



Operations Monitoring Report

Fourth Quarter FY20

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I. Executive Summary

A review of the fiscal year 2020 (FY20) Fourth Quarter performance and contract obligations between Constellation New Energy (CNE) and the Metropolitan Government of Nashville and Davidson County (Metro) is presented in this report by Thermal Engineering Group, Inc. (TEG). The status of the available funds for all active capital construction and repair and improvement projects are also presented. For the fiscal year 2020 to date, CNE has met their contract obligations to Metro and has had no contract violations.

During the Third Quarter FY20, the nCOVID-19 pandemic reached Metro Nashville. The State's and Metro's "Safer at Home" and "Stay at Home" orders resulted in a decrease of the commercial activities within the DES service area. Restaurants, bars, and venues were shut and building occupancies for hotels and office spaces dropped. Although businesses began re-opening in the Fourth Quarter, the steam and chilled water sales decreased dramatically.

For the Fourth Quarter FY20, the chilled water sales decreased 27.7% over the previous Fourth Quarter (FY19). The chilled water sendout also decreased 27.7% over the previous Fourth Quarter. The system losses decreased approximately 26.9%. The number of cooling degree days was 20.7% lower than in FY19. The peak chilled water demand for the current quarter was 14,696 tons, which is 5.1% lower than the previous Fourth Quarter.

For the fiscal year, chilled water sales decreased 8.3% over the previous fiscal year (FY19). Chilled water sendout decreased 7.1% but system losses increased 20.3%. The peak chilled water demand for the year was 17,711 tons, which is a 2.6% decrease from FY19. For the year, the number of cooling degree days were 2.9% lower than the previous year.

Steam sendout for the current quarter decreased by approximately 10.4% over the previous Fourth Quarter and steam sales, likewise, decreased by approximately 14.8%. This decrease came with an 88.4% increase in heating degree days thus the quarter was much cooler than FY19. Total steam system losses increased by 3.1% over the previous Fourth Quarter. The peak steam demand for the current quarter was 88,844 pounds per hour, which represents a decrease in the Fourth Quarter demand by approximately 12.0%.

Annual steam sales decreased 8.7% over the previous fiscal year and the steam sendout decreased 6.0%. The system losses increased 11.1%. The year experienced a 6.8% decrease in the number of heating degree days. The peak steam demand for the year was 136,906 pph which is a 4.0% decrease from FY19.

The EGF performance continues to satisfactorily meet the System Performance Guarantee (Guaranteed Maximum Quantity or GMQ) levels. The chilled water plant electric consumption per unit of sales continues to perform better than the guaranteed levels for the quarter. CNE began attempts at changing their operation and performing additional maintenance at the EGF to increase the chiller plant efficiency during the quarter. These changes resulted in the quarterly average efficiency being approximately the same as the previous Fourth Quarter. However, annually, the chiller plant efficiency declined 1.7% over FY19. TEG believes that the decline in

performance of the chiller plant is related to a decrease in the condition, maintenance and operation of the cooling towers and chillers by CNE. Although CNE is making obvious attempts at improving their operation of the EGF, TEG is continuing to monitor the chiller plant performance and CNE's effort into the new fiscal year.

The System Performance Levels for the boiler plant are being satisfactorily met, as well. The steam plant electric consumption per unit of sales increased over the previous Fourth Quarter by 22.6% due to a decrease in the overall steam demand. The total water consumption for the steam and decreased 3.3% from the previous Fourth Quarter. The steam plant water conversion also decreased by 3.3% for the quarter while experiencing a 3.8% decrease in the relative amount of condensate return. The boiler plant fuel efficiency decreased 4.0% from the previous Fourth Quarter.

Annually, the boiler plant water and electricity usages have increased while steam sales have fallen. The boiler plant fuel efficiency has decreased only 0.3% over FY19. This phenomenon may be due to the decrease in steam sales from March through June FY20 due to the government's response to the pandemic.

Work continued with the DES Capital and Repair & Improvement Projects during the Fourth Quarter. Repair and Improvements to the EDS continue as scheduled. DES133.1, DES139, DES152, DES153, DES154, DES157, DES159, DES161, DES162, DES163, DES168 and DES169 are ongoing. Projects DES171, DES172, DES173, DES174, DES175 and DES176 have been added. DES160 was closed during the Fourth Quarter FY20. Recurring maintenance items are included in the EDS Walkthrough section of this report. CNE has begun to address some of these items. As noted in prior quarterly monitoring reports, the postponement or deference of these items will result in an increase in maintenance costs to the DES and could impact the delivery of steam and chilled water.

The renovations at John Sevier building continued during the quarter. The DES instrumentation and metering system were installed, and the building began using steam and chilled water in May. The instrumentation and metering system were also installed at 5th and Broadway (DES160) and they began using chilled water during the quarter as their building construction continues.

The current fiscal year system operating costs to date are \$17,556,000. This value represents approximately 96.1% of the total budgeted operating cost for FY20. The customer revenues from the sales of steam and chilled water for FY20 are \$16,170,000 (79.3% of budgeted amount). The DES response to the nCOVID-19 pandemic included the potential deferral of customer invoices and waiving late fees. Some customers have taken advantage of these benefits thereby reducing a portion of the revenues. The repayments of the deferred amounts will begin in FY21. The required difference between the operating costs and revenues has been allocated from the Undesignated Fund Balance for FY20. The fiscal year to date amount required is \$1,386,100.

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II. Energy Distribution Sales and Performance

A. Chilled Water

This section of the report discusses and presents performance information regarding the operation of the EGF for the periods described. Charts and tabular data are also presented to provide a more detailed description of the actual EGF performance.

The Safer-At-Home strategy to combat the COVID-19 pandemic has impacted the DES by creating a significant decrease in the steam and chilled water energy usage and demand during the quarter. The venue-driven customers have had no events since early March, restaurants, bars, and hotels have had few patrons and many of the office buildings have experienced a decline in tenant occupancies due to more employees working from home. These factors have contributed to a decline in the energy use normally experienced during the spring. However, the decline in usage does not impact the MFA since the energy costs incurred by the system are passed through to the customers.

1. Sales and Sendout

A comparison for the Fourth Quarter chilled water sales is shown in Figure 1. This data reflects a 27.7% decrease in sales for the current quarter over the same quarter of the previous fiscal year. Annually, chilled water sales decreased 8.3% with most of the decrease in sales occurring in the Third and Fourth Quarters.

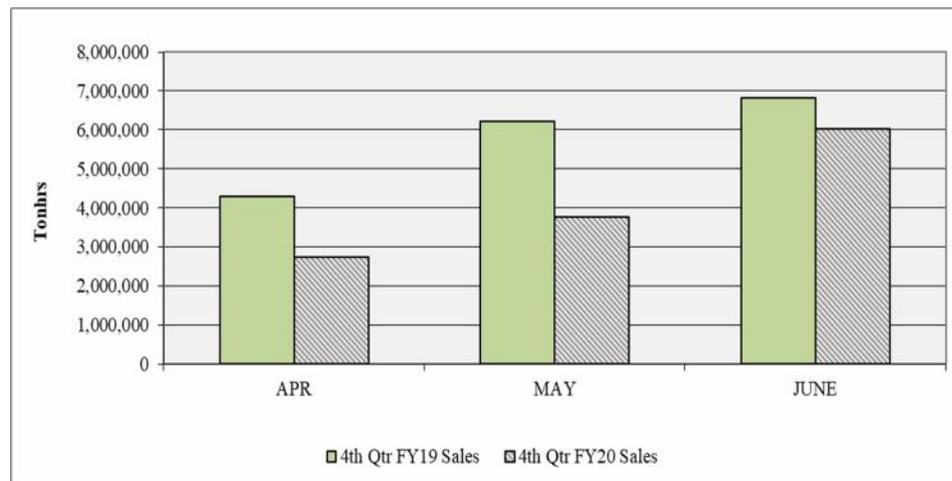


Figure 1. Chilled Water Sales Comparison

The peak chilled water demand for the current quarter was 14,969 tons, which represents a 5.1% decrease over the previous Fourth Quarter. The peak chilled water demand for the year was 17,711 tons, which is a 2.6% decrease over FY19.

Figure 2 shows the chilled water sales, sendout and losses for the previous twelve months. The losses on this figure are defined as the difference in tonhrs per month between the recorded sendout and sales values and represent the total energy loss for chilled water in the EDS. The number of cooling degree days per month are also tracked for comparison.

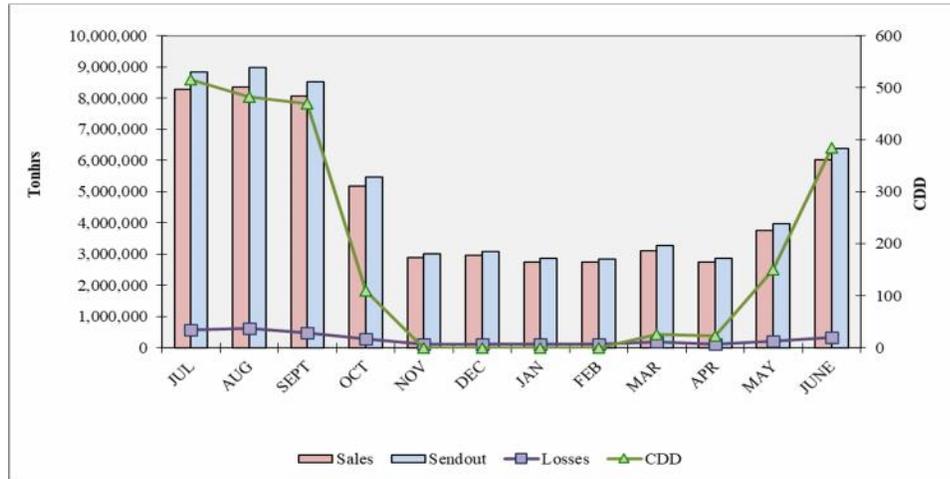


Figure 2. Chilled Water Sales, Sendout, Losses and CDD for the Previous Twelve Months

For FY20, the chilled water sendout decreased 7.1%. The total system losses decreased 8.3%. The number of cooling degree days decreased 2.9%.

2. Losses

A comparison of the total, chilled water energy losses in the EDS for the Fourth Quarter is shown in Figure 3. These losses are the difference in chilled water sendout and sales.

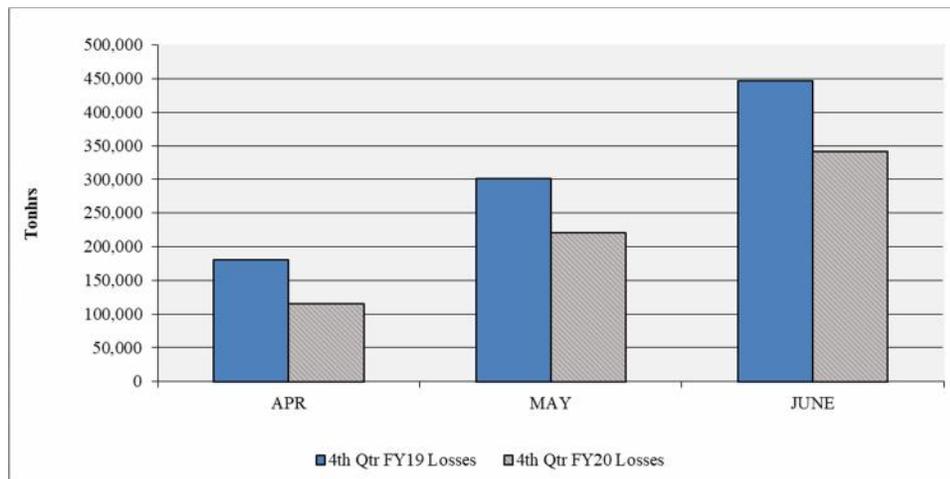


Figure 3. Chilled Water System Loss Comparison

The EDS make-up increased by 17.5% over the previous Fourth Quarter. All the known distribution leaks have been found and repaired. The locations where leaks remain suspected are on 3rd Ave N and 5th Ave N, but previous efforts to locate the actual source of the leaks have been unsuccessful. TEG and CNE continue to investigate areas of suspected leaks and will continue to monitor the system losses to determine the cause. For the year, the EDS make-up decreased 13.0% over FY19.

The make-up to the cooling towers decreased 31.8% over the previous Fourth Quarter. The number of cycles of concentration in the condensing water circuit increased 6.5%. The total chiller plant water use decreased 4.1% over FY19. The overall city water make-up comparison for the chilled water system Fourth Quarter is shown in Figure 4.

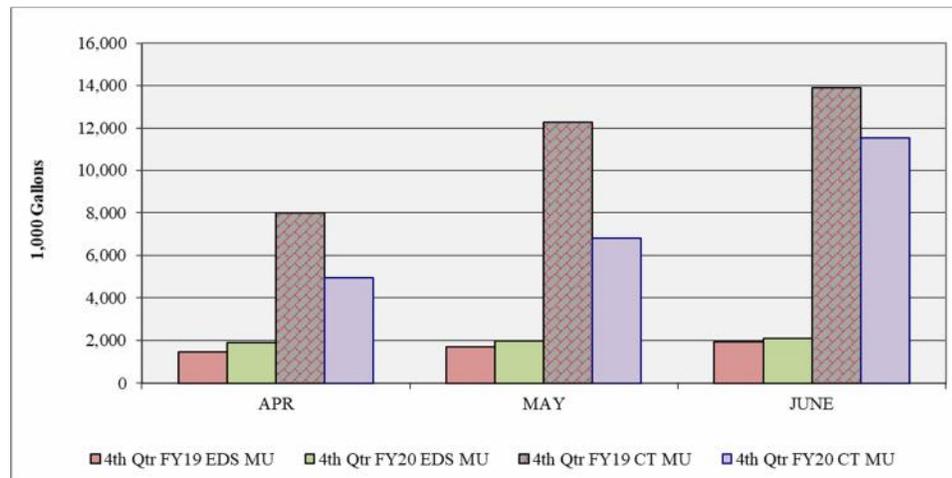


Figure 4. Chilled Water System City Water Usage Comparison

3. Performance

The performance of the chilled water aspect of the EGF is presented by the following two charts, Figures 5 and 6, for the previous twelve months. Under the management of CNE, the System Performance Guarantee levels as described in the ARMA are being achieved.

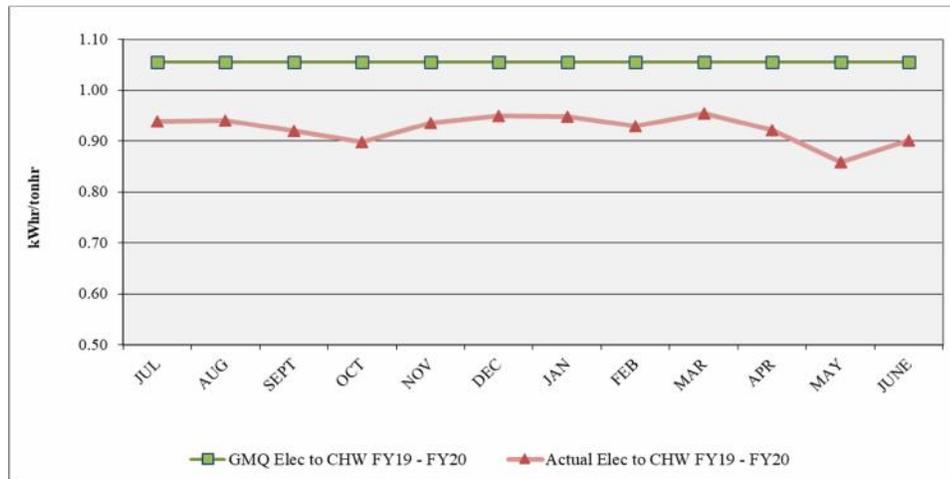


Figure 5. Chiller Plant Electric Performance Guarantee Comparison for the Previous Twelve Months

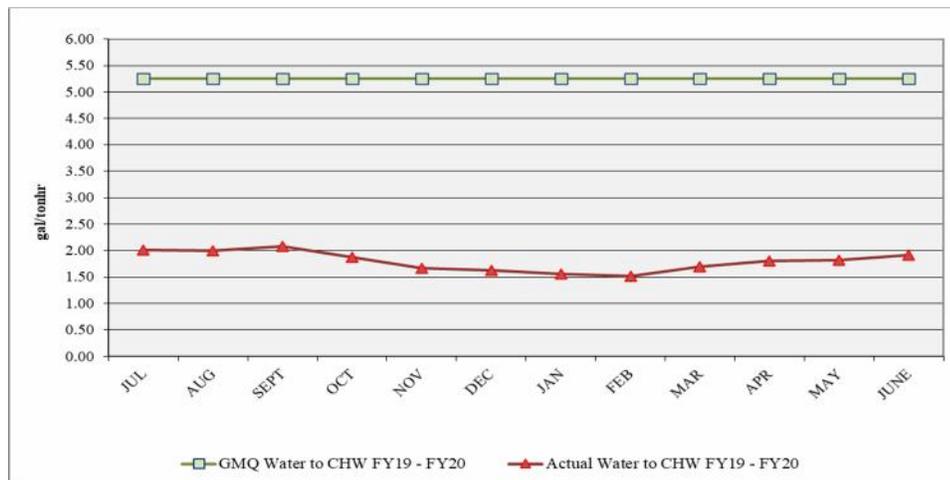


Figure 6. Chiller Plant Water Consumption Performance Guarantee Comparison for the Previous Twelve Months

The chilled water allocation of the electric consumption falls under the GMQ limit of 1.055 kWhr per tonhr for the current quarter, and no excursion is reported for the current fiscal year. The electric usage per unit of sales remained approximately the same as in the previous Fourth Quarter. The electric usage per unit of sales increased 1.7% over FY19, which is indicative of the decline in chiller plant efficiency.

CNE continued to perform some deferred maintenance on the cooling towers and chiller plant during the quarter. TEG believes this effort has led to a slight increase in the chiller plant efficiency. CNE has also begun addressing some operational issues within the plant in an additional effort to improve efficiency.

CNE and TEG are continuing to monitor the improvements created by these changes.

The total consumption of city water for the chiller plant for the current quarter has decreased by approximately 25.4% due largely to the decrease in chilled water sales. The water conversion factor for the chiller plant increased by approximately 3.2%. This increase in the factor means that more water than typical was required to produce the same amount of chilled water. Since chilled water sales are down, the water conversion factor should have remained approximately the same as in the previous quarter. However, the EDS make-up has increased which could be a contributing factor to increase in the water conversion factor since its proportion to the total water usage is higher with lower sales which results in reduced evaporation in the cooling towers. For the year, the water conversion factor increased 4.5% over FY19. TEG is continuing to monitor this issue, as well.

During the Fourth Quarter, CNE and Metro reached an agreement on the terms of their contract extension as System Operator. This new agreement, referred to as Amendment 2 of the ARMA, changes the System Performance Guarantees (Guaranteed Maximum Quantities in Table 2) by requiring a more efficient operation of the EGF. Amendment 2 becomes effective July 1, 2020.

B. Steam

1. Sales and Sendout

The steam sendout decreased by approximately 10.4% over the previous Fourth Quarter (FY19), and the sales also decreased by approximately 14.8%. The Quarter experienced an 88.4% increase in the number of heating degree days. The steam system losses increased 3.1% over the previous Fourth Quarter and experienced a decrease in the relative amount of condensate return of 3.8%. A comparison for the Fourth Quarter steam sales is shown in Figure 7. For FY20, the steam sales decreased 8.7% while sendout decreased 6.0%. The number of heating degree days for FY20 were 6.8% lower than in FY19.

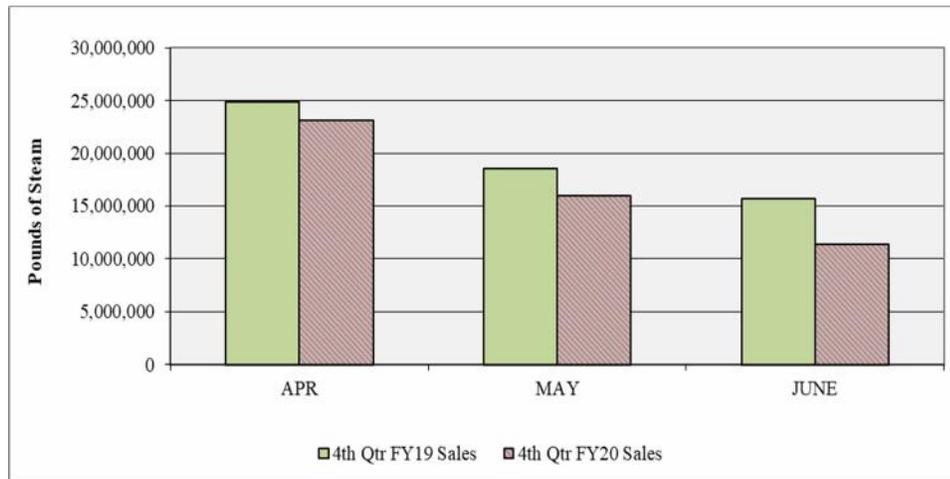


Figure 7. Steam Sales Comparison

The peak steam demand for the current quarter was 88,844 pph, which reflects an approximate 12.0% decrease in the peak steam production over the previous Fourth Quarter. The peak steam demand for FY20 was 136,906 pph. This demand is 4.0% lower than in FY19.

Figure 8 shows the steam sales, sendout and losses for the previous twelve months. The losses on this figure are defined as the difference in pounds per month between the recorded sendout and sales values and represent the total mass loss in the EDS between the EGF and the customer meters.

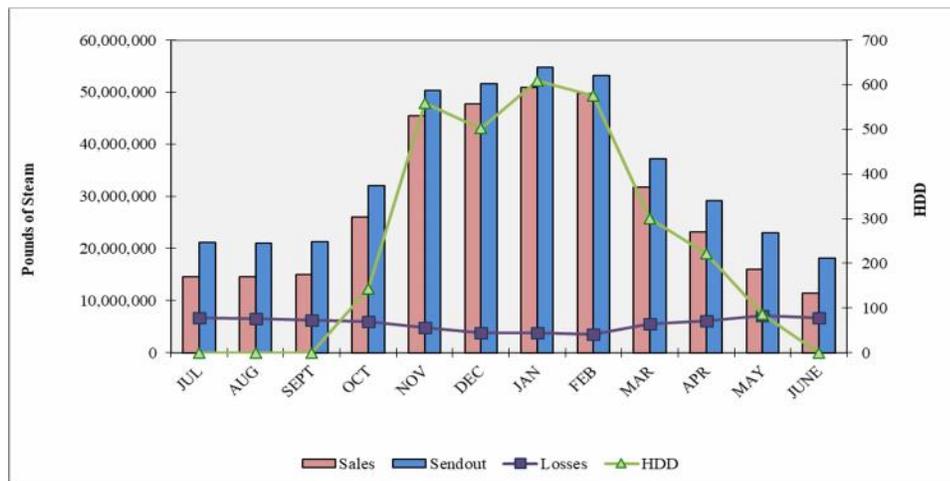


Figure 8. Steam Sales, Sendout, Losses and HDD for the Previous Twelve Months

2. Losses

A comparison of the total steam mass losses in the EDS for the Fourth Quarter is shown in Figure 9. The mass loss is caused by the heat loss in the EDS between

the EGF and the customer meters, resulting in a mass loss at steam traps. Faulty traps, steam leaks or meter error could also be a contributing cause of these losses. Whenever steam sales decrease from the previous quarter, the percent of system losses can be expected to increase since most of these losses are based on a near constant heat loss of the system.

The increase in the losses shown in Figure 9 may be due to a new leak in the condensate system. CNE reported a new “hot spot” during March that was discovered with their monthly thermographic reviews of the system. This new “hot spot”, located near MH-9 on 5th Ave N and Deaderick St, was revealed to be a condensate leak through exploratory excavation performed during the quarter. The cost for the repairs to this leak are being tracked as DES176.

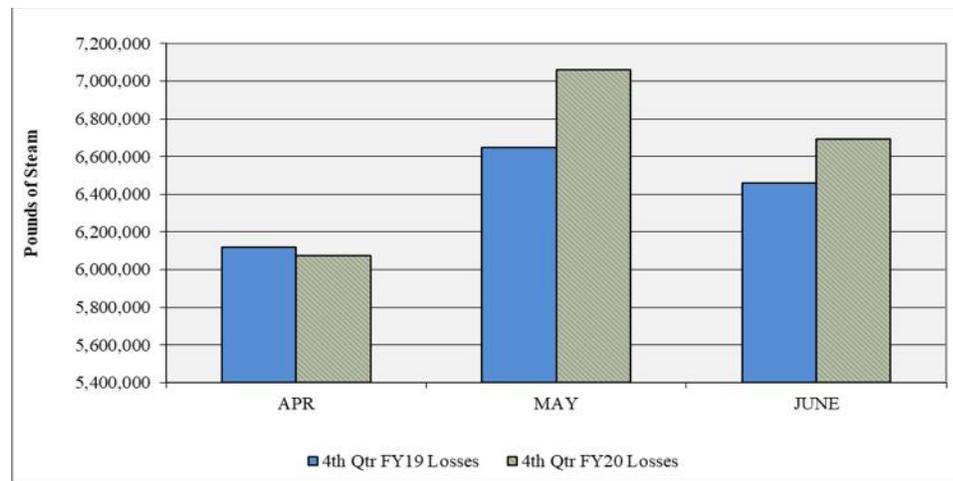


Figure 9. Steam System Losses

The amount of city water make-up (MU) to the steam system consists of the loss in mass between the EGF and the customers, in the condensate return from the customers to the EGF and losses at the EGF. The amount of condensate return decreased by approximately 13.8% during the Fourth Quarter. This decrease is largely due to a decrease in steam sendout and the corresponding data is shown in the comparison of Fourth Quarter data in Figure 10. For FY20, the relative amount of condensate return decreased 9.1% over FY19. The city water make-up to the steam system increased 10.6% in FY20.

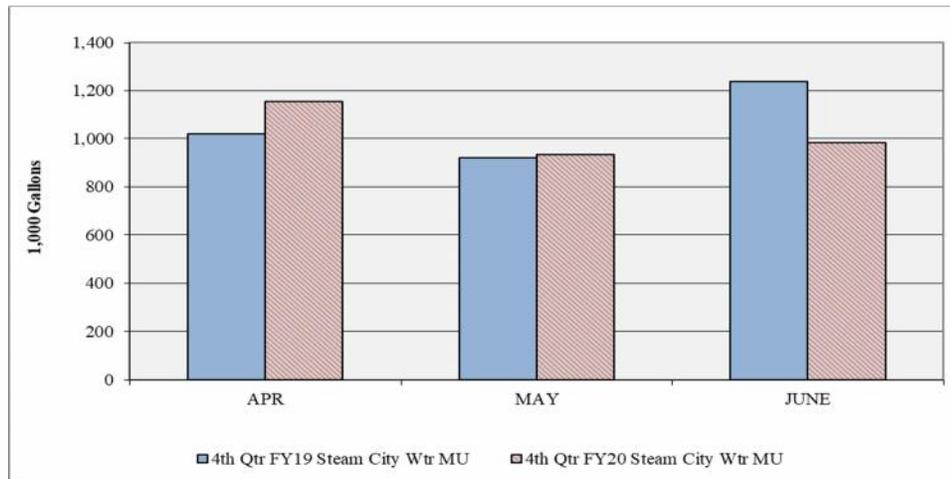


Figure 10. Steam System City Water Make-up Comparison

3. Performance

The performance of the steam system of the EGF is presented by the following three charts, Figures 11, 12 and 13. Under the management of CNE, the System Performance Guarantee levels as described in the ARMA are being achieved satisfactorily.

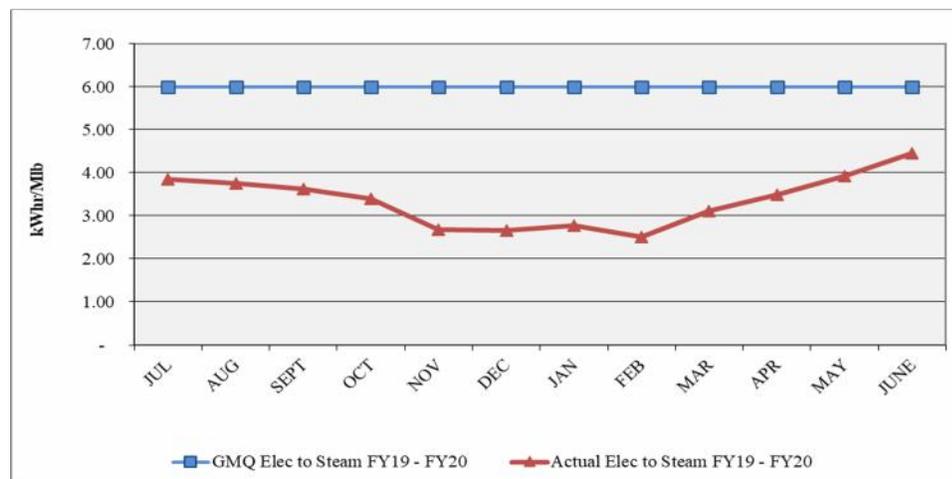


Figure 11. Steam Plant Electric Performance Guarantee for the Previous Twelve Months

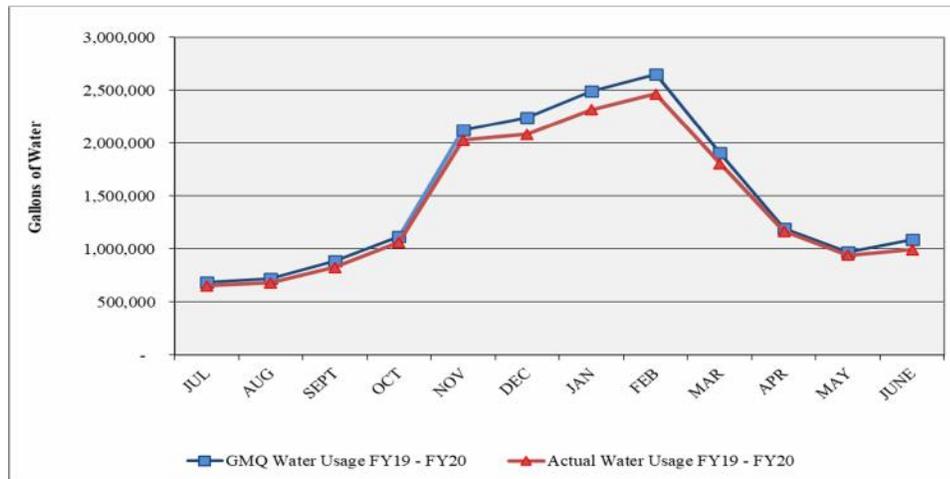


Figure 12. Steam Plant Water Performance Guarantee for the Previous Twelve Months

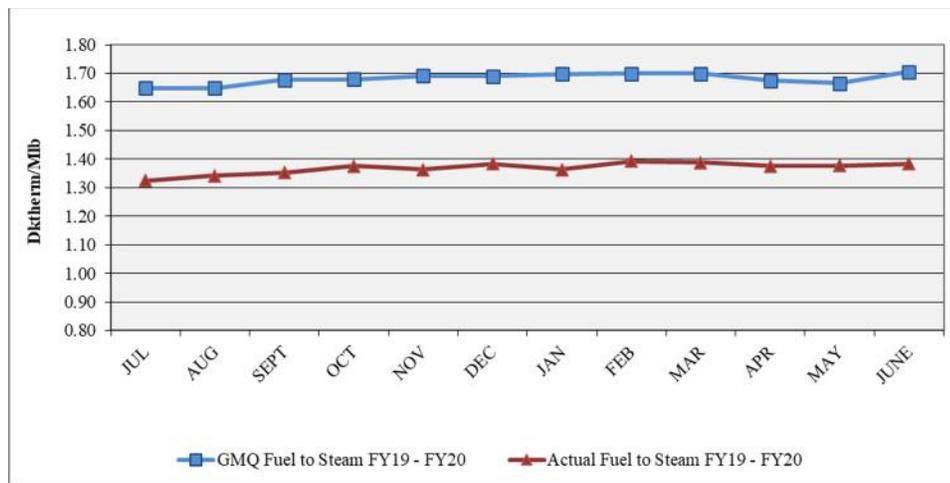


Figure 13. Steam Plant Fuel Performance Guarantee for the Previous Twelve Months

The current quarter experienced a 4.5% increase in the steam plant electric consumption while experiencing a 22.6% increase in the electric conversion factor. The water consumption for the steam plant decreased 3.3% this quarter as compared to the previous Fourth Quarter. The fuel consumption per unit of steam sales was 4.0% higher than in the previous Fourth Quarter. This increase in the fuel consumption unit is the highest single quarter increase recorded and represents a significant decrease in boiler plant efficiency. This change may be due to the significantly lower steam sales and sendout. TEG will continue to monitor this issue. For the year, the steam electric conversion factor increased 6.2% but the fuel efficiency remained approximately the same. The 10.6% in annual water usage may be related to the decline in the relative condensate return (9.1%) as compared to FY19.

Amendment 2 of the ARMA, effective July 1, 2020, will require a more efficient operation in order to meet the performance goals for the steam system, as well as the chilled water.

C. Contract Guarantee Performance

The production and sales performance for the EGF and EDS are summarized in Table 1 for the current quarter. Additional parameters, such as cooling tower blow-down and peak demands are listed in this table, as well. Table 2 presents the Fourth Quarter and Annual comparisons of the Guaranteed Maximum Quantities (GMQ) or System Performance Guarantees of the criteria commodities (fuel, water and electricity).

Table 1. Fourth Quarter and Annual FY20 Production, Sales and Consumption Summary

Item	Unit	Fourth Quarter FY20	Fourth Quarter FY19	*Percent Difference	Total Year FY20	Total Year FY19	*Percent Difference
	days	91	91	0.00%	366	365	0.27%
Total Electric Use	kWhrs	11,378,147	15,652,685	-27.31%	53,568,646	57,417,435	-6.70%
Chilled Water	kWhrs	11,184,097	15,466,901	-27.69%	52,506,987	56,322,467	-6.77%
Steam	kWhrs	194,050	185,784	4.45%	1,061,659	1,094,968	-3.04%
Total Water Use	kgal	32,353	42,427	-23.74%	143,003	146,808	-2.59%
Total Chilled Water	kgal	29,281	39,250	-25.40%	126,144	131,568	-4.12%
EDS Make-up	kgal	5,959	5,073	17.47%	19,662	22,602	-13.01%
Cooling Towers	kgal	23,322	34,177	-31.76%	106,482	108,966	-2.28%
Calc CT Evaporation	kgal	20,978	30,543	-31.32%	95,462	92,943	2.71%
CT Blowdown	kgal	2,344	3,634	-35.50%	11,020	16,023	-31.22%
Calc # Cycles		8.95	8.40	6.48%	8.66	5.80	49.34%
Steam	kgal	3,072	3,177	-3.31%	16,859	15,240	10.62%
Total Fuel Use	mmBTU	96,783	103,883	-6.83%	566,364	601,143	-5.79%
Natural Gas	mmBTU	96,775	103,875	-6.84%	565,895	600,771	-5.81%
Propane	mmBTU	8	8	0.00%	468	372	25.89%
Condensate Return	kgal	5,787	6,715	-13.82%	34,919	40,881	-14.58%
lbs		47,195,457	54,763,270	-13.82%	284,794,127	333,420,119	-14.58%
Avg Temp	°F	193.3	190.3	1.58%	186.4	182.8	2.01%
Sendout							
Chilled Water	tonhrs	13,211,200	18,262,300	-27.66%	60,109,100	64,693,500	-7.09%
Steam	lbs	70,258,000	78,401,000	-10.39%	412,950,000	439,458,000	-6.03%
Peak CHW Demand	tons	14,969	15,771	-5.09%	17,711	18,185	-2.61%
Peak Steam Demand	lb/hr	88,844	100,906	-11.95%	136,906	142,594	-3.99%
CHW LF		40.41%	53.02%	-23.78%	38.64%	40.61%	-4.86%
Steam LF		36.21%	35.58%	1.78%	34.34%	35.18%	-2.40%
Sales							
Chilled Water	tonhrs	12,532,975	17,333,938	-27.70%	56,841,256	61,977,080	-8.29%
Steam	lbs	50,430,387	59,170,565	-14.77%	346,226,698	379,380,218	-8.74%
Losses							
Chilled Water	tonhrs	678,225	928,362	-26.94%	3,267,844	2,716,420	20.30%
Steam	lbs	19,827,613	19,230,435	3.11%	66,723,302	60,077,782	11.06%
		28.22%	24.53%	15.06%			
Degree Days							
CDD		557	702	-20.66%	2,158	2,223	-2.92%
HDD		309	164	88.41%	3,000	3,220	-6.83%

*positive percent difference values imply an increase from FY19 to FY20

Table 2. Fourth Quarter and Annual FY20 Performance Guarantee Comparison for Steam and Chilled Water

GMQ Calculations	Unit	Fourth Quarter FY20	Fourth Quarter FY19	*Percent Difference	Total Year FY20	Total Year FY19	*Percent Difference
Steam							
GMQ Elec Conversion	kWhr/Mlb	6.00	6.00		6.00	6.00	
Electric Conversion	kWhr/Mlb	3.85	3.14	22.55%	3.07	2.89	6.24%
GMQ Plant Efficiency	Dth/Mlb	1.682	1.679		1.681	1.674	
Plant Efficiency	Dth/Mlb	1.378	1.325	3.96%	1.372	1.368	0.26%
Actual %CR		67.17%	69.85%	-3.83%	68.97%	75.87%	-9.10%
Avg CR Temp	°F	193	190	1.58%	186	183	2.01%
GMQ Water Conversion	gal	3,251,890	3,332,993		18,070,373	14,951,668	
Water Conversion	gal	3,102,720	3,208,770	-3.31%	17,027,590	15,392,400	10.62%
Chilled Water							
GMQ Elec Conversion	kWhr/tonhr	1.055	1.055		1.055	1.055	
Electric Conversion	kWhr/tonhr	0.892	0.892	0.01%	0.924	0.909	1.65%
GMQ Water Conversion	gal/tonhr	5.25	5.25		5.25	5.25	
Water Conversion	gal/tonhr	2.34	2.26	3.18%	2.22	2.12	4.54%

*positive percent difference values imply an increase from FY19 to FY20

D. Operating Costs

The fixed operating costs for the DES include the management fee to CNE, debt service payments on the bonds and engineering and administration costs and are charged to the Initial System Customers (ISCs) relative to their contract demand. For all non-ISCs, their fixed costs are principally based on a value established by their contracts and are not tied directly to the actual costs of the debt service or CNE's management fee.

Amendment 2 of the ARMA, effective July 1, 2020, will reduce the total management fee paid to CNE. The ISCs, whose fixed costs are tied directly to the value of the System Operator's management fees, will see the greatest reduction in costs for FY21. However, all customers will benefit from the negotiated contract extension due to more stringent performance guarantees and a reduction in the Fuel Efficiency Adjustment.

The variable costs are dependent on the amounts of steam and chilled water produced and sold to the customers. These latter costs include the utility and chemical treatment costs. Most of the costs incurred for the operation of the DES are passed onto the customers in the form of the demand charges (fixed costs) and energy charges (variable costs). Therefore, the reduction in monthly energy usage decreases the revenue for the DES but has negligible impact on the required Metro Funding Amount. A summary of the total operating costs for the fiscal year to date are shown in Table 3.

The revenues shown in Tables 3 and 4 reflect the charges to the customers for their respective steam and chilled water service. The difference between the total costs and revenues from the customers is the shortfall that must be covered by Metro. The shortfall

exists due to the remaining unsold capacity at the EGF and the debt service for bonds to which the customers do not directly contribute.

The DES response to the nCOVID-19 pandemic included the potential deferral of customer invoices and waiving late fees. Customers had the option, beginning in late March, to defer 75% of their invoices for a two-month period if they could substantiate financial hardship due to the pandemic. DES also waived late fees and disconnects for non-payments. This deferral was extended during the Fourth Quarter through the end of July. Only two customers have taken advantage of the deferrals as of the writing of this report. Customers will be invoiced one-twelfth of the total deferred amounts beginning in FY21.

For FY20, the current fiscal year system operating costs to date are \$17,556,000. This value represents approximately 86.1% of the total budgeted operating cost for FY20. The customer revenues from the sales of steam and chilled water for FY20 are \$16,170,000 (79.3% of budgeted amount). The required difference between the operating costs and revenues has been allocated from the Undesignated Fund Balance for FY20. The fiscal year to date amount required is \$1,386,100. These totals do not include any costs or additional revenues that may be accounted for in the annual customer true-up or any outstanding invoices as of the date of this report.

Table 3. DES Expenses and Revenues to Date

Item	FY20 Budget	First Quarter Expenses	Second Quarter Expenses	Third Quarter Expenses	Fourth Quarter Expenses	Total Spending to Date	% of Budget
Operating Management Fee							
FOC: Basic	\$ 4,357,000	\$ 1,096,984	\$ 1,096,984	\$ 1,096,984	\$ 1,096,984	\$ 4,387,936	100.71%
9th Chiller	\$ 42,800	\$ 10,754	\$ 10,754	\$ 10,754	\$ 10,754	\$ 43,018	100.51%
C/O 6A	\$ 86,200	\$ 21,233	\$ 21,233	\$ 21,233	\$ 21,233	\$ 84,930	98.53%
C/O 6B	\$ 75,500	\$ 18,588	\$ 18,588	\$ 18,588	\$ 18,588	\$ 74,353	98.48%
C/O 7	\$ 27,800	\$ 7,003	\$ 7,003	\$ 7,003	\$ 7,003	\$ 28,011	100.76%
C/O 8	\$ 12,300	\$ 3,065	\$ 3,065	\$ 3,065	\$ 3,065	\$ 12,258	99.66%
Pass-thru Charges:	\$ 253,100	\$ 47,826	\$ 55,733	\$ 60,782	\$ 58,842	\$ 223,183	88.18%
Chemical Treatment	\$ 253,100	\$ 47,826	\$ 55,733	\$ 60,782	\$ 58,842	\$ 223,183	88.18%
Insurance	\$ 31,400	\$ 5,178	\$ 14,406	\$ -	\$ -	\$ 19,584	62.37%
Marketing:	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	n.a.
CNE Sales Activity	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	n.a.
Incentive Payments	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	n.a.
FEA:	\$ 65,075	\$ 13,126	\$ 30,149	\$ 29,657	\$ 11,613	\$ 84,545	129.92%
Steam	\$ 65,075	\$ 13,126	\$ 30,149	\$ 29,657	\$ 11,613	\$ 84,545	129.92%
Chilled Water	\$ 177,124	\$ 109,741	\$ 57,013	\$ 48,888	\$ 91,446	\$ 307,088	173.37%
Misc:	\$ -	\$ (202,506)	\$ (141,292)	\$ (154,719)	\$ (189,560)	\$ (688,077)	n.a.
Metro Credit	\$ -	\$ (202,506)	\$ (141,292)	\$ (154,719)	\$ (189,560)	\$ (688,077)	n.a.
ARFA	\$ 66,300	\$ 16,587	\$ 16,669	\$ 16,669	\$ 16,669	\$ 66,594	100.44%
Deferral	\$ -	\$ -	\$ -	\$ (44,862)	\$ (103,060)	\$ (147,922)	n.a.
Subtotal - Man Fee =	\$ 5,194,600	\$ 1,350,083	\$ 1,331,597	\$ 1,268,760	\$ 1,233,138	\$ 5,183,578	99.79%
Reimbursed Management Fee + Chem Treatment		\$ 1,350,831	\$ 1,336,028	\$ 1,268,760	\$ 1,233,137	\$ 5,188,756	0.00%
Metro Costs							
Pass-thru Charges:	\$ 27,100	\$ 17,333	\$ 14,661	\$ 17,939	\$ 2,348	\$ 52,280	192.92%
Engineering	\$ 27,100	\$ 17,333	\$ 14,661	\$ 17,939	\$ 2,348	\$ 52,280	192.92%
EDS R&I Transfers	\$ 287,600	\$ 71,900	\$ 71,900	\$ 71,900	\$ 71,900	\$ 287,600	100.00%
Metro Marketing	\$ 10,900	\$ -	\$ -	\$ -	\$ -	\$ -	0.00%
Project Administration	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	n.a.
Metro Incremental Cost	\$ 324,200	\$ 58,365	\$ 59,993	\$ 79,150	\$ 94,948	\$ 292,457	90.21%
Utility Costs:	\$ 620,000	\$ 189,195	\$ 126,787	\$ 138,958	\$ 174,719	\$ 629,659	101.56%
Water/Sewer	\$ -	\$ 273	\$ 730	\$ 899	\$ 81	\$ 1,983	n.a.
EDS Water/Sewer	\$ -	\$ 273	\$ 730	\$ 899	\$ 81	\$ 1,983	n.a.
EDS Electricity	\$ 59,200	\$ 13,414	\$ 14,505	\$ 15,761	\$ 14,841	\$ 58,521	98.85%
Electricity	\$ 5,814,700	\$ 1,829,987	\$ 913,884	\$ 722,249	\$ 1,058,563	\$ 4,524,683	77.81%
Natural Gas Consultant	\$ 12,400	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 12,000	96.77%
Natural Gas Transport	\$ -	\$ 40,856	\$ 69,085	\$ 73,682	\$ 43,545	\$ 227,168	n.a.
Natural Gas Fuel	\$ 2,959,100	\$ 185,302	\$ 457,256	\$ 390,782	\$ 162,381	\$ 1,195,720	40.41%
Propane	\$ -	\$ -	\$ 61,141	\$ (40,000)	\$ -	\$ 21,141	n.a.
Subtotal - Metro Costs =	\$ 10,115,200	\$ 2,409,625	\$ 1,792,942	\$ 1,474,320	\$ 1,626,326	\$ 7,303,213	72.20%
Subtotal - Operations =	\$ 15,309,800	\$ 3,759,708	\$ 3,124,539	\$ 2,743,080	\$ 2,859,463	\$ 12,486,790	81.56%
Debt Service							
2012 Bonds	\$ 3,485,800	\$ 868,963	\$ 868,963	\$ 868,963	\$ 868,963	\$ 3,475,850	99.71%
2005 Bonds -Self Funded	\$ 401,100	\$ 356,106	\$ -	\$ 44,959	\$ -	\$ 401,066	99.99%
2007 Bonds -Self Funded	\$ 181,700	\$ 45,425	\$ 45,425	\$ 45,425	\$ 45,425	\$ 181,700	100.00%
2008 Bonds -Self Funded	\$ 181,400	\$ 45,350	\$ 45,350	\$ 45,350	\$ 45,350	\$ 181,400	100.00%
2010 Bonds -Self Funded	\$ 183,200	\$ 45,800	\$ 45,800	\$ 45,800	\$ 45,800	\$ 183,200	100.00%
Fund 49107 -Self Funded	\$ 646,000	\$ 161,500	\$ 161,500	\$ 161,500	\$ 161,500	\$ 646,000	100.00%
MIP	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	n.a.
Oper. Reserve Fund	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	n.a.
Subtotal - Capital =	\$ 5,079,200	\$ 1,523,144	\$ 1,167,038	\$ 1,211,997	\$ 1,167,038	\$ 5,069,216	99.80%
Total =	\$ 20,389,000	\$ 5,282,852	\$ 4,291,577	\$ 3,955,077	\$ 4,026,501	\$ 17,556,006	86.11%
Customer Revenues							
Taxes Collected		\$ 96,963	\$ 79,459	\$ 79,049	\$ 78,300	\$ 333,771	n.a.
Taxes Paid		\$ 96,963	\$ 79,460	\$ 79,049	\$ 78,300	\$ 333,772	n.a.
Interest & Misc Revenue	\$ 192,400	\$ 45,476	\$ 45,935	\$ 46,641	\$ 6,924	\$ 144,976	75.35%
Penalty Revenues/Credits		\$ 22,252	\$ (153,877)	\$ (27,496)	\$ 28,919	\$ (130,202)	n.a.
Energy Revenues Collected		\$ 4,658,529	\$ 3,958,519	\$ 3,744,673	\$ 3,793,416	\$ 16,155,137	85.96%
Revenues =	\$ 20,389,000	\$ 4,726,257	\$ 3,850,576	\$ 3,763,818	\$ 3,829,259	\$ 16,169,910	79.31%
Metro Funding Amount =	\$ -	\$ 556,595	\$ 441,001	\$ 191,259	\$ 197,242	\$ 1,386,096	0.00%

The DES serves 29 customers and 42 buildings in downtown Nashville. These customers are divided into three categories: 1) Privately owned buildings, 2) State of TN owned buildings and 3) Metro owned buildings. A summary of the annual costs for each of these three categories is presented in Table 4. These values include late fees and penalties and any unpaid balances.

Table 4. Customer Revenue Summary to Date

Building	Chilled Water			Steam		
	Total Cost	Consumption (tonhrs/yr)	Unit Cost (\$/tonhr)	Total Cost	Consumption (Mlb/yr)	Unit Cost (\$/Mlb)
Private Customers	\$ 3,686,779	18,065,561	\$ 0.2041	\$ 1,251,018	88,886	\$ 14.0744
State Government	\$ 3,213,799	12,299,713	\$ 0.2613	\$ 1,603,878	105,777	\$ 15.1628
Metro Government	\$ 4,781,375	26,473,982	\$ 0.1806	\$ 1,618,588	151,564	\$ 10.6793
New Customers	\$ 3,100,654	17,192,861	\$ 0.1803	\$ 1,119,664	118,415	\$ 9.4554
Total	\$ 11,681,953	56,839,256	\$ 0.2055	\$ 4,473,484	346,227	\$ 12.9207

Total Revenue \$ 16,155,437
 True-up and Adjustments (Net) \$ 14,473
 Net Revenue \$ 16,169,910

III. EGF Operations

Items relating to the facility operations presented herein are derived from the monthly reports issued by CNE for FY20. TEG and CNE continue to meet monthly and regularly communicate about important issues and on-going projects. CNE has reported and managed EGF operations satisfactorily and according to the ARMA with no contract violations; however, chiller plant performance has continued to decline over its historic values.

A. Reliability

The principle issues surrounding the reliable operation of the EGF relates to the ability to operate without significant interruption, exclusive of planned outages, and disruption of service to the customers. The following disruptions in service occurred during the quarter.

-) The boiler pressure dropped to a low of 138 psig for approximately forty-five (45) minutes on April 18 due to starting an additional boiler.
-) An electrical power failure on May 3 caused the boiler pressure to drop to a low of 121 psig for approximately forty-five (45) minutes. This failure also caused the chilled water temperature to rise to about 47.5°F for thirty-six (36) minutes.
-) A failed leaving temperature sensor on chiller 4 caused the sendout temperature to be above 43.3°F for approximately seventy-six (76) minutes on May 5.
-) Chiller 3 tripped on low condenser water flow on May 17 causing the sendout temperature to reach a maximum of 44.6°F for approximately forty-four (44) minutes.
-) Boiler 2 tripped due to low water level on May 21 causing the steam pressure to drop to a low of 135 psig for approximately forty-five (45) minutes.
-) The chilled water sendout temperature was above 43.3°F on June 1 for approximately forty-five (45) minutes while Trane was troubleshooting chiller 7.

B. Efficiency

The operation of the EGF satisfied the guaranteed levels for all commodity usage during the quarter. There were no significant excursions above the guaranteed levels for the current quarter. A more detailed discussion of the contract guarantee performance was presented previously in this report.

C. Environment, Health and Safety

No environmental violations were reported during the quarter.

In order to maintain the COVID-19 social distancing guidelines, CNE has implemented and is requiring regular attendance for online safety courses for their employees.

D. Personnel

CNE is currently staffed with nineteen full time employees, one part-time employee and one relief staff. Of the current number of employees, fourteen were previously employed by Nashville Thermal Transfer Corporation.

E. Training

Staff training for this quarter consisted of the Health and Safety training discussed previously.

F. Water Treatment

The water treatment program consists of regular testing and monitoring of the water chemistry in the steam, chilled water and condensing water systems. Chemicals are added to control the water hardness, chlorine levels and biologicals. Remote testing of the condensate at the AA Birch, Tennessee Tower and the Andrew Jackson also occurs regularly to monitor the concentration and distribution of the steam system chemicals.

) Steam System

- The condensate return averaged approximately 67.2% of the steam sendout during the quarter, which represents a 3.8% decrease over the previous Fourth Quarter. Due to discovering hardness in the condensate during the quarter, the condensate was dumped for a portion of June.
- The relative condensate return was 69.0% for FY20, which represents a 9.1% decrease from FY19.
- Feedwater iron, pH and hardness (otherwise) remained within their acceptable ranges during the quarter.

-) Condensing Water System
 - o The conductivity of the condensing water continues to be normal with only a few excursions resulting in high cycles of concentration and low blowdown rates.
-) Chilled Water System
 - o CNE continues to monitor and test for the presence of bacteria in the system. The continuous dosage of the biocide continues. The biological growth in the system, as measured at the EGF and at the customer buildings, has become essentially non-existent.
 - o The project to install a side stream filter at the EGF remains on hold pending funding and authorization from Metro.

G. Maintenance and EGF Repairs

CNE continues to report on the numerous routine maintenance and preventive maintenance activities performed on the EGF primary and ancillary equipment. The principle items are discussed herein as they relate to the repair, maintenance or replacement of equipment or devices at the facility and are not considered extraordinary. The cost for these items is included as part of the FOCs.

-) Cleared debris around exterior of EGF;
-) Checked and repaired plant computers and servers;
-) Checked and adjusted packing on all pumps;
-) Repaired plant lighting;
-) Completed the replacement of chilled water pump 6 VFD;
-) Replaced the breaker on cooling tower 12;
-) Repaired tube leaks on chiller 6;
-) Cleaned and repaired the cooling tower blowdown meter and strainer;
-) Replaced the AED;
-) Adjusted the pressure differential switches on the condensing water pumps;
-) Repaired the jackshaft on boiler 4;
-) Cleaned the cooling towers;
-) Repaired tube leaks in boiler 3;
-) Replaced the solenoid on chiller 9;
-) Cleaned the hot deck on cooling tower 9;
-) Replaced the oil filter on chiller 3;
-) Replaced the temperature sensor on chiller 6 and 7;
-) Repaired insulation around EGF;

-) Cleaned the temperature sensor on chiller 4;
-) Applied the test coat to the riser tube in cooling tower 1;
-) Other repairs, maintenance and preventative maintenance were made during the quarter and are listed in the monthly reports issued by CNE.

H. EGF Walkthrough

The Fourth Quarter Walkthrough was conducted on June 30, 2020, by Kevin L. Jacobs, P.E. Based on the review of the EGF, the following comments and observations are presented. The items noted in this section need to be completed prior to the end of the operating contract for the System Operator in accordance with the ARMA paragraph 12.03.

-) CNE has reported in the previous quarters that the riser tubes in all of the cooling towers had been painted and that the cooling tower fill had all been replaced. Rust spots on the riser tubes remained present in the Fourth Quarter FY20 Walkthrough and have continued to worsen. CNE applied a test coat of a new material on the riser tube for cooling tower 1 during the Quarter. No additional work has been performed on the riser tubes since the First Quarter Walkthrough FY18.
-) In previous Walkthrough reports, it was noted that significant scale was observed on the fill (louvers) to several of the cooling towers. CNE began cleaning some of the towers and their louvers during the Second Quarter. Where the cleaning has occurred, the scale has been largely removed. Although the vast majority of the scale has been removed by CNE's efforts, towers 11, 12, 13 and 15 need additional cleaning. TEG has investigated the change in the chiller plant efficiency and determined that the chiller plant efficiency has declined in the past calendar year relative to the past 3 and 5-year averages. Although an increase in chiller plant efficiency is noted for the Fourth Quarter, it remains TEG's opinion that the cause of the decrease in the chiller plant efficiency is due to the condition of the cooling towers.
-) In previous Walkthrough reports, it was noted that a leaking chemical feed line was observed on the south side of the southern DA. CNE had cleaned the affected area and repaired the original leak first reported over a year prior; however, the new leak (that was first reported in the Q4FY19 report) has formed and has become worse than the previous one. The leak in this chemical feed line causes a localized build-up of the chemical salts at the leak point. CNE has cleaned the leak and repaired the leaky valve. This item will be removed from future reports unless the problem recurs.
-) An additional leak with salt build-up was noted on a valve at the sulfite (oxygen scavenger) tank on the mezzanine level. Additional build-up of material was also noted on a valve from the BWT6233 tank. CNE has cleaned the leak and repaired the leaky valve. This item will be removed from future reports unless the problem recurs.

-) The condensate leak in the header piping between the two de-aerators noted in previous Walkthrough reports has been repaired and re-insulated. This item will be removed from future reports unless the leak recurs.
-) CNE has removed all of the dead trees and their detritus. CNE and Metro have discussed the plan to potentially replace the trees. CNE will meet with the city's Urban Forester to determine the appropriate tree density required by the city for the EGF site and the proper species to replant. CNE has postponed this meeting due to CNE's safety protocols associated with the pandemic.
-) During the Walkthrough, a rainwater leak was noted from the roof drain on the mezzanine level over the chemical feed tank BWT6130. A second leak was also noted from around a natural gas vent near the de-aerator on the mezzanine level. CNE was made aware of these leaks.
-) Mineral deposits on the condensing water pumps have been noted in previous Walkthrough reports and CNE has since cleaned the pumps and painted the volutes. During this Walkthrough, the mineral deposits were noted as having returned on the condensing water pumps. These were last cleaned in the Second Quarter FY18. CNE needs to clean these pumps; painting may not be necessary.
-) During the Walkthrough, the EGF experienced a momentary loss of electricity due to the ongoing storm. The loss of power was sufficient to cause most of the lighting in the EGF to flicker and the chillers to trip off-line. Subsequent to this disruption, four lamps on the west side of the chillers, two lamps near the expansion tanks and one lamp above chiller 9 were not working. The lamps could have not been working due to the electrical disruption or they could be blown. CNE needs to investigate this issue and replace these lamps, if necessary.
-) Other action items previously noted to be addressed by CNE have been completed. (See also the "Quarterly EGF Walkthrough Report," dated June 30, 2020, by TEG for additional information.)

IV. Capital Projects

The Capital Projects discussed in this section are those projects funded through the issuance of bonds by Metro. Costs for these projects will be paid from funds already appropriated. The status of the projects is discussed, and the project cost-to-date and bond balances are also presented. The Mayor's "Stay-at-Home" COVID-19 order has been lifted and Nashville is in a staged re-opening which has allowed work on projects to resume.

A. Fourth Quarter FY20 Open Projects

The following projects remained open at the end of the Fourth Quarter FY20.

1. DES111 – DES Combined Heat and Power

This project is currently on hold.

2. DES133.1 - Old Convention Center Site Redevelopment: Monitoring of Broadway Tunnel

This project involved the monitoring/reporting on the condition of the Broadway Tunnel related to the construction and blasting at the 5th + Broadway Development. The City is pursuing reimbursement from the contractor(s) responsible for the blasting and subsequent damage to the tunnel through legal means, this project remains open. The repairs for tunnel damage were completed under project DES164.

3. DES139 – DES Options Review

During the Quarter, the budget submitted to Metro Council for FY21 included the adoption of an extension to CNE's operating contract and the intent to rescind Engie's offer to Metro's RFP for the sale or operating contract of the DES. The terms of the contract extension have been agreed upon by Metro and CNE. With the passage of the FY21 budget in June, the execution of CNE's contract extension, referred to as Amendment 2 to the Amended and Restated Management Agreement (ARMA) is anticipated in early FY21.

4. DES152 – Manhole A and Manhole M Coating Repairs

The structural steel in these manholes were cleaned and painted as part of DES107 in 2015. Portions of the paint is now flaking on these supports. The paint manufacturer reviewed the failing coatings. Their position is that the surface preparation and paint application was at fault. However, TEG employed a painting inspector during this work and records were maintained regarding the ambient conditions, surface preparation and coating application process. Even with this evidence, the paint manufacturer is not willing to warrant the work. Before the existing corrosion progresses, these coating failures need to be repaired. This project addresses these needed repairs. Due to similar issues resulting from DES107 work, Manhole B has been added to this scope.

TEG is preparing construction documents to have this work completed and expects the project to be bid late in the First Quarter FY21 or early in the 2nd Quarter FY21.

5. DES153 – Manhole L Repairs

The structural steel in Manhole L is corroded and needs to be cleaned and painted to prevent any additional corrosion. Additionally, the condensate piping in this manhole experiences severe hammering, and the piping configuration needs to be modified to alleviate this problem.

TEG has completed the design for these repairs and is monitoring a new coating which has been used in DES157 and DES159. One of these coatings is performing well and will be specified for this project. It is anticipated that a pre-bid meeting will be scheduled during the First Quarter FY21.

6. DES154 – Manhole K Repairs

The structural steel in Manhole K is corroded and needs to be cleaned and painted to prevent any additional corrosion.

TEG started the design for these repairs during the First Quarter FY19, however, due to higher priority projects this work has been postponed. It is anticipated that this work will take place during FY21.

7. DES157 – Manhole 9 Structural Steel Repairs

This project was substantially complete during the Fourth Quarter FY20. The contractor is having to provide insulation inserts for an ill-fitting insulation blanket to complete this project. These inserts will be installed early in the First Quarter FY21. Upon their installation, this project will be closed.

8. DES159 – Manhole B2 Structural Steel Repairs

This project was substantially complete during the Fourth Quarter FY20, however additional needed repairs at a steam pipe wall penetration have been discovered. It is anticipated that this work will be substantially complete during the First Quarter FY21.

9. DES160 – New Service to 5th + Broadway Development

The instrumentation for the 5th + Broadway development was installed late in the Third Quarter. The completion of the installation, along with the metering panel and its programming, was completed in April 2020. With the completion of a successful hydrostatic test of the chilled water piping, the chilled water to the building was energized in April and became available for use by the building's contractor. This project is now completed.

10. DES161 – Manhole S6 Insulation

This project addresses the installation of insulation in Manhole S6 which is a small manhole in the State distribution system. It is anticipated that this work will be bid during the First Quarter FY21.

11. DES162 – Service to New Hotel at 3rd Ave & Molloy

The completion of the new service to the Hyatt Centric is anticipated in the First Quarter FY21. The building's contractor plans to need chilled water service during construction in August 2020. The Hyatt Centric is expected to open for commercial operation in April 2021.

12. DES163 – New Service to MDHA Parcel K

Negotiations with this potential customer are in the early stages.

13. DES168 – DES Service to 1st and KVB Hotels

TEG continued to be in contact with the engineer for two new hotels proposed to be developed at 1st Ave S and KVB during the quarter. The building's preliminary design is reported to include service from the DES but is currently on hold pending direction from the building's developer/owner.

14. DES169 - Manhole 20 Repairs

Manhole 20 is connected to the 7th Avenue Tunnel and houses steam, condensate return and chilled water service piping to Hume Fogg High School. The pipe support stanchions in this manhole (adjacent to the 7th Avenue Tunnel), are badly corroded and require replacement. This project addresses the replacement of these pipe supports.

Submittals have been approved and it this work is scheduled to take place during the First Quarter FY21

15. DES171 – Broadway Tunnel Pipe Support & Safety Items Repairs

Some of the steel pipe supports, guides and anchors in the Broadway Tunnel are corroded and either need to be repaired or replaced. Additionally, the access ladder in Manhole 18 needs to be re-positioned so that it properly aligns with the manway. A pre-bid meeting will be held early in the First Quarter FY21. It is anticipated that the work will be substantially completed during the Second Quarter FY21.

16. DES172 – Viridian and 4th Avenue Tunnel Pipe Support Repairs

Some of the steel pipe supports, guides and anchors in the 4th Avenue Tunnel and the supports for the Viridian service are corroded and either need to be repaired or replaced. Additionally, the access ladder in Manhole 17 needs to be re-positioned so that it properly aligns with the manway. A pre-bid meeting will be held early

in the First Quarter FY21. It is anticipated that the work will be substantially completed during the Second Quarter FY21.

17. DES173 – Manhole B3 Structural Repairs

The steel pipe supports in Manhole B3 need to be cleaned and coated to prevent further corrosion. In addition, some minor concrete repairs are needed. This manhole is located in front of the new Hyatt-Centric Hotel being constructed and scheduled to open early in 2021 (a new DES customer). Therefore, TEG has arranged with the developer/owner to have this work completed during the fall of 2020. It is anticipated that this work will be bid in the late August/early September.

18. DES174 – 7th Avenue Tunnel Pipe Support Repairs

Some of the steel pipe supports, guides and anchors in the 7th Avenue Tunnel are corroded and either need to be repaired or replaced. Additionally, the access ladder in Manhole 22 needs to be re-positioned so that it properly aligns with the manway. A pre-bid meeting will be held early in the First Quarter FY21. It is anticipated that the work will be substantially completed during the Second Quarter FY21.

19. DES175 – Manhole 4 Condensate Return Repairs

The condensate return piping between Manholes 3 and 4 on Union Street failed several years ago. Because of the few customers connected to this part of the condensate return system, the costs to replace this piping segment resulted in a very long payback. In lieu of replacing this piping segment, in order to safely discharge the condensate from the trap within Manhole 4, a short piping run was installed between Manhole 4 and the basement of 401 Union Street (Fairlane Hotel) in order to discharge the trap's condensate to drain. After several years of service, this piping between Manhole 4 and 401 Union Street has now failed.

This project investigates solutions for the replacement of this segment of the condensate return piping system including potential directional drilling to the 4th Avenue Tunnel.

20. DES176 – Manhole 9 Condensate Return Leak Repair

A leak in the condensate return piping main immediately east of Manhole 9 has been discovered. Hot water was found flowing up from the ground adjacent to Manhole 9. This project addresses the repair of this piping segment. Due to the potential hazard to the public, a contractor will be hired to excavate and investigate the cause for this leak. This work will be completed during the First Quarter FY21.

B. Fourth Quarter FY20 Closed Projects

DES160 was closed during the Fourth Quarter FY20.

C. Capital Projects Budget

The following table summarizes the costs and remaining balance of the DES capital projects based on reported expenditures to date. Open projects or completed projects that require some additional management are shown. Total costs for projects that are closed are shown with a gray highlight. Only the funds currently available are shown.

Table 5. Capital Projects Expense Summary

DES Project #	Description	Total Budget	FY20 Spending to Date	Total Spent to Date	Remaining Balance
Fund-49109					
DES139	Options Review	\$ 63,600	\$ -	\$ 44,019	\$ 19,581
DES133	NCC Development	\$ 10,000	\$ 47	\$ 8,808	\$ 1,192
DES133.3	Broadway Tunnel Reinforcement	\$ -	\$ -	\$ 1,427	\$ (1,427)
DES135	Chilled Water Leak 5th and Union	\$ 50,000	\$ 1,132	\$ 28,801	\$ 21,199
DES151	MH 23 Repairs	\$ -	\$ 47	\$ 7,446	\$ (7,446)
DES160	5th + Broadway Service	\$ -	\$ 2,677	\$ 2,677	\$ (2,677)
Total Closed Projects		\$ 2,493,661	\$ -	\$ 2,507,423	\$ (13,762)
Metro Project Admin		\$ -	\$ -	\$ -	\$ -
Project Man, Development, etc		\$ (11,346)	\$ -	\$ -	\$ (11,346)
Total 2010 Bond		\$ 2,605,916	\$ 3,904	\$ 2,600,602	\$ 5,314
Fund-49107					
	EMR 19-001 Steam Leak at Municipal	\$ 2,221	\$ 2,182	\$ 2,182	\$ 39
Total Closed Projects		\$ 8,497,779	\$ -	\$ 8,497,779	\$ 0
Metro Project Admin		\$ -	\$ -	\$ -	\$ -
Project Man, Development, etc		\$ -	\$ -	\$ -	\$ -
Customer Connection Fund		\$ 8,500,000	\$ -	\$ 8,499,961	\$ 39
Fund-49116					
DES111	DES CHP	\$ 168,706	\$ -	\$ 168,706	\$ -
DES133.1	NCC Blasting Issue	\$ 72,151	\$ 37,151	\$ 37,151	\$ 35,000
DES135	Chilled Water Leak	\$ 43,638	\$ 819	\$ 43,638	\$ -
DES139.1	Options Review	\$ 161,250	\$ 57,941	\$ 136,250	\$ 25,000
DES151	MH 23 Repairs	\$ 219,388	\$ 142,267	\$ 219,388	\$ -
DES152	MH A & M Repairs	\$ 25,000	\$ 2,489	\$ 2,489	\$ 22,511
DES153	MH L Repairs	\$ 115,418	\$ 5,985	\$ 8,918	\$ 106,500
DES154	MH K Repairs	\$ 70,085	\$ -	\$ 85	\$ 70,000
DES157	MH 9 Repairs	\$ 127,509	\$ 85,289	\$ 104,509	\$ 23,000
DES158	MH 18A Repairs	\$ 64,760	\$ 97	\$ 64,760	\$ -
DES159	MH B2 Repairs	\$ 92,281	\$ 45,594	\$ 57,281	\$ 35,000
DES160	5th + Broadway Service	\$ 54,554	\$ 6,597	\$ 54,554	\$ -
DES161	MH S6 Insulation	\$ 38,000	\$ -	\$ -	\$ 38,000
DES162	3rd and Molloy Service	\$ 120,885	\$ 82,068	\$ 115,885	\$ 5,000
DES163	Parcel K Service	\$ 1,018,802	\$ 178	\$ 1,302	\$ 1,017,500
DES164	Broadway Tunnel Repairs	\$ 175,329	\$ -	\$ 175,329	\$ -
DES165	AA Birch Tunnel Repairs	\$ 63,242	\$ -	\$ 63,242	\$ -
DES166	Misc. Tunnel Repairs	\$ -	\$ -	\$ -	\$ -
DES167	EDS Fiber Optic Installation	\$ 4,443	\$ -	\$ 4,443	\$ -
DES168	1st and KVB Hotels	\$ 5,365,777	\$ 367	\$ 5,777	\$ 5,360,000
DES169	MH-20 Repairs	\$ 17,500	\$ 5,456	\$ 15,188	\$ 2,312
DES170	MH-18 Anchor Repair PH-2	\$ 129,409	\$ 129,409	\$ 129,409	\$ -
	EMR 19-004 Emergency Leak Repairs	\$ 64,580	\$ 64,580	\$ 64,580	\$ -
	EMR 19-001 Steam Leak at Municipal	\$ -	\$ -	\$ -	\$ -
DES171	Broadway Tunnel Support Repair	\$ 225,157	\$ 30,157	\$ 30,157	\$ 195,000
DES172	Viridian Pipe Support Repair	\$ 158,878	\$ 18,878	\$ 18,878	\$ 140,000
DES173	MH-B3 Structural Repair	\$ 31,823	\$ 1,823	\$ 1,823	\$ 30,000
DES174	7th Ave Pipe Support Repairs	\$ 135,534	\$ 20,534	\$ 20,534	\$ 115,000
DES175	MH4 Condensate Repair	\$ 99,340	\$ 6,340	\$ 6,340	\$ 93,000
Total Closed Projects		\$ 15,723	\$ -	\$ 15,723	\$ -
Metro Project Admin		\$ -	\$ -	\$ -	\$ -
Project Man, Development, etc		\$ 17,069,402	\$ -	\$ -	\$ 17,069,402
CHP and EDS Repairs		\$ 25,783,775	\$ 746,069	\$ 1,568,389	\$ 24,215,386

V. Energy Distribution System Repairs, Improvements, PM and Emergencies

Several EDS repairs and improvements were made during the Fourth Quarter. The principle items for discussion are presented in the following sections.

A. Repairs and Improvements

Several repairs were made to the EDS and at customer buildings during the quarter. The remaining value of the R&I account to date is \$139,389. Table 6 provides a summary of the FY20 expenditures and revenues to date associated with the R&I budget.

Table 6. FY20 Repair and Improvement Expenditure and Revenue Summary

Description	Date	Tracking #	Vendor	Expenditure	Transfers	Balance
Value at end of FY19				\$ 322,271.31		\$ 63,714.08
Interest/Transfer	07/01/19	DES-2370	-	\$ 151.26		
Interest/Transfer	07/01/19	DES-2370	-	\$ (151.26)		
Redeposit of Interest	03/02/20	DES-2370	-	\$ 151.26		
CNE July 2019 Invoice	02/21/20	DES-2370	CNE	\$ 11,319.33		
EMR19-003	02/21/20	DES-2373	CNE	\$ 46,254.14		
Interest/Transfer	08/01/19	DES-2370	-	\$ 187.92		
Interest/Transfer	03/02/20	DES-2370	-	\$ (187.92)		
Redeposit of Interest	08/01/19	DES-2370	-	\$ 187.92		
CNE Aug 2019 Invoice	02/21/20	DES-2373	CNE	\$ 8,278.99		
Interest/Transfer	09/03/19	DES-2370	-	\$ 208.87		
Interest/Transfer	09/03/19	DES-2370	-	\$ (208.87)		
Redeposit of Interest	03/02/20	DES-2370	-	\$ 208.87		
EMR19-005 CND Leak Repair	02/01/20	DES-2378	CNE	\$ 2,850.00		
CNE Sept 2019 Invoice	02/01/20	DES-2378	CNE	\$ 8,531.49		
Sub-Total First Quarter				\$ 77,782.00	\$ 71,900.01	\$ 57,832.09
EMR19-003 CO 1	02/01/20	DES-2378	CNE	\$ 8,357.26		
Interest/Transfer	10/01/19	-	-	\$ 222.72		
Interest/Transfer	10/01/19	-	-	\$ (222.72)		
EMR19-006 MH-D1 Vault Lid	02/01/20	DES-2378	CNE	\$ 17,330.83		
CNE Oct 2019 R&I Invoice	02/01/20	DES-2378	CNE	\$ 6,302.29		
Interest/Transfer	11/01/19	-	-	\$ 236.52		
Interest/Transfer	11/01/19	-	-	\$ (236.52)		
CNE Nov 2019 R&I Invoice	02/01/20	DES-2378	CNE	\$ 10,487.42		
EMR 19-007 3rd Ave Excavation	02/21/20	DES-2376	CNE	\$ 30,005.67		
Interest/Transfer	12/02/19	-	-	\$ 228.91		
Interest/Transfer	12/02/19	-	-	\$ (228.91)		
CNE Dec 2019 R&I Invoice	02/01/20	DES-2378	CNE	\$ 8,579.11		
Sub-Total Second Quarter				\$ 81,062.58	\$ 71,900.01	\$ 48,669.52
Interest/Transfer	01/02/20	-	-	\$ 246.46		
Interest/Transfer	01/02/20	-	-	\$ (246.46)		
CNE Jan 2020 R&I Invoice	03/02/20	DES-2380	CNE	\$ 20,476.11		
CNE Feb 2020 R&I Invoice	04/01/20	DES-2382	CNE	\$ 6,029.08		
Interest/Transfer	02/03/20	-	-	\$ 258.85		
Interest/Transfer	02/03/20	-	-	\$ (258.85)		
Redeposit of Interest	04/15/20	DES-2378	-	\$ 258.85		
Interest/Transfer	03/03/20	-	-	\$ 265.80		
Interest/Transfer	03/03/20	-	-	\$ (265.80)		
CNE Mar 2020 R&I Invoice	06/30/20	-	CNE	\$ 14,477.06		
Sub-Total Third Quarter				\$ 41,241.10	\$ 71,900.01	\$ 79,328.43
Interest/Transfer	04/01/20	-	-	\$ 93.53		
Interest/Transfer	04/01/20	-	-	\$ (93.53)		
CNE Apr 2020 R&I Invoice	06/30/20	-	CNE	\$ 6,343.61		
Interest/Transfer	05/01/20	-	-	\$ 8.03		
Interest/Transfer	05/01/20	-	-	\$ (8.03)		
CNE May 2020 R&I Invoice	06/30/20	-	CNE	\$ 4,874.40		
Interest/Transfer	06/01/20	-	-	\$ -		
Interest/Transfer	06/01/20	-	-	\$ -		
CNE June 2020 R&I Invoice	07/17/20	-	CNE	\$ 621.40		
Sub-Total Fourth Quarter				\$ 11,839.41	\$ 71,900.01	\$ 139,389.03
FY20 Year to Date				\$ 211,925.09	\$ 287,600.04	\$ 139,389.03

B. Preventive Maintenance

Preventive maintenance, tunnel and manhole inspections and reviews of customers' mechanical rooms were performed during the quarter. The principle items for discussion are presented.

1. EDS Manhole/Tunnel Inspections
 - a. The monthly vault/tunnel reviews were conducted as scheduled.
 - b. Several of the vaults continue to require pumping due to the accumulation of either groundwater or surface water.
 - c. CNE continues to fabricate and replace trap assemblies within the EDS.
 - d. CNE has begun to wire brush clean areas of minor corrosion and then paint these areas with a cold galvanizing paint. If maintained, this should help alleviate the progression of some areas of corrosion.
2. Customer metering station calibration checks were completed as scheduled.
3. The installation of the metering and instrumentation equipment at the John Sevier were completed during the Quarter. The new devices became operational in April and the building began using DES services.
4. Water chemistry samples at customer buildings were taken as scheduled.
5. Other EDS items are included in the CNE monthly reports.

C. Emergencies

There were no emergencies reported during the quarter.

D. EDS Walkthrough

The Fourth Quarter FY 2020 walkthrough was conducted on June 29, 2020. The manholes that were visited included A, B, K, L, M, N1, N2, S5, 25 and 26. The following comments and observations are a result of these visits:

1. Manhole A
 - a. There was some water present in this manhole, and it required pumping prior to entry.
 - b. There are some areas of spalled concrete in the ceiling caused by the proximity of the "feet" of rebar chairs to the surface of the concrete. TEG has included the repair of these areas in the scope for the cleaning and coating of the pipe support steel which will be put out to bid soon. In the meantime, CNE should monitor these areas and report any further degradation to TEG.
 - c. There is some corrosion on the steel supports. These supports were cleaned and painted as a part of DES107 in 2015. Soon after this project was

completed, TEG noticed the paint failing and contacted the paint inspector and the paint manufacturer. A site meeting occurred to review the failing paint and even though the paint inspector had records proving that the paint was applied per specifications, the paint manufacturer determined that the failure was caused by application errors. The paint failure occurred outside the initial 12-month warranty. TEG disagrees with the paint manufacturer's position and has developed a repair scope to prevent this from becoming a major repair/replacement. This project should be combined with paint and insulation repair in Manholes B and M.

2. Manhole B

- a. There was a small amount of water in the floor of both sides of this manhole.
- b. There is some debris in the chilled water side of the manhole which should be removed. This includes some dirt and a safety cone. **This item appeared in the last three years' reports and requires immediate action.**
- c. The paint applied to the piping supports and anchors under DES107 is beginning to fail and there is some corrosion on some of the supports. TEG will add this manhole to the scope for cleaning and re-coating which already includes Manholes A and M. This work will be bid in the near future.
- d. A portion of the link seal on the northern steam exit from the manhole has come out of the penetration. Attempts to re-install this link seal have not been successful. Currently there is no groundwater seepage at this wall penetration. CNE should monitor this wall penetration and notify TEG if groundwater seepage is detected.
- e. The access ladder siderails on the chilled water side of this manhole are "squared off" at the top and present a potential hazard to maintenance personnel. CNE should chamfer these corners and smooth out any sharp edges as soon as possible.

3. Manhole M

- a. There was no water present in this manhole.
- b. The link-seal on the steam line penetration at the northern wall has been dislodged from the top portion of the pipe. CNE personnel have tried to re-position this link-seal without success. CNE should continue to monitor the link-seal and report if water infiltration or other complications arise.
- c. The steam trap was replaced in this manhole. A portion of the dripleg insulation was removed for this installation. In addition, the piping upstream of the new trap has not been insulated. CNE should proceed with the installation/repair of this insulation as part of the R&I scope. The quotes should include matching the existing insulation on the dripleg and the use of Pyrogel XT insulation on the trap piping. **This item appeared on the last two years' reports and requires immediate action.**
- d. The bases of the piping supports have some rust stains caused by "creep" because the underside of the baseplates could not be painted under DES107.

However, there is some corrosion on the edges of some of the baseplates. TEG has developed a repair scope and specification for cleaning and coating these baseplates. This project will be included with the coating repair in Manholes A and B. This work will be bid in the near future.

4. Manhole L

- a. There is some corrosion of the structural components in this manhole, especially on the north side of the anchor beam and on the west side where a strut penetrates the manhole floor. TEG has developed a scope outline and drawings to clean and coat these structural components along with some additional needed repairs. TEG has waited to determine the viability of a new coating that has been used in other manholes before issuing this work for bid. It appears that the new coating has merit and therefore TEG will coordinate a pre-bid meeting with CNE for this project to proceed.
- b. There is some insulation damage that should be repaired on the steam piping within this manhole. This item appeared on last year's report and will be addressed in the forthcoming project.
- c. The condensate piping in this manhole has experienced water hammer events. The forthcoming project being developed by TEG includes components which address this hammering problem.
- d. The manhole has a "trough" in the floor which accumulates mud and debris. There is a substantial amount of mud in this trough which is covering the dripleg drain piping. This mud needs to be removed. TEG will include the removal of this mud in the forthcoming project.
- e. The northern condensate slip joint is leaking again. This joint was leaking recently and was injected with packing material which had stopped this leak. It appears that the joint is not in alignment with the piping which is probably the cause of the leak. TEG will add the replacement of this joint to the scope already developed.
- f. There is a small spalled hole in the western concrete wall. Additionally, there is some spalling around the western structural anchor beam penetration. These concrete repairs will be included in the upcoming project.

5. Manhole K

- a. There is some mud in the floor of the manhole. CNE needs to clean this mud from the manhole. **This item appeared in last two year's report.**
- b. There is some corrosion of the structural components in this manhole. TEG will prioritize the extent of the corrosion in this manhole compared to other projects and coordinate with CNE to have these metal surfaces cleaned and coated.
- c. There are some hairline cracks in the concrete patching of the southern manhole wall. CNE should monitor these cracks and notify TEG of any significant changes.

- d. The strainer upstream of the steam trap does not have a blowdown valve. CNE should have installed a blowdown valve on this strainer when the trap was recently replaced. This item appeared in the prior three year's reports and requires immediate action.
6. Manhole N1
 - a. There was no water present in this manhole.
 - b. The CHW piping in this manhole was never insulated. Most of the piping in this manhole is ductile iron; however, there are some steel components and the surface condensation has caused some corrosion. Therefore, the non-insulated piping in this manhole should be insulated. This project was postponed in the FY19 budget. TEG will provide updated specifications to CNE to have this manhole insulated. CNE should proceed with this work as soon as possible.
 - c. The piping supports in this manhole have surface corrosion and should be cleaned and coated to prevent further corrosion. TEG will include specifications for this work with the insulation work that needs to be accomplished.
 7. Manhole N2
 - a. The manhole could not be entered due to low oxygen readings.
 - b. From prior reviews of this manhole (and pictures taken by extending the camera down through the manway) the CHW isolation valves the bypass piping in this manhole were never insulated. The surface condensation ("sweating") is causing some corrosion to occur, therefore, the uninsulated piping in this manhole needs to be insulated. This project was postponed in the FY19 budget. TEG will provide updated specifications to CNE to have this manhole insulated. CNE should proceed with this work as soon as possible.
 8. Manhole S5
 - a. There were no deficiencies to report.
 9. Manhole S6
 - a. This manhole has an extremely heavy and awkward manhole lid which requires two people, each with a crowbar, to remove. CNE did not have two crowbars on the maintenance truck, therefore the interior of this manhole could not be reviewed. This manhole will be added to next quarter's list of manholes to review.
 - b. TEG has directed CNE to replace this lid; CNE is currently working with a contractor to accomplish this task.
 10. Manhole 25
 - a. These manholes house the chilled water supply and return valves for the State Library and Archives service.

- b. There were no deficiencies to report.
11. Manhole 26
- a. These manholes house the chilled water supply and return valves for the State Supreme Court service.
 - b. Cars were parked over these manholes so they could not be reviewed. TEG will add these to a future quarterly review.

Action Items

Action items from the above walkthrough are presented in the separate quarterly manhole review report presented to CNE.

VI. Customer Relations

This section contains descriptions of the marketing efforts made by the DES Team during the quarter and prominent existing customer interactions. The topics of interactions, meetings and training seminars with the customers are also discussed. There are currently 29 customers, comprised of 42 different buildings, connected to the EDS. Service to each of these buildings continues to prove satisfactory, and the responsiveness to customer issues is handled by CNE in an excellent and professional manner.

A. Marketing

Conversations with the engineering team for two proposed hotels at 1st Ave S and KVB continued during the quarter. This project is tracked under DES168.

The developer and engineering team for Lot K reported that they remain interested in DES service but are continuing to work through a revised building plan.

Communications with these potential customers and their design teams decreased late in the quarter, presumably due to nCovid-19 pandemic and the decline in economic activity within Davidson County.

TEG began discussions with two new potential customers during the quarter. One potential customer is a proposed hotel to be located near Peabody and 8th Ave S. The other potential customer is at 333 Union St which involves the renovation of the existing building into a small boutique hotel.

B. Customer Interaction

The CNE customer service representative (CSR) continues to respond to customer issues as they arise. Much of the communication involves minor problems with the customers' heating and cooling systems that are unrelated to DES service. Other more significant issues are summarized herein.

-) The DES metering and instrumentation systems were commissioned at the John Sevier building during April and DES services were restored.
-) Several customers made repairs within their buildings during the Quarter and requested assistance from CNE, which was provided. Some of these repairs involved isolating the steam or chilled water services to the building for the customers.
-) Communication issues with the DES metering panels at several customer buildings prompted CNE to investigate the causes. Although communications were restored to many of the buildings, some issues remained at the end of the Quarter. These issues are largely related to internal internet connections that are the customers' responsibility.
-) CNE repaired a steam leak on a bypass line at the John Sevier building.
-) CNE investigated the cause of increased hardness in the condensate return during June by testing the condensate from several customer buildings. Some customers' condensate was placed to drain until repairs could be made. By the end of the month, only the James K Polk building was still being drained.
-) Due to the shut-down of many businesses, CNE and TEG have been unable to contact anyone at the Wildhorse Saloon. CNE continues to investigate who the new or remaining contacts might be but have remained unsuccessful by the end of the month. This customer continues to pay their invoices, however.
-) Other minor issues and customer interactions are noted in the monthly reports from CNE.

VII. Recommendations

Based on the review of the Fourth Quarter FY20 EGF and EDS operations, the following recommendations are made.

-) The items noted in the Walkthrough Reports as in need of repair need to be completed prior to the end of the operating contract for the System Operator in accordance with the ARMA paragraph 12.03.
-) TEG is continuing to monitor the chilled water system losses, the water usage at the EGF and the decrease in chiller plant electric efficiency. Although CNE had performed some of the previously noted work on the cooling towers, they need to complete the remaining items and work towards restoring the chiller plant efficiency to its historic values.
-) CNE needs to address the recurring maintenance items included in the EDS Walkthrough section of this report.
-) Corroded structural steel within the vaults and tunnels should be cleaned and coated or replaced.
-) Insulation that is absent or in disrepair in the vaults and tunnels should be addressed through the Amendment 2 with CNE, additional capital and R&I projects, and through regular maintenance provided by CNE.

-) Steam traps which need repair or replacement should be addressed as soon as possible.
-) Expansion joint leaks should be repaired by either tightening the packing bolts or injection of packing once the leak(s) is sufficient for the repair to be effective.
-) Debris needs to be cleaned and removed from some of the manholes.