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Appendix for ECM 6: Premium Efficiency Motor Retrofit, Union Colony Civic Center

I. Energy Savings Calculations

ECM 6 Premium Efficiency Motor Retrofit, Union Colony Civic Center Calculation

Savings Estimate

Date:	31-Jul-12
Project:	City of Greeley Colorado
Location:	UCCC
Measure:	ECM 6 Premium Efficiency Motor Retrofit, Union Colony Civic Center

ECM 6 Premium Efficiency Motor Retrofit	
Estimated Savings (kWh/Yr):	2,363
Estimated Savings (kW/Yr):	16

Unit No.	Application	HP	kW	Existing RPM	New RPM	Existing Efficiency	New Efficiency	Load Factor	Utilization Factor	Peak Load Months	Hours of Use	Existing Demand, kW	Existing Energy Use, kWh	New Demand, kW	New Energy Use, kWh	Demand Savings, kW	Energy Use Savings, kWh
RTU-2	SA Fan	15	9.0	1755	1755	90.0%	93%	80%	90%	12	1831	107.4	18,212	104.0	17,625	3.5	587
RTU-2	RA Fan	5	3.0	1745	1745	86.5%	90%	80%	90%	12	1831	37.3	6,316	35.8	6,071	1.4	246
RTU-3	SA Fan	10	6.0	1750	1750	89.5%	92%	80%	80%	12	660	64.0	4,401	62.3	4,281	1.7	120
RTU-3	RA Fan	5	3.0	1745	1745	86.5%	90%	80%	80%	12	660	33.1	2,277	31.8	2,188	1.3	89
RTU-6	SA Fan	40	23.9	1770	1770	93.0%	95%	80%	90%	12	1831	277.2	47,000	271.4	46,010	5.8	989
RTU-6	RA Fan	10	6.0	1750	1750	89.5%	92%	80%	90%	12	1831	72.0	12,209	70.1	11,878	2.0	332
															Total	15.7	2,363

ASSUMPTIONS:

New motors same RPM as existing

Load Factor is 0.8 for all motors

Utilization factor is 0.9 for all except RTU-3, which is 0.8

Peak load months = 12 months for all motors

UCCC Equipment Run-hours:

RTU 2:	1831	assumed equal to AHU 6
RTU 3:	660	from customer (Dale B.)
RTU 6:	1831	from customer (Dale B.)

FORMULAE:

Motor (kW) =	(Motor Horsepower x 0.746 (kW/HP) x Load Factor)
Speed Ratio Correction Factor =	((New RPM)/(Existing RPM)) ^ 3
Existing Energy Use (kWh) =	(Existing kW /Existing Efficiency) x Hours of Use
Existing Demand (kW) =	(Existing kW /Existing Efficiency) x Peak Load Months x Utilization factor
New Energy Use (kWh) =	(New kW /New Efficiency) x Hours of Use x Speed Ratio Correction Factor
New Demand (kW) =	(New kW /New Efficiency) x Peak Load Months x Utilization factor x Speed Ratio Correction Factor
Demand Savings (kW) =	(Existing Demand) - (New Demand)
Energy Use Savings (kW) =	(Existing Energy Use) - (New Energy Use)

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Appendix for ECM 6: Premium Efficiency Motor Retrofit, Lincoln Park Annex

I. Energy Savings Calculations

ECM 6 Premium Efficiency Motor Retrofit, Lincoln Park Annex Calculation

Savings Estimate

Date:	31-Jul-12
Project:	City of Greeley Colorado
Location:	LPA
Measure:	ECM 6 Premium Efficiency Motor Retrofit, Lincoln Park Annex

ECM 6 Premium Efficiency Motor Retrofit	
Estimated Savings (kWh/Yr):	303
Estimated Savings (kW/Yr):	1

Unit No.	Application	HP	kW	Existing RPM	New RPM	Existing Efficiency	New Efficiency	Load Factor	Utilization Factor	Peak Load Months	Hours of Use	Existing Demand, kW	Existing Energy Use, kWh	New Demand, kW	New Energy Use, kWh	Demand Savings, kW	Energy Use Savings, kWh
AC-7	SA Fan	5	3.0	1750	1750	87.5%	90%	80%	90%	12	3197	36.8	10,902	35.8	10,599	1.0	303
															Total	1.0	303

ASSUMPTIONS:

New motors same RPM as existing

Load Factor is 0.8 for all motors

Utilization factor is 0.9 for all motors

Peak load months = 12 months for all motors

Library hours of use:

Mon-Thurs	9am-8pm	or	11	hrs
Fri, Sat	10am-5pm	or	7	hrs
Sun	1pm-5pm	or	4	hrs

Closed for 12 holidays

For a total of: 3,197 operating hours / year

FORMULAE:

Motor (kW) =	(Motor Horsepower x 0.746 (kW/HP) x Load Factor)
Speed Ratio Correction Factor =	((New RPM)/(Existing RPM)) ^ 3
Existing Energy Use (kWh) =	(Existing kW /Existing Efficiency) x Hours of Use
Existing Demand (kW) =	(Existing kW /Existing Efficiency) x Peak Load Months x Utilization factor
New Energy Use (kWh) =	(New kW /New Efficiency) x Hours of Use x Speed Ratio Correction Factor
New Demand (kW) =	(New kW /New Efficiency) x Peak Load Months x Utilization factor x Speed Ratio Correction Factor
Demand Savings (kW) =	(Existing Demand) - (New Demand)
Energy Use Savings (kW) =	(Existing Energy Use) - (New Energy Use)