

Measurement and Verification Executive Summary 2019

Reporting period 2018

In 2012 and 2015, the County has entered into 4 guaranteed energy performance contracts (GEPCs) to implement capital improvements that would reduce greenhouse gas emissions and operating costs. These upgrades, which were completed from 2013-2017, included heating and cooling upgrades, building automation systems, and lighting and controls. This work helps meet President Preckwinkle’s Carbon Neutral Goal by 2050 and aligns with the Sustainable and Open Communities pillars of the policy roadmap. These contracts have resulted in avoided greenhouse gas emissions of **44,279** metric tons of CO2E, the equivalent of 5,302 homes energy use for one year.

These contracts are now in the measurement and verification phase, which evaluates trending data to ensure our savings. In 2018, the County achieved energy savings of 413,646 Mbtu, with cost savings of \$5,666,707. The following table summarizes the results of the contracts in 2018.

Facility	Savings in 2018	Guaranteed Annual Energy Savings ¹	Operating Dollars Saved ²
DOC and JTDC	212,557 Mbtu	190,247 Mbtu	\$1,951,601
Stroger Campus	124,258 Mbtu	120,360 Mbtu	\$1,736,926
Corporate Buildings (Package 1)	39,024 Mbtu	45,242 Mbtu	\$680,302
Courthouses & Highway Facilities (Package 2)*	37,807 Mbtu*	63,013 Mbtu	\$1,194,639*
Total for 2018	413,646 Mbtu	418,862 Mbtu	\$5,563,468

*Estimated Savings from utility bills. Year 1 M&V Report due 9/2019. A detailed breakdown will be available in Fall 2019

IMPACTS TO SAVINGS – Our energy savings can be impacted by multiple factors, such as the following are three key areas that impact our savings.

Impact of climate change – Weather extremes, such as the polar vortex and extreme heat can impact our utility usage. Cooling degree days, the number of degrees a day’s average temperature is above 65 degrees, were up 30% in 2018 over the previous year. The cooling degree total of 1,290 in 2018 is second highest cooling degree total since 1970. The energy savings data does not correct for the impact of weather. Rather, the energy conservation measures are verified to be performing properly, but the operational savings may not directly reflect this due to weather impacts.

Areas of improvement – The M&V services help us identify potential changes in our operation that need to be corrected for us to ensure energy savings. We are currently working with the Department of Facilities Management and Cook County Health Buildings and Grounds to make any needed corrections

¹ Savings are measured in Million British Thermal Units (Mbtu). One MBTU is the equivalent energy used driving 507 miles.

² This includes energy and maintenance savings. Calculations are based on actual energy rates for 2018.

so that the installed technologies can operate correctly, and we can meet our energy savings targets. All together, these improvements can help us realize an additional 6,252 Mbtu in savings. These savings would push our total to 419,898 Mbtu. If these improvements do not deliver savings, we can enforce the guarantee that is part of this contract.

Impact of changes in operation – Facility operations are fluid and constantly changing. This can be due to equipment repair, changes in staffing, or even the addition or subtraction of a facility. On the DOC Campus, facilities have been added and demolished, and these changes are reflected in the savings calculations. However, changes in standard operations, such as County offices being open later, will impact energy usage, and these impacts are very difficult to project and therefore, are not reflected in our savings calculations.

CONCLUSION

All contracts have performed well, but there is opportunity for increased savings. Operating costs have decreased by **over \$5.56 million in 2018**.

The operational savings for these projects has been accounted for through a lower energy budget for 2017 and beyond, making the dollars saved available to be used elsewhere in the County budget. A cash flow summary is included on the following page.

The Bureau of Asset Management is pro-actively working with staff and the contracting companies to develop a strategy to increase energy savings from these contracts. With these energy savings, carbon emissions will be avoided, which will help reduce our environmental impact and help mitigate the impact of climate change for the residents and visitors to Cook County.

Bureau of Asset management

Measurement and Verification Report 2019

Appendix

Section 1. Energy Savings Calculations Assumptions

Section 2. Savings Summary Table

Section 3. Cash Flow Analysis

Section 1.

Energy Savings Calculations Assumptions

Energy Rates

Rates used in savings calculations were provided from the Bureau of Finance and reflect the rates in effect the year of the calculated savings. The guaranteed energy savings in kilowatt hours (electricity) and therms (natural gas) are per the contracts.

Maintenance Savings

Maintenance savings are per the agreed upon amounts in the contract and have been verified with County personnel.

Actual Utility Data

Utility data used in the calculations comes directly from utility bills.

Electric Demand Savings

Electric Demand savings have not been included in the total savings shown in the calculations. Due to the decrease in energy usage, demand should also go down and will result in additional dollar savings to the County, but has not yet been quantified.

Weather Normalization

Weather normalization, the impact weather has on electric and natural gas usage, has not been factored into the actual energy usage data shown in the calculations. When there is a significant increase or decrease in heating and cooling degree days, weather is listed as a potential factor for energy increase/decrease, but is not quantified in this report.

Baseline Energy Usage

Baseline energy usage is outlined in each contract and will be the same for each year.

Adjustments to Actual Energy Usage Calculations

1 kWh = 3412.142 British Thermal Unit (Btu)

1 Therm = 99,976.1 Btu

1 MBtu = 1,000,000 Btu

Actual Usage for the DOC is reduced by 2,736,610 kWh and 257,530 therms to account for the addition of the RTU/RCDC, which was not open during the baseline year.

In 2017, actual energy usage was increased by 1,256,302 kWh and 116,203 therms to account for the demolition of Division 3, which was open during the baseline year.

Year 3 Energy Savings Calculations

Year 3 - 12/1/2017 - 11/30/2018

Electricity - DOC/JTDC					
	Baseline Electricity usage (kWh)	Electricity usage (kWh)	Energy Saved	Electric rate	Total Dollars Saved
DOC	60,027,430	52,412,161	7,615,269	\$0.0883	\$672,428.25
JTDC	18,370,124	15,773,929	2,596,195	\$0.0833	\$216,263.04
Total	78,397,554	68,186,090	10,211,464		\$888,691.30
Guaranteed			18,965,583		
Difference			-8,754,119		

Natural Gas - DOC/JTDC					
	Baseline Natural Gas Usage (Therms)	Natural Gas Usage (Therms)	Energy Saved	N.G. Rate	Total Dollars Saved
DOC	6,232,957	4,501,736	1,731,221	\$0.5340	\$924,472.01
JTDC	521,851	475,506	46,345	\$0.5430	\$25,165.34
Total	6,754,808	4,977,242	1,777,566		\$949,637.35
Guaranteed			1,255,171		
Difference			522,395		

Total Energy Savings	\$1,838,329
Maintenance Savings	\$113,272
Electricity Demand Savings	\$0
Total Saved (Preliminary)	\$1,951,601

Year 3 - 9/1/2016 - 8/31/2017

Electricity - Stroger Campus					
	Baseline Electric Usage (kWh)	Electric Usage (kWh)	Energy Saved	Electric Rate	Dollars Saved
Stroger + Hektoen	60,603,157	49,386,950	11,216,207	\$0.0830	\$930,945.18
IFM	2,371,804	1,985,701	386,103	\$0.0870	\$33,590.96
CORE Center	2,615,142	3,034,514	-419,372	\$0.0860	-\$36,065.99
Guaranteed			12,311,391		
Difference			-1,128,453		

Natural Gas - Stroger Campus					
	Baseline Natural Gas Usage (Therms)	Natural Gas Usage (Therms)	Energy Saved	N.G. Rate	Dollars Saved
Stroger + Hektoen	4,033,866	3,283,799	750,067	\$0.5590	\$419,287.45
IFM	225,874	115,477	110,397	\$0.5670	\$62,595.10
CORE Center	114,084	113,335	749	\$0.5700	\$426.93
Guaranteed			783,704		
Difference			77,509		

Avoided Capital Expense	\$0
Maintenance Savings	\$326,146
Energy Savings	\$1,410,780
Total Saved (Preliminary)	\$1,736,926

Year 1 - 3/1/2018 - 02/28/2019

Electricity - Package 1					
	Baseline Electricity usage (kWh)	Electricity usage (kWh)	Energy Saved	Electric rate	Total Dollars Saved
County Building	12,831,899	10,248,267	2,583,632	\$0.0843	\$217,800.18
Dunne Building	9,517,557	6,508,738	3,008,819	\$0.1050	\$315,926.00
Total	22,349,456	16,757,005	5,592,451		\$533,726.17
Guaranteed			6,132,491		
Difference			-540,040		

Natural Gas - Package 1					
	Baseline Natural Gas Usage (Therms)	Natural Gas Usage (Therms)	Energy Saved	N.G. Rate	Total Dollars Saved
County Building	532,139	359,350	172,789	\$0.5340	\$92,269.33
Dunne Building	305,837	279,160	26,677	\$0.5340	\$14,245.52
Total	837,976	638,510	199,466		\$106,514.84
Guaranteed			243,228		
Difference			-43,762		

Total Energy Savings	\$640,241
Maintenance Savings	\$40,061
Electricity Demand Savings	\$0
Total Saved (Preliminary)	\$680,302

Year 3 Energy Savings Calculations (Btu)

Year 3 - 12/1/2017 - 11/30/2018

Electricity - DOC/JTDC			
	Baseline Electricity usage (kWh)	Electricity usage (kWh)	Energy Saved
DOC	204,822,115,055	178,837,735,859	25,984,379,196
JTDC	62,681,471,646	53,822,885,646	8,858,586,000
Total	267,503,586,701	232,660,621,505	34,842,965,196
Guaranteed			64,713,262,309
Difference			-29,870,297,113

Natural Gas - DOC/JTDC			
	Baseline Natural Gas Usage (Therms)	Natural Gas Usage (Therms)	Energy Saved
DOC	623,146,732,328	450,066,008,510	173,080,723,818
JTDC	52,172,627,761	47,539,235,407	4,633,392,355
Total	675,319,360,089	497,605,243,916	177,714,116,173
Guaranteed			125,487,101,413
Difference			52,227,014,760

Total Guaranteed	190,200,363,722
Total Saved	212,557,081,368

Year 3 - 9/1/2016 - 8/31/2017

Electricity - Stroger Campus			
	Baseline Electric Usage (Btu)	Electric Usage (Btu)	Energy Saved
Stroger + Hektoen	206,786,577,332	168,515,286,347	38,271,290,985
IFM	8,092,932,044	6,775,493,782	1,317,438,263
CORE Center	8,923,235,854	10,354,192,669	-1,430,956,815
Guaranteed			42,008,214,310
Difference			-3,850,441,876

Natural Gas - Stroger Campus			
	Baseline Natural Gas Usage (Btu)	Natural Gas Usage (Btu)	Energy Saved
Stroger + Hektoen	403,290,190,603	328,301,417,204	74,988,773,399
IFM	22,582,001,611	11,544,940,100	11,037,061,512
CORE Center	11,405,673,392	11,330,791,294	74,882,099
Guaranteed			78,351,669,474
Difference			7,749,047,535

Total Guaranteed	120,359,883,784
Total Saved	124,258,489,442

Year 1 - 3/1/2018 - 02/28/2019

Electricity - Package 1			
	Baseline Electricity usage (kWh)	Electricity usage (kWh)	Energy Saved
County Building	43,784,261,518	34,968,542,258	8,815,719,260
Dunne Building	32,475,255,977	22,208,738,297	10,266,517,680
Total	76,259,517,495	57,177,280,555	19,082,236,940
Guaranteed			20,924,930,106
Difference			-1,842,693,166

Natural Gas - Package 1			
	Baseline Natural Gas Usage (Therms)	Natural Gas Usage (Therms)	Energy Saved
County Building	53,201,181,878	35,926,411,535	17,274,770,343
Dunne Building	30,576,390,496	27,909,328,076	2,667,062,420
Total	83,777,572,374	63,835,739,611	19,941,832,763
Guaranteed			24,316,986,851
Difference			-4,375,154,088

Total Guaranteed	45,241,916,957
Total Saved	39,024,069,703

Section 3. Guaranteed Energy Performance Contracts Cash Flow Analysis

Year	2011	2012	2013	2014	2015	2016	2017	2018
Debt Service*	(\$101,916)	(\$2,125,463)	(\$2,268,656)	(\$3,384,621)	(\$3,384,621)	(\$3,390,552)	(\$3,656,182)	(\$4,090,812)
M & V Expense-Stroger Campus				\$0	\$0	(\$208,395)	(\$181,947)	(\$149,510)
M & V Expense-DOC & JTDC				\$0	\$0	(\$130,318)	(\$101,610)	(\$104,912)
M & V Expense - Package 1				\$0	\$0	\$0	\$0	(\$30,402)
M & V Expense - Package 2				\$0	\$0	\$0	\$0	(\$43,771)
Total Gross Annual Expenses	(\$101,916)	(\$2,125,463)	(\$2,268,656)	(\$3,384,621)	(\$3,384,621)	(\$3,729,265)	(\$3,939,739)	(\$4,419,407)
Maintenance Savings			\$0	\$0	\$0	\$274,182	\$286,337	\$672,678
Capital Avoidance			\$0	\$0	\$0	\$1,050,000	\$0	\$0
Rebates Received			\$88,128	\$739,656	\$1,111,079	\$1,516,772	\$1,691,522	\$0
Energy Savings - Stroger Campus			\$192,671	\$526,193	\$1,236,285	\$1,268,330	\$1,188,666	\$1,410,780
Energy Savings - DOC & JTDC			\$250,888	\$747,486	\$1,902,310	\$2,405,657	\$2,146,696	\$1,838,329
Energy Savings - Package 1			\$0	\$0	\$0	\$547,397	\$675,072	\$640,241
Energy Savings - Package 2**			\$0	\$0	\$0	\$478,378	\$877,318	\$1,001,440
Total Gross Annual Savings			\$531,687	\$2,013,335	\$4,249,674	\$7,540,716	\$6,865,611	\$5,563,468
Annual Net Savings	(\$101,916)	(\$2,125,463)	(\$1,736,969)	(\$1,371,286)	\$865,053	\$3,811,451	\$2,925,873	\$1,144,061
Net Savings to date	(\$101,916)	(\$203,832)	(\$2,329,295)	(\$4,066,264)	(\$5,437,550)	(\$4,572,497)	(\$761,047)	\$2,164,826
Project Status			Construction	Construction	Construction	M & V Year 1	M & V Year 2	M & V Year 3

*Debt Service is the principal and interest payment made on the money borrowed to execute the projects

**Savings for Package 2 based on utility bill energy use reduction. A reconciled savings report will be available in Fall of 2019.