

The utility rates are based on the values given by campus. The total energy cost savings is equivalent to about 11% of annual building energy cost.

Table 3 Summary of ECMs

ECM #	Potential Annual Savings			
	Electric (kWh)	Steam (MMBtu)	Chilled Water (MMBtu)	Monetary
1	-	560	3213	\$40,141
2	41282	209	299	\$12,632
3	10976	129	72	\$3,029
Sum	52258	898	3584	\$55,793

CONCLUSION

This study has investigated the potential savings in retro-commissioning of an academic building with the focus on HVAC operation, including ventilation reduction and terminal unit operation. The case study includes a reduced-order energy model calibrated based on ASHRAE Guideline 14. The ventilation calculations based on ASHRAE 62.1 2010, setting dual minimum setpoints for the air terminal units and unoccupied mode shut-off of fan powered boxes bring about 11% energy cost saving based on the calibrated energy model. In a nutshell, the reduced order energy model was well capable of estimating the recommended measures of retro-commissioning.

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