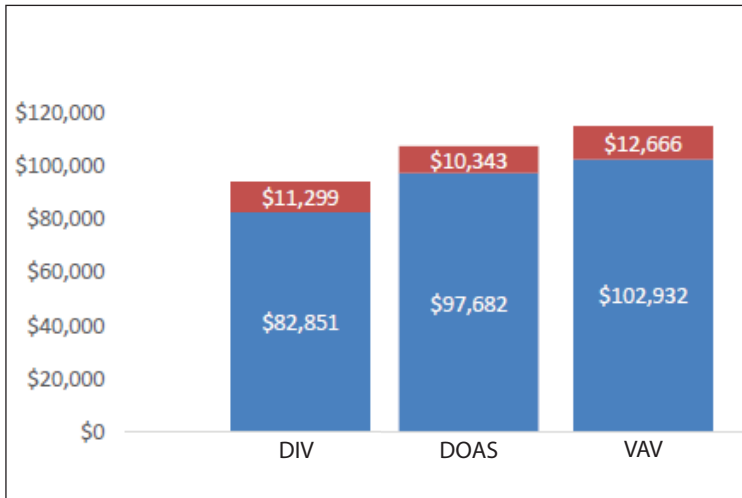
Minneapolis, Minnesota



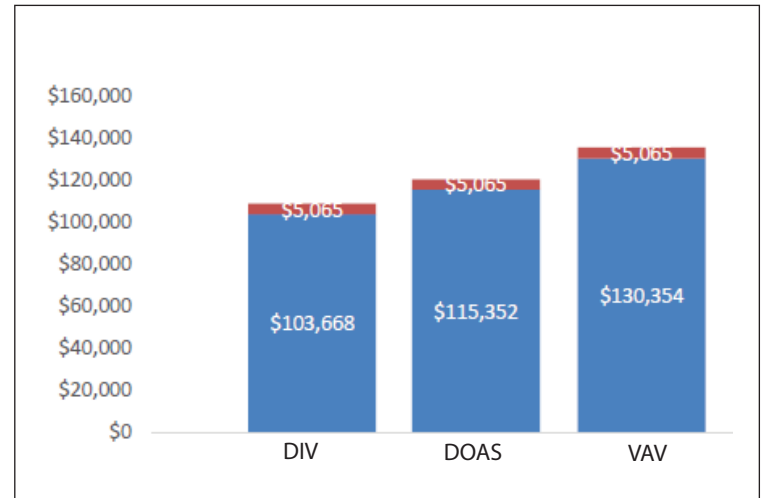
Seattle, Washington



Columbus, Ohio



Washington, D.C.



## WHY DOAS-QLCI WINS

The results show a consistent and significant energy and energy cost savings for the entire building by simply changing the classroom wings to DOAS-QLCI in each of the locations studied – ranging between 15 and 25% savings compared to a VAV AHU system and 10 to 18% when compared to a DOAS FCU system.

The savings can be attributed to the following primary factors:

- Reduction in total ventilation required per ASHRAE 62.1-2013
- Reduction in chiller energy due to reduced airflow for ventilation and supply
- Increased chiller performance at part load due to primary and secondary chilled water loops with higher supply CHW temperatures to the DIV units
- Reduction in boiler energy due to reduced airflow for ventilation and supply
- Reduction in fan energy by eliminating FCU fans (DOAS FCU system)
- Reduction in total heating and cooling capacity related to reduction in peak outside air required

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