Metro Nashville
DISTRICT ENERGY SYSTEM

Operations Monitoring Report

Fourth Quarter FY21

Prepared by:

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I. Executive Summary

A review of the fiscal year 2021 (FY21) 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 2021 to date, CNE has failed to meet the performance guarantees for twelve consecutive months as required by Paragraph 8.d of the Amendment 2 of the Amended and Restated DES Management Agreement (ARMA) between Metro and CNE and Section 18 of the ARMA. TEG will continue to monitor CNE's operations.

For the Fourth Quarter FY21, the chilled water sales increased 28.3% over the previous Fourth Quarter (FY20). The chilled water sendout also increased 28.3% over the previous Fourth Quarter. The system losses increased approximately 27.5%. The number of cooling degree days was approximately the same as in FY20. The peak chilled water demand for the current quarter was 16,655 tons, which is 11.3% higher than the previous Fourth Quarter. The increase in chilled water sales is attributed to the re-opening of the city and recovery from the nCOVID-19 pandemic.

However, the total chilled water sales for FY21 was 9.3% lower than for FY20. Likewise, the chilled water sendout was 8.4% lower than in FY20. The number of cooling degree days for FY21 was 11.8% lower than in FY20. The contributing factors to the overall decrease in sales are the shut-down imposed due to the nCOVID-19 pandemic during the latter half of FY20 and first part of FY21 and the decline in cooling degree days.

Steam sendout for the current quarter increased by approximately 7.3% over the previous Fourth Quarter and steam sales, likewise, increased by approximately 7.0%. This increase came with a 13.3% decrease in heating degree days thus the quarter was much cooler than in FY20. Total steam system losses were approximately 7.9% greater than in the previous Fourth Quarter. The peak steam demand for the current quarter was 93,500 pounds per hour, which represents an increase in the Fourth Quarter demand by approximately 5.2%. The increase in steam sales may be due to the decrease in building occupancy due to the re-opening of the city after the pandemic or an increase in domestic water heating.

The steam sales for FY21 remained 5.8% lower than in FY20. The steam sendout in FY20 was also 3.9% lower than in FY20. More than half of FY20 was without the government-imposed lockdowns to prevent the spread of nCOVID-19, while the city was shut for approximately two-thirds of FY21. With the shutdowns over, the DES sales and the city's economy are expected to recover.

With the implementation of the new System Performance Guarantee (Guaranteed Maximum Quantity or GMQ) levels beginning in this fiscal year, CNE has failed to consistently meet the chilled water-water conversion and the steam fuel conversion factors. The chilled water plant electric consumption per unit of sales continues to perform better than the guaranteed levels for the quarter, and CNE has consistently met this metric. CNE continues to make changes to their

operation at the EGF to address the issues preventing them from meeting the new performance criteria.

These changes have resulted in the quarterly average chiller plant efficiency being approximately 3.2% better than in the Fourth Quarter FY20, and FY21's performance was 3.6% better than in FY20. The chilled water-water conversion factor averaged 3.5% higher than the new performance guarantee for the Quarter and 1.5% higher for FY21.

The steam water conversion has operated similar to historic values with only three excursions above the guarantee for FY21 and no excursions in the Fourth Quarter. The steam fuel guarantee was exceeded nine of the twelve months of FY21 and was exceeded for two months in the Fourth Quarter. The steam electric conversion guarantee was exceeded only twice in the First Quarter FY21 with no subsequent excursions noted. TEG is continuing to monitor CNE's efforts in improving the system's performance.

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, DES154, DES 143/161, DES172, DES174, DES177, DES178, DES179, DES180, DES182, DES185, DES186, DES187, DES188, DES189 and DES190 are ongoing. 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. Projects DES187, DES188, DES189 and DES190 have been added. Projects DES153, DES168, DES171, DES173, DES181, DES183 and DES184 are in close-out.

The current fiscal year system operating costs to date are $16,344,775. This value represents approximately 86.0% of the total budgeted operating cost for FY21. The customer revenues from the sales of steam and chilled water for FY21 are $15,810,397 (86% of budgeted amount). The difference between the operating costs and customer revenue is the Metro funding amount (MFA), which represents the shortfall in cash flow for the system. The MFA transferred to date for FY21 is $630,700 (100% of budget). However, the actual MFA required cannot be accurately calculated due to outstanding invoices as of the date of this report.

The DES response to the nCOVID-19 pandemic included the potential deferral of customer invoices and the waiving late fees. The option to take the deferral and the late fee waiver period expired at the end of the First Quarter. Two customers took advantage of the deferral option and were able to reduce a portion of their invoices. The repayments of the deferred amounts began in the First Quarter FY21 and will end in the First Quarter FY22; the revenues shown herein include the repayment of those amounts. The DES Advisory Board recommended to continue waiving the late fees to customers through May 2021 and voted to discontinue the waiver in their May meeting.

Metro Nashville DISTRICT ENERGY SYSTEM

Table of Contents

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 decline in business operations, office building occupancies and group events due to the COVID-19 pandemic has impacted the DES by creating a significant decrease in the steam and chilled water energy usage and demand since the pandemic began. The Fourth Quarter FY20 experienced significant economic restrictions that have since been loosened in the Fourth Quarter FY21. However, the decline in usage does not impact the MFA, provided that the customers are paying their invoices, 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 28.3% increase in sales for the current quarter over the same quarter of the previous fiscal year.

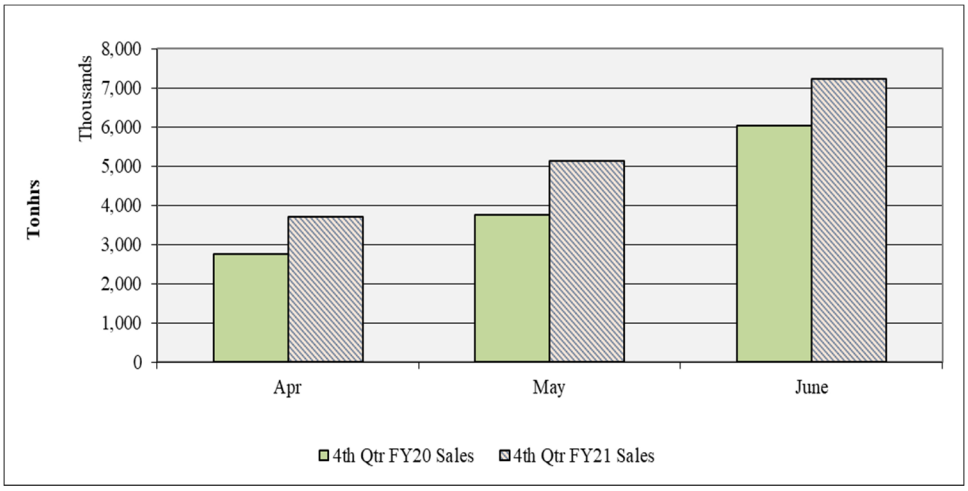

Figure 1. Chilled Water Sales Comparison

The peak chilled water demand for the current quarter was 16,655 tons, which represents a 11.3% increase over the previous Fourth Quarter. This increase in chilled water demand must be affected by building occupancies since the number of cooling degree days were approximately the same as in the Fourth Quarter FY20.

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.

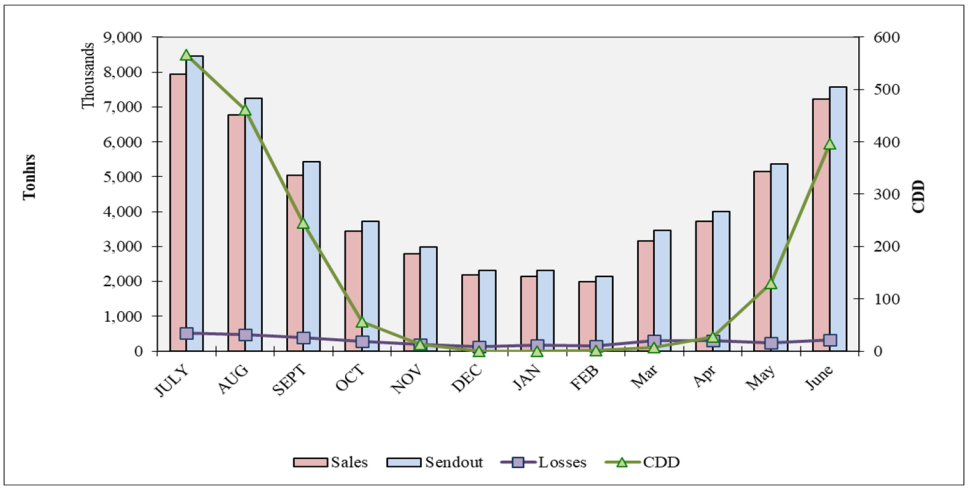

Figure 2. Chilled Water Sales, Sendout, Losses and CDD for the Previous Twelve Months

The peak cooling demand for FY20 was 6.0% higher than in FY21. Even though the pandemic lockdown covered portions of both FY20 and FY21, the number of cooling degree days in FY20 were 11.8% higher than in FY21. These two factors contributed to a decrease in chilled water sales (9.3%) in FY21.

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.

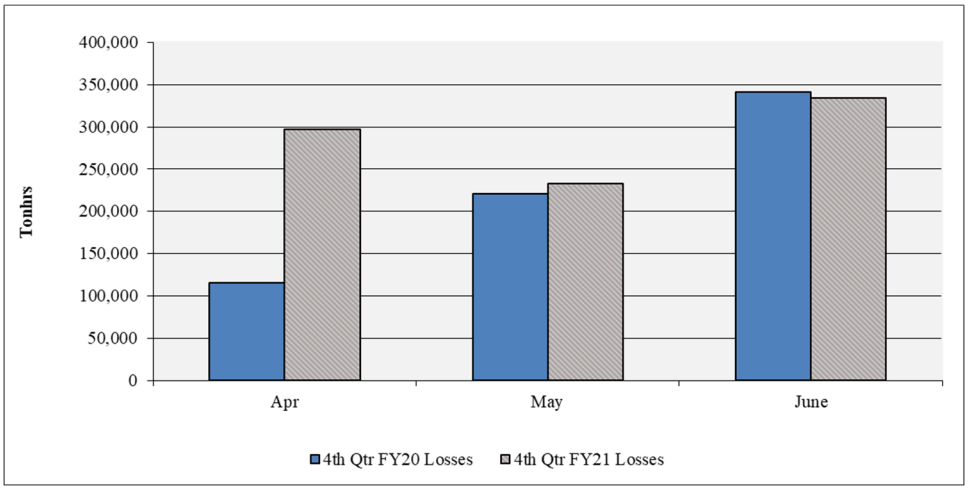

Figure 3. Chilled Water System Loss Comparison

The EDS make-up decreased by 48.1% over the previous Fourth Quarter. Although some distribution leaks have been repaired during the year, some losses still remain. The daily losses have fluctuated throughout the quarter, the make-up rate finished the quarter at less than 45,000 gallons per day.

A leak is still suspected on 5th Ave N, but previous efforts to locate the actual source of the leak have been unsuccessful. However, CNE and TEG will continue to monitor the EDS make-up and investigate any potential leaks. If the specific location of an additional leak were discovered, DES would address the issue promptly.

The make-up to the cooling towers increased 32.8% over the previous Fourth Quarter. The water usage in the cooling towers is largely due to the consumption of chilled water and should vary with chilled water sales. The number of cycles of concentration in the condensing water circuit decreased 43.5%. The total chiller plant water use increased 16.4% over the Fourth Quarter FY21. The overall city water make-up comparison for the chilled water system Fourth Quarter is shown in Figure 4.

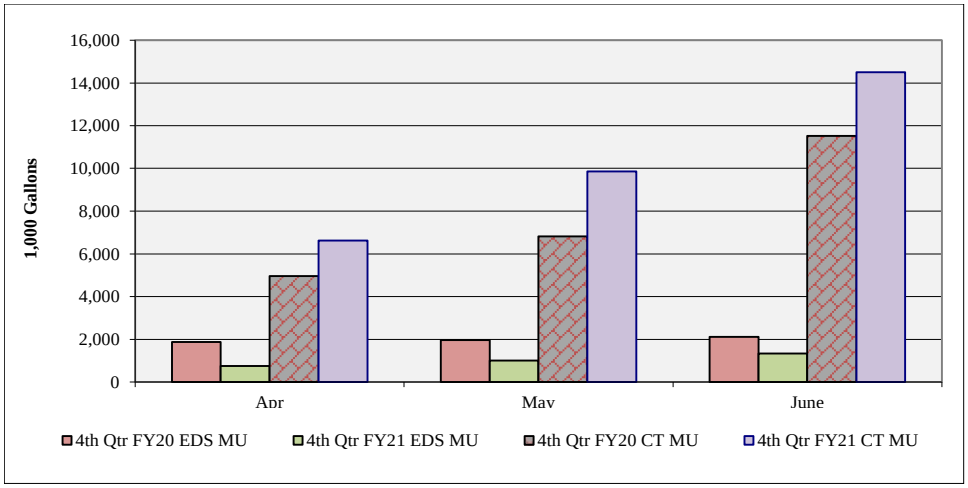

Figure 4. Chilled Water System City Water Usage Comparison

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. The System Performance Guarantee levels as described in Amendment 2 of the ARMA were not consistently achieved for the chilled water-water conversion for FY21. CNE has met the chilled water-electric guarantee each month of the fiscal year.

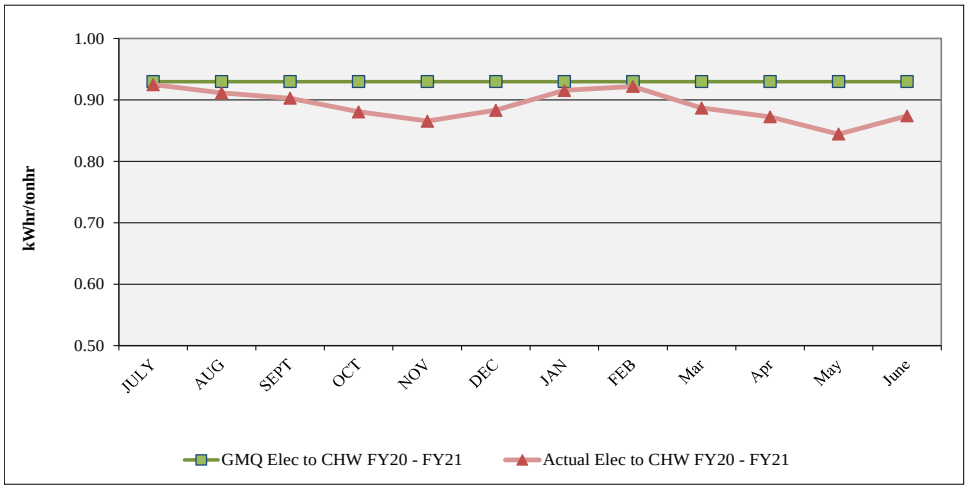

Figure 5. Chiller Plant Electric Performance Guarantee Comparison for the Previous Twelve Months

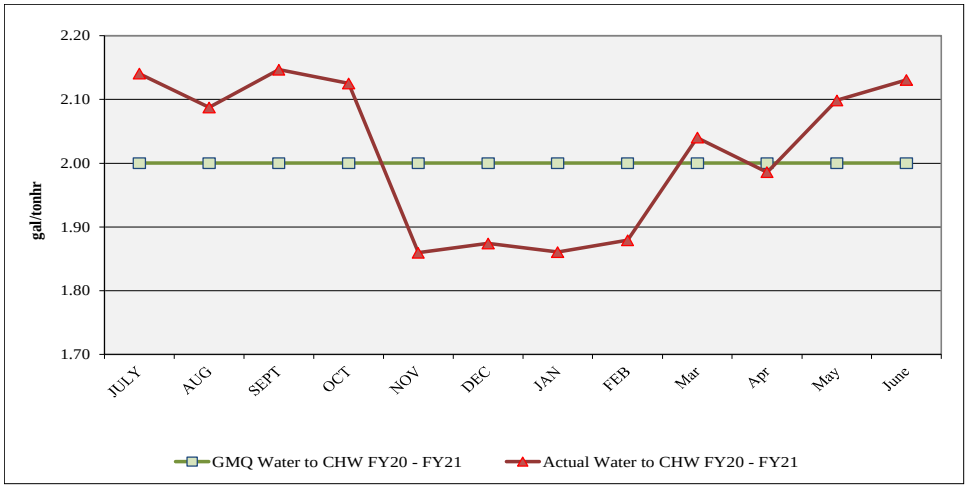

Figure 6. Chiller Plant Water Consumption Performance Guarantee Comparison for the Previous Twelve Months

The chilled water allocation of the electric consumption falls under the GMQ limit of 0.93 kWhr per tonhr for the current quarter, and no excursion is reported for the current fiscal year. The electric usage per unit of sales decreased 3.2% over the previous Fourth Quarter and 3.6% over the previous year. These values reflect an improved chiller plant electric efficiency.

CNE has worked to address 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 increased by approximately 16.4% due largely to the increase in chilled water sales.

The water conversion factor for the chiller plant increased by approximately 7.5% (on average) over the Third Quarter, exceeding the guaranteed values for the Quarter. The actual chilled water-water metric is 3.5% higher than the guarantee for the Fourth Quarter and 1.5% higher for the fiscal year. (Since the guarantees for the chilled water-water were different in FY20, a comparison between the two years cannot be fairly made.)

B. Steam

1. Sales and Sendout

The steam sendout increased by approximately 7.3% over the previous Fourth Quarter (FY20), and the sales also increased by approximately 7.0%. The Quarter experienced a 13.3% decrease in the number of heating degree days. The steam system losses increased 7.9%, and the relative amount of condensate return increased 14.5% due to condensate repairs made in the Second and Third Quarters. A comparison for the Fourth Quarter steam sales is shown in Figure 7.

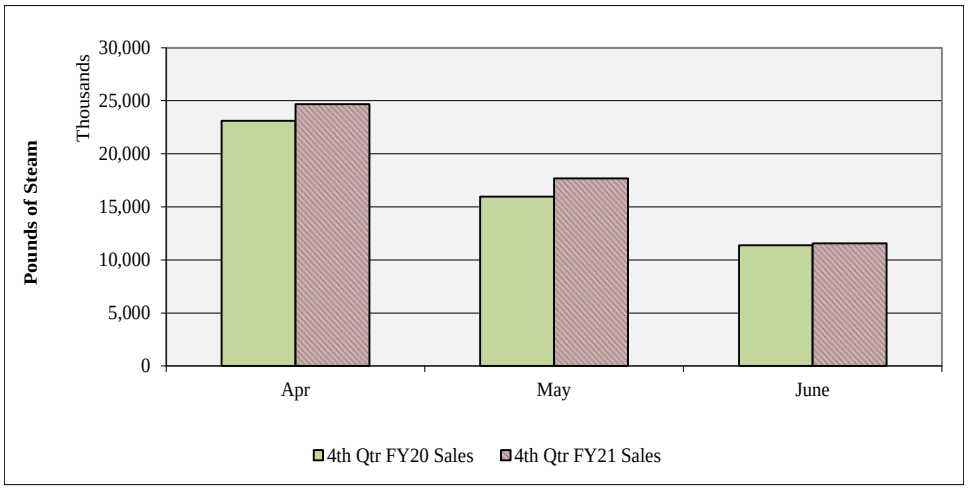

Figure 7. Steam Sales Comparison

The peak steam demand for the current quarter was 93,500 pph, which reflects an approximate 5.2% increase in the peak steam production over the previous Fourth Quarter.

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.

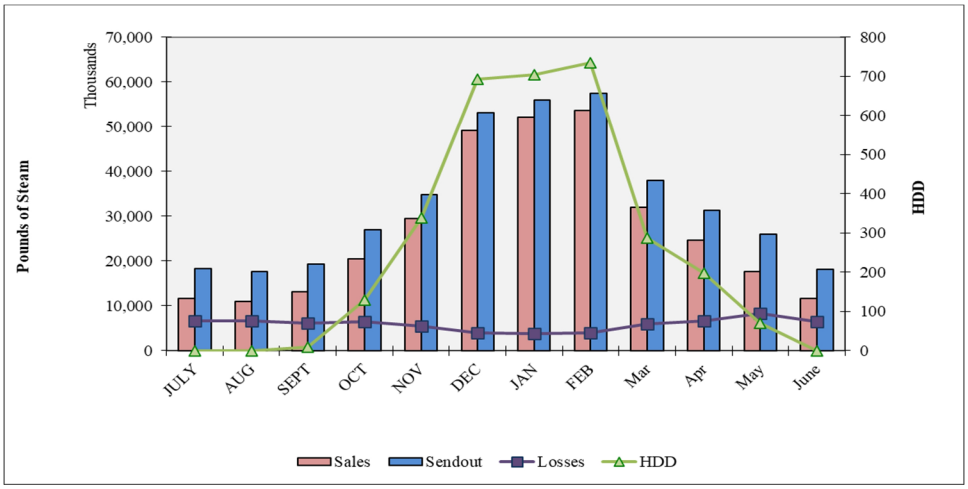

Figure 8. Steam Sales, Sendout, Losses and HDD for the Previous Twelve Months

Although FY21 experienced an increase in the heat degree days of 5.7%, the steam sales in FY21 decreased 5.8% over FY20. This phenomenon may be due to influence of the pandemic shutdowns over the winter months between the two fiscal years. The economy had yet to experience the effects of the nCOVID-19 in December 2019 and January and February 2020 while much of the city was shut-down the following year.

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.

With the recent repairs to the condensate return system, the amount of condensate returned to the EGF has increased and is approaching historically typical values.

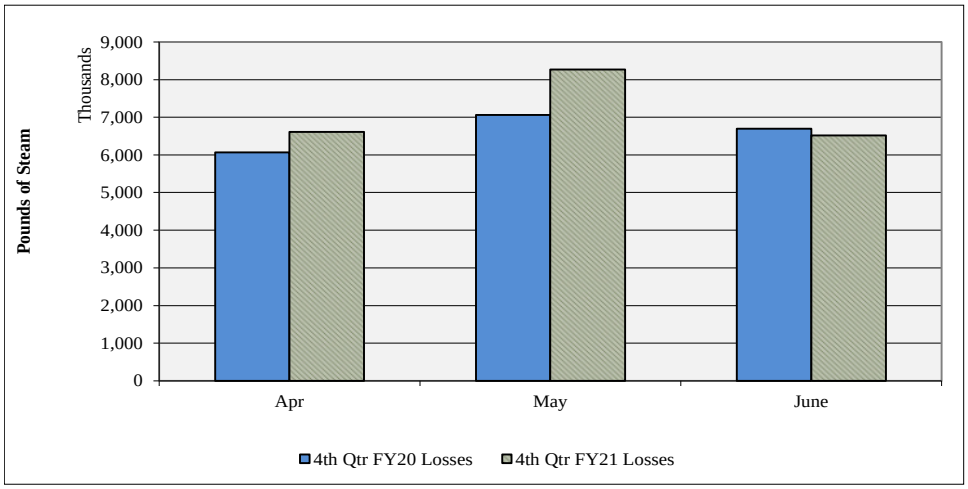

Figure 9. Steam System Losses

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 corresponding data for steam system make-up is shown in the comparison of Fourth Quarter data in Figure 10.

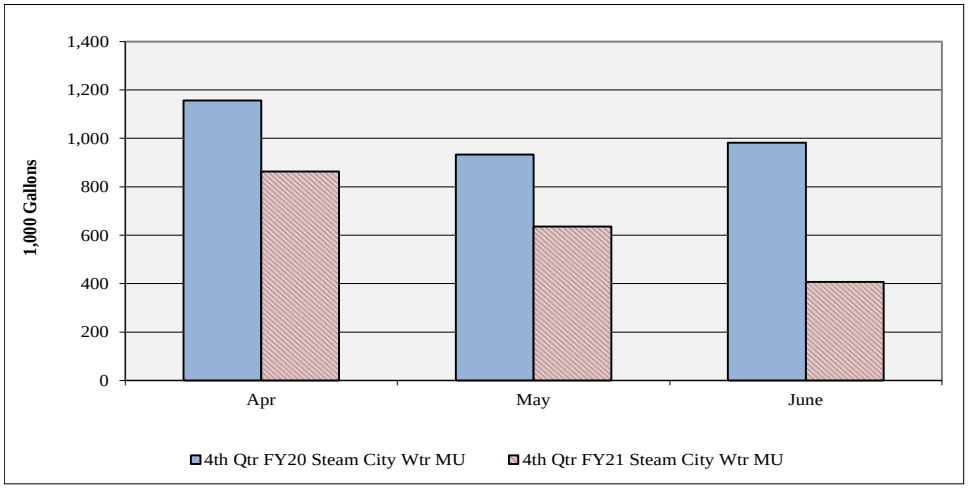

Figure 10. Steam System City Water Make-up Comparison

3. Performance

The performance of the steam system of the EGF is presented by the following three charts, Figures 11, 12 and 13. The steam fuel conversion factor exceeded the guaranteed values for nine of the twelve months in 2021. The steam electric conversion factor was exceeded in July and August (First Quarter) but was not exceeded in subsequent months. TEG monitors CNE's performance regularly and will continue to report any non-compliance in the EGF's operation. The steam water conversion factor exceeded the guaranteed values in December 2020 and

January and February 2021; however, exceeding the steam water factor in the winter months is not historically unusual.

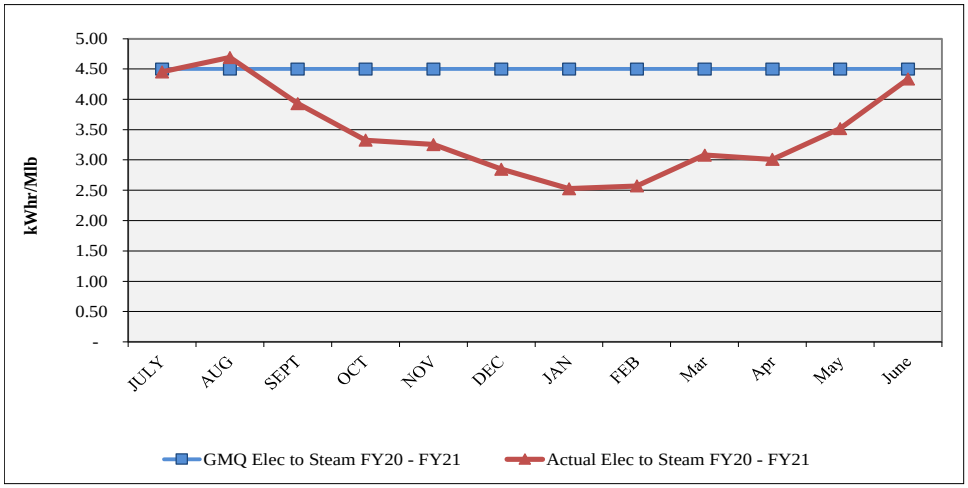

Figure 11. Steam Plant Electric Performance Guarantee for the Previous Twelve Months

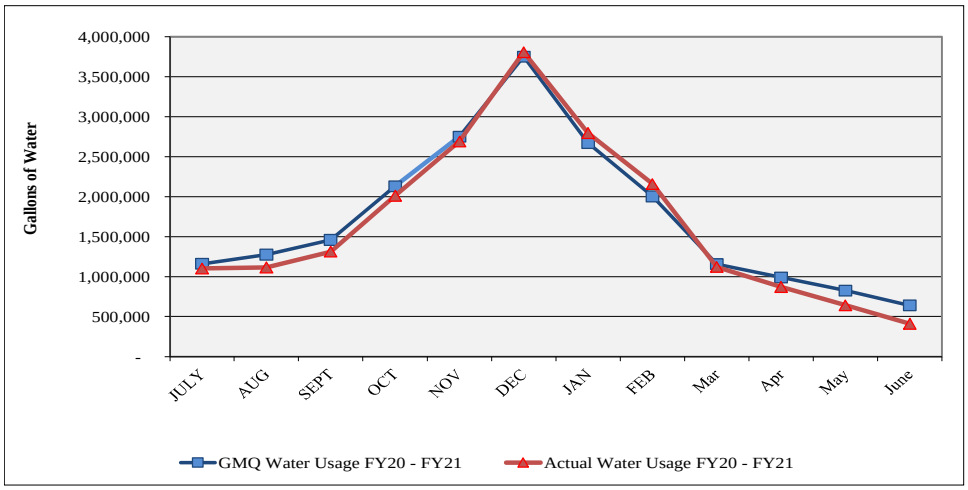

Figure 12. Steam Plant Water Performance Guarantee for the Previous Twelve Months

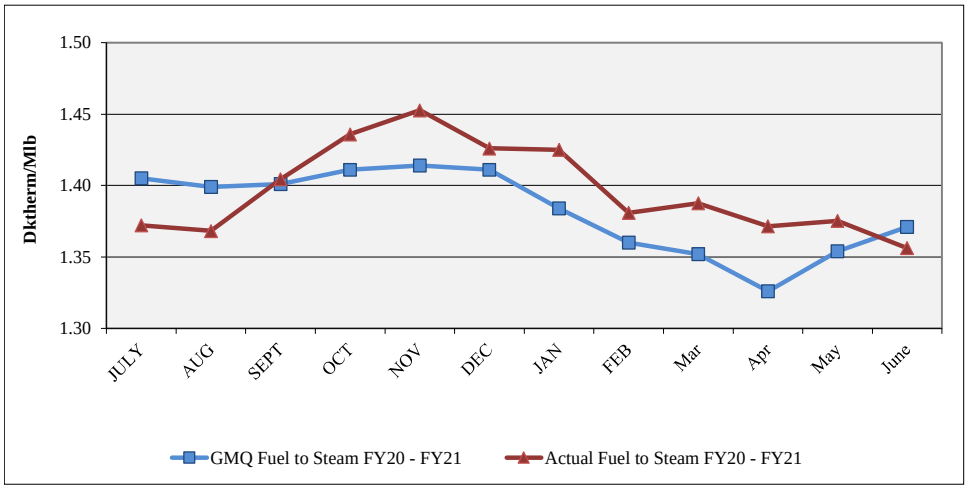

Figure 13. Steam Plant Fuel Performance Guarantee for the Previous Twelve Months

The current quarter experienced a decrease in the steam plant electric consumption while experiencing an 8.5% decrease in the electric conversion factor. For the fiscal year, this metric is 3.3% higher than in FY20; however, the CNE exceeded the guaranteed value for only two months.

The water consumption for the steam plant decreased 38.0% this quarter as compared to the previous Fourth Quarter, but the annual usage was 17.7% higher than in FY20. The fuel consumption per unit of steam sales was approximately the same as in the previous Fourth Quarter. The increase in the fuel consumption per unit of sales represents a decrease in boiler plant efficiency. For the fiscal year, this fuel metric is 2.2% higher in FY21 than in FY20.

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).

For FY21, CNE has failed to meet the performance guarantees required under Amendment 2 of the ARMA for twelve consecutive months. At least one of the factors were exceeded in each month of FY21.

Table 1. Fourth Quarter FY21 and Annual Production, Sales and Consumption Summary

Item	Unit	Fourth Quarter FY21	Fourth Quarter FY20	*Percent Difference		Total Year FY21	Total Year FY20	*Percent Difference
	days	91	91	0.00%		365	366	-0.27%
Total Electric Use	kWhrs	14,086,854	11,378,147	23.81%		46,947,139	53,568,646	-12.36%
Chilled Water	kWhrs	13,900,099	11,184,097	24.28%		45,933,769	52,506,987	-12.52%
Steam	kWhrs	186,755	194,050	-3.76%		1,013,370	1,061,659	-4.55%
Total Water Use	kgal	35,977	32,353	11.20%		131,471	143,003	-8.06%
Total Chilled Water	kgal	34,071	29,281	16.36%		111,629	126,144	-11.51%
EDS Make-up	kgal	3,093	5,959	-48.10%		14,278	19,662	-27.38%
Cooling Towers	kgal	30,978	23,322	32.83%		97,351	106,482	-8.58%
Calc CT Evaporation	kgal	25,863	20,978	23.29%		82,261	95,462	-13.83%
CT Blowdown	kgal	5,115	2,344	118.22%		15,090	11,020	36.93%
Calc # Cycles		5.06	8.95	-43.50%		5.45	8.66	-37.07%
Steam	kgal	1,906	3,072	-37.96%		19,842	16,859	17.69%
Total Fuel Use	mmBTU	103,158	96,783	6.59%		556,239	566,364	-1.79%
Natural Gas	mmBTU	103,158	96,775	6.60%		555,888	565,895	-1.77%
Propane	mmBTU	0	8	-100.00%		352	468	-24.94%
Condensate Return	kgal	7,104	5,787	22.77%		30,560	34,919	-12.48%
	lbs	57,940,819	47,195,457	22.77%		249,245,351	284,794,127	-12.48%
Avg Temp	°F	195.3	193.3	1.03%		185.7	186.4	-0.40%
Sendout								
Chilled Water	tonhrs	16,947,200	13,211,200	28.28%		55,044,600	60,109,100	-8.43%
Steam	lbs	75,350,000	70,258,000	7.25%		396,827,000	412,950,000	-3.90%
Peak CHW Demand	tons	16,655	14,969	11.26%		16,655	17,711	-5.96%
Peak Steam Demand	lb/hr	93,500	88,844	5.24%		138,100	136,906	0.87%
CHW LF		46.59%	40.41%	15.29%		37.73%	38.64%	-2.35%
Steam LF		36.90%	36.21%	1.91%		32.80%	34.34%	-4.47%
Sales								
Chilled Water	tonhrs	16,082,366	12,532,975	28.32%		51,534,304	56,841,256	-9.34%
Steam	lbs	53,950,997	50,430,387	6.98%		326,332,096	346,226,698	-5.75%
Losses								
Chilled Water	tonhrs	864,834	678,225	27.51%		3,510,296	3,267,844	7.42%
Steam	lbs	21,399,003	19,827,613	7.93%		70,494,904	66,723,302	5.65%
		28.40%	28.22%	0.63%				
Degree Days								
CDD		553	557	-0.72%		1,903	2,158	-11.82%
HDD		268	309	-13.27%		3,170	3,000	5.67%

*positive percent difference values imply an increase from FY20 to FY21

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

GMQ Calculations	Unit	Fourth Quarter FY21	Fourth Quarter FY20	*Percent Difference		Total Year FY21	Total Year FY20	*Percent Difference
Steam								
GMQ Elec Conversion	kWhr/Mlb	4.50	6.00			4.50	6.00	
Electric Conversion	kWhr/Mlb	3.62	3.96	-8.47%		3.46	3.35	3.25%
GMQ Plant Efficiency	Dth/Mlb	1.350	1.682			1.382	1.681	
Plant Efficiency	Dth/Mlb	1.368	1.378	-0.72%		1.402	1.372	2.20%
Actual %CR		76.90%	67.17%	14.47%		62.81%	68.97%	-8.93%
Avg CR Temp	°F	195	193	1.03%		186	186	-0.40%
GMQ Water Conversion	gal	2,454,748	3,251,890			20,809,468	18,070,373	
Water Conversion	gal	1,925,060	3,102,720	-37.96%		20,040,420	17,027,590	17.69%
Chilled Water								
GMQ Elec Conversion	kWhr/tonhr	0.930	1.055			0.930	1.055	
Electric Conversion	kWhr/tonhr	0.864	0.892	-3.21%		0.890	0.924	-3.61%
GMQ Water Conversion	gal/tonhr	2.00	5.25			2.00	5.25	
Water Conversion	gal/tonhr	2.07	1.85	12.24%		2.02	2.22	-9.02%

*positive percent difference values imply an increase from FY20 to FY21

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.

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 and are passed onto the customers directly without mark-up. 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. Only two customers took advantage of the deferrals. These two customers are being invoiced one-twelfth of the total deferred amounts. Although the nCOVID-19 deferral period ended with the First Quarter, the DES Advisory Board

recommended continuing to waive late fees from the customers through at the end of May 2021. As of June 1, late fees have been re-instated as Nashville recovers from the pandemic.

For FY21, the current fiscal year system operating costs to date are $16,344,775. This value represents approximately 86% of the total budgeted operating cost for FY21. The customer revenues from the sales of steam and chilled water for FY21 are $15,810,397 (86% of budgeted amount). The difference between the operating costs and customer revenue is the Metro funding amount (MFA), which represents the shortfall in cash flow for the system. The MFA transferred to date for FY21 is $630,700 (100% of budget). However, the actual MFA required cannot be accurately calculated due to outstanding invoices as of the date of this report. The total revenue list includes the costs associated with the FY20 customer true-up and repayment of the nCOVID-19 deferrals for the two customers who elected for this option.

Table 3. DES Expenses and Revenues to Date

Item		FY21 Budget	First Quarter Expenses	Second Quarter Expenses	Third Quarter Expenses	Fourth Quarter Expenses	Total Spending to Date	% of Budget
Operating Management Fee								
FOC:	Basic	$ 3,776,800	$ 944,203	$ 944,203	$ 944,203	$ 944,203	$ 3,776,811	100.00%
	9th Chiller	$ -	$ -	$ -	$ -	$ -	$ -	n.a.
	C/O 6A	$ -	$ -	$ -	$ -	$ -	$ -	n.a.
	C/O 6B	$ -	$ -	$ -	$ -	$ -	$ -	n.a.
	C/O 7	$ -	$ -	$ -	$ -	$ -	$ -	n.a.
	C/O 8	$ -	$ -	$ -	$ -	$ -	$ -	n.a.
Pass-thru Charges:	Chemical Treatment	$ 260,700	$ 68,435	$ 71,706	$ 54,454	$ 51,183	$ 245,778	94.28%
	Insurance	$ 14,800	$ 16,013	$ -	$ -	$ -	$ 16,013	108.19%
Marketing:	CNE Sales Activity	$ -	$ -	$ -	$ -	$ -	$ -	n.a.
	Incentive Payments	$ -	$ -	$ -	$ -	$ -	$ -	n.a.
FEA:	Steam	$ 125,000	$ 890	$ (6,066)	$ (11,483)	$ (4,364)	$ (21,023)	-16.82%
	Chilled Water	$ 73,800	$ (2,741)	$ 8,642	$ 3,738	$ 17,298	$ 26,937	36.50%
Misc:	Metro Credit	$ -	$ (347,378)	$ (206,007)	$ (144,834)	$ (206,819)	$ (905,039)	n.a.
	ARFA	$ 59,400	$ 14,850	$ 14,850	$ 14,850	$ 14,850	$ 59,400	100.00%
	Deferral	$ -	$ -	$ -	$ -	$ -	$ -	n.a.
	Subtotal - Man Fee =	**$ 4,310,500**	**$ 1,041,650**	**$ 1,033,335**	**$ 1,005,762**	**$ 1,023,169**	**$ 4,103,916**	**95.21%**
Reimbursed Management Fee + Chem Treatment			$ 1,041,650	$ 1,033,335	$ 1,005,762	$ 1,023,169	$ 4,103,916	0.00%
Metro Costs								
Pass-thru Charges:	Engineering	$ 37,300	$ 6,136	$ 14,296	$ 21,027	$ 11,479	$ 52,938	141.93%
	EDS R&I Transfers	$ 291,900	$ 72,258	$ 73,692	$ 72,975	$ 72,975	$ 291,900	100.00%
	Metro Marketing	$ 10,900	$ -	$ -	$ -	$ -	$ -	0.00%
	Project Administration	$ -	$ -	$ -	$ -	$ -	$ -	n.a.
	Metro Incremental Cost	$ 330,900	$ 70,051	$ 56,323	$ 67,286	$ 63,374	$ 257,034	77.68%
Utility Costs:	Water/Sewer	$ 633,400	$ 326,528	$ 187,694	$ 128,707	$ 195,147	$ 838,076	132.31%
	EDS Water/Sewer	$ -	$ 44	$ 152	$ 3,440	$ 795	$ 4,430	n.a.
	EDS Electricity	$ 59,400	$ 20,223	$ 18,942	$ 16,049	$ 11,672	$ 66,884	112.60%
	Electricity	$ 5,919,500	$ 1,461,598	$ 679,802	$ 619,746	$ 1,251,166	$ 4,012,311	67.78%
	Natural Gas Consultant	$ 12,400	$ -	$ 1,000	$ 5,000	$ 6,000	$ 12,000	96.77%
	Natural Gas Transport	$ -	$ 36,211	$ 58,880	$ 75,084	$ 51,033	$ 221,208	n.a.
	Natural Gas Fuel	$ 2,305,000	$ 150,093	$ 445,716	$ 632,469	$ 276,607	$ 1,504,886	65.29%
	Propane	$ -	$ 77,271	$ -	$ -	$ (81,896)	$ (4,625)	n.a.
	Subtotal - Metro Costs =	**$ 9,600,700**	**$ 2,220,411**	**$ 1,536,496**	**$ 1,641,784**	**$ 1,858,352**	**$ 7,257,043**	**75.59%**
	Subtotal - Operations =	**$ 13,911,200**	**$ 3,262,061**	**$ 2,569,832**	**$ 2,647,546**	**$ 2,881,521**	**$ 11,360,959**	**81.67%**
Debt Service	2012 Bonds	$ 3,486,100	$ 879,026	$ 869,336	$ 869,303	$ 869,303	$ 3,486,969	100.02%
	2005 Bonds -Self Funded	$ 377,700	$ 337,647	$ -	$ -	$ -	$ 337,647	89.40%
	2007 Bonds -Self Funded	$ 176,000	$ 44,000	$ 44,000	$ 44,000	$ 44,000	$ 176,000	100.00%
	2008 Bonds -Self Funded	$ 175,900	$ 43,975	$ 43,975	$ 43,975	$ 43,975	$ 175,900	100.00%
	2010 Bonds -Self Funded	$ 178,300	$ 44,575	$ 44,575	$ 44,575	$ 44,575	$ 178,300	100.00%
	Fund 49107 -Self Funded	$ 629,000	$ 157,250	$ 157,250	$ 157,250	$ 157,250	$ 629,000	100.00%
	Fund 49116 -Self Funded	$ 75,000	$ -	$ -	$ -	$ -	$ -	0.00%
	MIP	$ -	$ -	$ -	$ -	$ -	$ -	n.a.
	Oper. Reserve Fund	$ -	$ -	$ -	$ -	$ -	$ -	n.a.
	Subtotal - Capital =	**$ 5,098,000**	**$ 1,506,473**	**$ 1,159,136**	**$ 1,159,103**	**$ 1,159,103**	**$ 4,983,816**	**97.76%**
	Total =	**$ 19,009,200**	**$ 4,768,534**	**$ 3,728,967**	**$ 3,806,649**	**$ 4,040,624**	**$ 16,344,775**	**85.98%**
Customer Revenues								
	Taxes Collected		$ 92,533	$ 77,468	$ 75,201	$ 90,115	$ 335,317	n.a.
	Taxes Paid		$ 92,533	$ 77,467	$ 75,201	$ 90,127	$ 335,328	n.a.
	Interest & Misc Revenue	$ 230,900	$ -	$ 624	$ -	$ -	$ 624	0.27%
	Penalty Revenues/Credits		$ 30,813	$ 20,239	$ 7,700	$ 5,547	$ 64,300	n.a.
	Energy Revenues Collected		$ 4,261,488	$ 3,687,538	$ 3,740,230	$ 4,056,228	$ 15,745,484	83.78%
	Revenues =	**$ 18,378,500**	**$ 4,292,301**	**$ 3,708,402**	**$ 3,747,930**	**$ 4,061,763**	**$ 15,810,397**	**86.03%**
	Metro Funding Amount =	**$ 630,700**	**$ 476,233**	**$ 20,565**	**$ 58,719**	**$ (21,138)**	**$ 534,378**	**84.73%**

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. The New Customers listed in Table 4 are non-Initial System private customers. 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	$ 3,671,600	17,532,286	$ 0.2094		$ 1,275,565	82,675	$ 15.4287
State Government	$ 3,236,233	13,019,176	$ 0.2486		$ 1,765,493	113,129	$ 15.6061
Metro Government	$ 4,198,317	20,985,842	$ 0.2001		$ 1,598,304	130,529	$ 12.2448
New Customers	$ 2,705,279	12,391,807	$ 0.2183		$ 1,127,678	99,372	$ 11.3481
Total	**$ 11,106,149**	**51,537,304**	**$ 0.2155**		**$ 4,639,362**	**326,332**	**$ 14.2167**

Total Revenue	**$ 15,745,511**
True-up and Adjustments (Net)	**$ 64,886**

III. EGF Operations

Items relating to the facility operations presented herein are derived from the monthly reports issued by CNE for FY21. 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; however, they have failed to meet the new performance guarantees in Amendment 2 for twelve consecutive months. A portion of this inability to meet the new guarantees may be attributed to the operation of the EGF equipment. Although CNE was not able to maintain the steam production capacity for five days during December 2020, the issues with the boilers have been repaired and the problem did not recur in the Fourth Quarter. However, there were seventeen (17) boiler trips in the fiscal year.

A. Reliability

The principal 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.

- On May 26, boiler #4 tripped and was offline for five hours resulting in a minimum system pressure of 83 psig. CNE investigated the boiler and replaced a safety limit relay and timer in the safety relay circuit.
- There were no other reported issues during the quarter.

B. Efficiency

The operation of the EGF did not satisfy all of the guaranteed levels for all commodity usage during the quarter. There were 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 as required by Exelon, 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. This current level of staffing satisfies the level listed in the Amendment 2 of the ARMA. 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.

Chem-Aqua began working as CNE's water treatment vendor during the Third Quarter and is in the process of upgrading or replacing some of the EGF's chemical storage tanks and chemical feed systems.

- Steam System
  - The condensate return averaged approximately 76.9% of the steam sendout during the quarter, which represents a 14.5% increase over the previous Fourth Quarter. The repairs to the condensate return system have been completed and condensate is no longer being dumped due to high hardness levels.
  - Feedwater iron, pH, and hardness remained within their acceptable ranges during the quarter.
- Condensing Water System
  - 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
  - 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. Chem-Aqua is in the process of implementing their proprietary biological treatment system.

- Metro and CNE are evaluating options for the installation of a side stream filter at the EGF.

G. Maintenance and EGF Repairs

CNE continues to report on the routine and preventative maintenance activities performed on the EGF primary and ancillary equipment. The principal 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;
- Installed new computers and servers;
- Checked, updated, backed-up and repaired plant computers and servers;
- Checked and adjusted packing on all pumps;
- Repaired plant lighting;
- Assisted Chem-Aqua with the replacement of chemical storage and feed equipment;
- Repaired leak on boiler #4 safety valve and low water cutout;
- Replaced steam drum gasket on boiler #4;
- Replaced condensing water pump #1 motor;
- Completed propane fill station modifications;
- Assisted Siemens repair Desigo issues;
- Repaired doors on MCC-1 and MCC-2;
- Assisted HydroVac clear floor drains and clean out oil separator manhole;
- Replaced switches on vaporizer;
- Performed troubleshooting and repaired safety circuit on boiler #4;
- Replaced relays on boiler #3;
- 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 EGF Walkthrough was conducted on June 22, 2021, by Kevin L. Jacobs, P.E. Ben Casteel with Metro Water Services accompanied Mr. Jacobs on the Walkthrough. 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 FY19 Walkthrough and have continued to worsen. CNE has applied the new coating on the riser tubes to four of the cooling towers prior to the previous Walkthrough Report.
- In previous Walkthrough reports, it was noted that significant scale was observed on the louvers to several of the cooling towers. CNE began a thorough cleaning of the cooling towers in FY20. The cleaning of the scale and buildup on the louvers was previously reported as having been significantly reduced. CNE reported that the towers were cleaned during the quarter and most of the cells were in better condition than noted previously. However, towers 11, 13 and 15 need additional cleaning. Some additional scale may be present on the outboard louvers along the west bank of towers. This item will be removed from future reports unless the issue returns.
- Four of the trees on the west side of the EGF have died and been removed. CNE and Metro have discussed CNE's plan for the tree replacement. After speaking with Metro's urban forester, CNE has developed a plan to replace the four trees in the fall of 2021. This item will be removed from future lists since CNE intends to follow through with their plan.
- The louvers and portions of the fill at cooling towers 1, 6 and 15 appear to have been damaged. No additional work appears to have been completed since the previous Walkthrough. The damaged portions need to be repaired or replaced. In addition, the sections of the louvers on towers 5 and 6 appear to have separated in several places. CNE needs to address this issue.
- The presence of foam and algae on the cooling towers and cooling tower deck was significantly less than in previous walkthroughs, although algae remains in certain areas of the deck and on the cooling tower structures. **CNE needs to clean the existing algae and take measures to prevent or reduce its re-occurrence.**
- As noted in the previous Walkthrough report, the insulation on the feedwater piping at the boiler 4 economizer appears to have been damaged. During the Third Quarter Walkthrough, insulation on the condensate piping near the unit heaters for the boiler plant make-up air was missing. **CNE did not make the insulation repairs in the Fourth Quarter but intends to have their insulator on-site in the First Quarter FY22.**
- As noted in the previous Walkthrough report, the weather stripping on the doors to the two MCC's located on the cooling tower deck has deteriorated or is missing. Trash, including a coke can, wiring and other debris from electrical work was located within the MCC's. The door hardware was also damaged or broken on several of the MCC doors. **CNE has replaced and repaired the door hardware and removed all of the trash from within the MCC's. Weather stripping was added but some of the older weather stripping remains and should be replaced.**

- CNE, Metro and TEG have discussed the need for CNE to perform additional cleaning of the EGF and to maintain an increased level of cleanliness through the plant. CNE stated in the First Quarter FY21 that they intended to address the overall cleanliness of the EGF. **CNE has made some improvement from the level noted in the Third Quarter Walkthrough Report. CNE needs to address the remaining issues promptly.**
- The concrete and brick facade of the EGF has noticeable water stains and has blackened in some places. **This item was discussed with CNE during the walk-through, and they plan on pressure washing and cleaning the building's façade soon.**
- Other action items previously noted to be addressed by CNE have been completed. (See also the "Quarterly EGF Walkthrough Report," dated June 22, 2021, 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.

A. Fourth Quarter FY21 Open Projects

The following projects remained open at the end of the Fourth Quarter FY21.

1. 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. Metro 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.

2. DES139 – DES Options Review

TEG, the Metro Liaison and Metro Water Services (MWS) have discussed the Business and Marketing Plans proposed by TEG. The draft of these documents remain under review by MWS, but TEG is working under this project number to address the questions and comments raised by MWS during this meeting and is preparing other documentation that presents recommendations for the DES moving into the future while remaining under Metro ownership.

3. DES152 – Manhole A and Manhole M Coating Repairs

The structural steel in these manholes was cleaned and painted as part of DES107 in 2015. Portions of the paint are failing, resulting in spots of corrosion on these supports. The paint manufacturer reviewed the failing coatings. Their position was 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 was not willing to warrant the paint. To prevent progression of this corrosion, these areas 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.

Pricing has been received and CNE has been directed to contract to have this work done. It is anticipated that this work will be completed during the First Quarter FY22.

4. DES153 – Manhole L Repairs

This project was completed during the Fourth Quarter FY21 and is now in close-out.

5. DES154 – Manhole K Repairs

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

TEG started the design for these repairs during the First Quarter FY19; however, due to higher priority projects, this work was postponed. This project is anticipated to be executed during FY22

6. DES143/161 – Manhole N1, N2 and S6 Insulation

This project addresses the installation of insulation in three (3) manholes: Manhole N1, Manhole N2 and Manhole S6. Manhole N1 and N2 house chilled water piping which is partially uninsulated. Manhole S6 is a small manhole that is a part of the State distribution system which houses steam and condensate return piping which is uninsulated. These projects address the insulation of this uninsulated piping. This project is anticipated to be begin during the First Quarter FY22.

7. DES163 – New Service to MDHA Parcel K (Peabody Union)

TEG continue to have conversations with the design and development team for this site and have discussed potentially providing chilled water to the twenty-seven story, mixed-use development. The preliminary economic evaluation typically

provided to potential customers was completed and provided early in the Fourth Quarter FY21. The subsequent negotiations for DES service appear favorable with additional meetings anticipated in the First Quarter FY22.

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

The development of the two new hotels proposed at 1st Ave S and KVB as originally marketed will not proceed. This site has a new potential developer with new plans. Therefore, this project number will be retired and a new one issued if further negotiations with the new entities develop.

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

This project was completed during the Fourth Quarter FY21 and is now in close-out.

10. 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 were corroded and either need to be repaired or replaced. Additionally, the access ladder in Manhole 17 needed to be re-positioned so that it properly aligns with the manway. A pre-bid meeting was held during the First Quarter FY21, and a verbal award was made. Work began on this project during the Second Quarter FY21. Construction was delayed because of a 2nd Avenue North bomb explosion on Christmas morning and the subsequent police investigation. Construction was allowed to resume during the Third Quarter FY21. This project will be completed during the First Quarter FY22.

11. DES173 – Manhole B3 Structural Repairs

This project was completed during the Fourth Quarter FY21 and is now in close-out.

12. 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 needed to be repaired or replaced. Additionally, the access ladder in Manhole 22 needed to be re-positioned so that it properly aligns with the manway. A pre-bid meeting was held during the First Quarter FY21, and a verbal award was made. Work began on this project during the Second Quarter FY21. Construction was delayed because of a 2nd Avenue North bomb explosion on Christmas morning and the subsequent police investigation. Construction was allowed to resume during the Third Quarter FY21. This project will be completed during the First Quarter FY22.

13. DES177 – Manhole B1 Ladder and Platform

Manhole B1 is located in 1st Ave South and houses a groundwater sump pump to alleviate the amount of groundwater that infiltrates into Manhole B. Manhole B1 is a 4 ft diameter, precast manhole with individual embedded rung access ladder. Currently, personnel stand on partially submerged concrete blocks when maintenance is required within this manhole. This project addresses the installation of a platform and ladder for maintenance.

This project was bid and awarded during the Fourth Quarter FY21 and will be executed during the First Quarter FY22.

14. DES178 – Manhole 5 Repairs

Manhole 5 has several structural steel piping supports which are corroded and need to be cleaned and coated. This project addresses the cleaning and coating of these components.

It is anticipated that this project will begin in the First Quarter FY22.

15. DES179 – Manhole 11 Repairs

Manhole 11 has structural steel piping anchors/supports which are corroded and need to be cleaned and coated. This project addresses this need along with the repair of piping wall penetrations.

Engineering has begun on this project and the work is anticipated to be completed during FY22.

16. DES180 – State Tunnel Pipe Support Repairs

The State Tunnel has several steel piping supports which are corroded and need to be cleaned and coated. This project addresses the cleaning and coating of these components.

Engineering has started on this project and the work is anticipated to be completed during FY22.

17. DES182 – Manhole B10 Expansion Joint Replacement

Most of the work for this project was completed during the Fourth Quarter FY21. The contractor is awaiting the arrival of insulation blankets to complete this work. It is anticipated that this project will be completed during the First Quarter FY22.

18. DES183 – Hermitage Hotel Service Line Relocation

The Hermitage Hotel's project is not going to impact the DES service lines. Therefore, this project is now closed.

22. DES184 - 7th Avenue North Steam Leak Repair

This project was completed during the Fourth Quarter FY21 and is now in close-out.

19. DES185 – 5th Avenue North Exploratory Excavation

The exploratory excavation exposed the steam and condensate piping immediately south of Manhole 10 and it was discovered that there is no insulation on the steam piping and the condensate piping casing was damaged. Upon further investigation, a portion of the condensate piping was found to be badly corroded and required replacement. In addition, the steam piping penetrating Manhole 10 needed replacement to provide a sound penetration seal to prevent groundwater infiltration into Manhole 10.

Steam and condensate piping was replaced during the Fourth Quarter FY21. The contractor is awaiting the receipt of pipe-to-wall seals before they can proceed. It is anticipated that these parts will arrive early during the First Quarter FY22, therefore it is anticipated that this project will be completed during the First Quarter FY22.

20. DES186 – Printers Alley Exploratory Excavation

Piping repairs were completed during the Fourth Quarter FY21. The receipt of pipe insulation was delayed due to material shortages, however these materials were received and installed late in the Fourth Quarter FY21. It is anticipated that this project will be completed during the First Quarter FY22.

21. DES187 – Exploratory Excavation at Manhole 22B

Water has been leaking into Manhole 22B (located on 7th Avenue North beside Metro Public Library) through the steam piping casing that serves the Metro Public Library for several months. Therefore, there is a breach in the steam casing outside the manhole.

CNE began an exploratory excavation east of Manhole 22B during the Fourth Quarter FY21 to locate the damage to the casing and make repairs. It has been discovered that there is extensive damage to the steam piping casing and some damage to the condensate return pipe casing. Sections of new pre-insulated piping

will have to be ordered to replace portions of both the steam and condensate return piping.

It is anticipated that this project will be substantially complete during the First Quarter FY 22.

22. DES188 - 4th and Church Building Access Tunnel Repair

Chilled water, steam and condensate return service piping to the 4th and Church Building and the 5/3 Financial Center originates in the 4th Ave Tunnel, comes up a vertical shaft and then turns horizontal through an access tunnel into the underground parking garage of the 4th & Church Building. This access tunnel was constructed out of individual galvanized metal liner plates bolted together. Steel piping supports were then added inside this tunnel and these supports were welded to the steel liner plates. The pipe supports and liner plates are corroded and need to be repaired or replaced. This project addresses these needs.

It is anticipated that this project will be bid and awarded during the First Quarter FY22.

23. DES189 – Manhole 4 Structural Steel and Insulation Repair

The structural steel piping supports in Manhole 4 are corroded and need to be cleaned and coated to mitigate further degradation. In addition, the existing pipe insulation needs repair/replacement. This project addresses these needs.

It is anticipated that this work will be priced during the First Quarter FY22 with the execution to occur late in the First Quarter FY22 or during the Second Quarter FY22.

24. DES190 – Manhole 2 Sparge Tube and Trap Modifications

Due to the current piping configuration, the trap discharge piping which serves the existing sparge tube is very close to the floor of tis manhole. Manhole 2 is prone to groundwater infiltration. Because of this, the trap discharge piping has experienced corrosion with the result being that the pipe was leaking. CNE installed a temporary pipe clamp on the leaking pipe, but the piping/sparge tube configuration needs to be modified to raise these piping components. This work needs to take place soon to avoid an emergency shutdown repair.

The pipe modifications were completed during the Fourth Quarter FY21; however, the insulation replacement/repair has not yet occurred. This project will be completed during the First Quarter FY22.

B. Fourth Quarter FY21 Closed Projects

DES153, DES168, DES171, DES173, DES181, DES183 and DES184 were closed during the Fourth Quarter FY21.

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 efforts 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	FY21 Spending to Date	Total Spent to Date	Remaining Balance
Fund-49109						
	DES157	MH 9 Repairs	$ -	$ 5,314	$ 5,314	$ (5,314)
		Total Closed Projects	$ 2,600,602	$ -	$2,600,602	$ -
		Metro Project Admin	$ -	$ -	$ -	$ -
		Project Man, Development, etc	$ 5,314	$ -	$ -	$ 5,314
		Fund Total	**$ 2,605,916**	**$ 5,314**	**$2,605,916**	**$ -**
Fund-49107						
	DES157	MH 9 Repairs	$ -	$ 39	$ 39	$ (39)
		Total Closed Projects	$ 8,499,961	$ -	$8,499,961	$ -
		Metro Project Admin	$ -	$ -	$ -	$ -
		Project Man, Development, etc	$ 39	$ -	$ -	$ 39
		Fund Total	**$ 8,500,000**	**$ -**	**$8,500,000**	**$ -**
Fund-49116						
	DES111	DES CHP	$ 168,706	$ -	$ 168,706	$ -
	DES133.1	NCC Blasting Issue	$ 200,000	$ 102,024	$ 139,175	$ 60,825
	DES139	Options Review	$ 450,000	$ 179,550	$ 315,800	$ 134,200
	DES143	MH N1, N2 and S6 Insulation	$ 5,000	$ 1,977	$ 3,413	$ 1,587
	DES151	MH 23 Repairs	$ 219,388	$ -	$ 219,388	$ -
	DES152	MH A & M Repairs	$ 28,000	$ 6,327	$ 8,815	$ 19,185
	DES153	MH L Repairs	$ 129,893	$ 27,176	$ 36,094	$ 93,799
	DES154	MH K Repairs	$ 75,085	$ 589	$ 674	$ 74,411
	DES157	MH 9 Repairs	$ 127,509	$ 19,298	$ 123,807	$ 3,702
	DES159	MH B2 Repairs	$ 92,281	$ 1,472	$ 58,753	$ 33,528
	DES161	MH S6 Insulation	$ 38,000	$ -	$ -	$ 38,000
	DES162	3rd and Molloy Service	$ 150,000	$ 27,718	$ 143,602	$ 6,398
	DES163	Parcel K Service	$ 1,018,802	$ 10,172	$ 11,474	$ 1,007,328
	DES168	1st and KVB Hotels	$ 5,365,777	$ -	$ 5,777	$ 5,360,000
	DES169	MH-20 Repairs	$ 40,000	$ 16,827	$ 32,015	$ 7,985
	DES171	Broadway Tunnel Support Repair	$ 268,907	$ 81,774	$ 111,931	$ 156,976
	DES172	Viridian Pipe Support Repair	$ 190,128	$ 163,639	$ 182,516	$ 7,612
	DES173	MH-B3 Structural Repair	$ 50,000	$ 43,928	$ 45,751	$ 4,249
	DES174	7th Ave Pipe Support Repairs	$ 160,534	$ 39,199	$ 59,734	$ 100,801
	DES175	MH4 Condensate Repair	$ 118,090	$ 13,321	$ 19,661	$ 98,429
	DES176	Condensate Leak at MH9	$ 175,000	$ 125,424	$ 126,039	$ 48,961
	DES177	MHB1 Ladder & Platform	$ 45,500	$ 5,652	$ 5,652	$ 39,848
	DES178	MH-5 Repairs	$ 97,500	$ 3,802	$ 3,802	$ 93,698
	DES179	MH-11 Repairs	$ 58,500	$ 4,366	$ 4,366	$ 54,134
	DES180	State Tunnel Support Repairs	$ 140,000	$ 1,872	$ 1,872	$ 138,128
	DES181	3rd Ave Leak Repair	$ 140,000	$ 3,079	$ 3,079	$ 136,921
	DES182	MH-B10 Exp Joint Replacement	$ 110,000	$ 101,050	$ 101,050	$ 8,950
	DES183	Hermitage Hotel Service Relocation	$ 60,000	$ 1,032	$ 1,032	$ 58,968
	DES184	7th Ave STM Leak	$ 125,000	$ 122,550	$ 122,550	$ 2,450
	DES185	MH10 Water Leak	$ 110,000	$ 23,801	$ 23,801	$ 86,199
	DES186	Printers Alley Exploratory Excavation	$ 110,000	$ 5,348	$ 5,348	$ 104,652
	DES187	Exploratory Excavation/Steam Repair MH22B	$ 153,750	$ 1,623	$ 1,623	$ 152,127
	DES188	4th and Church Access Tunnel Repairs	$ 125,000	$ 6,910	$ 6,910	$ 118,090
	DES189	MH4 Structural Steel and Insulation Repairs	$ 56,750	$ 1,127	$ 1,127	$ 55,623
	DES190	MH Sparge Tube Repairs	$ 20,000	$ 2,000	$ 2,000	$ 18,000
		Total Closed Projects	$ 764,980	$ 97	$ 765,077	$ (97)
		Metro Project Admin	$ -	$ -	$ -	$ -
		Project Man, Development, etc	$14,811,920	$ -	$ -	$14,811,920
		Fund Total	**$26,000,000**	**$ 1,144,726**	**$2,862,418**	**$23,137,582**

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

Several EDS repairs and improvements were made during the Fourth Quarter. The principal 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 $47,950. Table 6 provides a summary of the FY21 expenditures and revenues to date associated with the R&I budget.

Table 6. FY21 Repair and Improvement Expenditure and Revenue Summary

Description	Date	Tracking #	Vendor	Expenditure	Transfers	Net Market Adjustment	Market Value	Balance
Value at end of FY20				**$ 211,925.09**		**$ -**	**$ 139,389.03**	**$ 139,389.03**
CNE July 2020 R&I	12/7/2020	DES-2391	CNE	$ 1,585.35				
CNE Aug 2020 R&I	12/7/2020	DES-2389	CNE	$ 3,709.28				
CNE Sept 2020 R&I	11/30/2020	DES-2393	CNE	$ 6,105.10				
		Sub-Total First Quarter		**$ 11,399.73**	**$ 72,258.34**	**$ -**	**$ 60,858.61**	**$ 200,247.64**
CNE Oct 2020 R&I	12/15/20	DES-2395	CNE	$ 5,283.66				
CNE Nov 2020 R&I	06/29/21	DES-2402	CNE	$ 5,343.65				
DES 171 BW Tunnel	06/29/21	DES-2402	CNE	$ 93,660.00				
DES159.1 MHB2	06/29/21	DES-2402	CNE	$ 4,313.55				
CNE Dec 2020 R&I	02/01/21	DES-2398	CNE	$ 9,837.57				
Net Change in Investment Value	12/31/20	-	-	$ -		20.97		
		Sub-Total Second Quarter		**$ 118,438.43**	**$ 73,691.66**	**$ 20.97**	**$ (44,725.80)**	**$ 155,521.84**
CNE Jan 2021 R&I	02/17/21	-	CNE	$ 2,781.36				
CNE Feb 2021 R&I	03/17/21	-	CNE	$ 3,756.74				
DES175 MH-4 CND Repair	03/17/21	-	CNE	$ 12,010.61				
DES176 MH-9 CND Leak Repair	03/17/21	-	CNE	$ 6,441.14				
DES181 Third Ave Leak	03/17/21	-	CNE	$ 106,878.22				
EMR20-003 Union St CND Repair	03/17/21	-	CNE	$ 59,888.67				
DES181 Third Ave Leak (final)	03/25/21	-	CNE	$ 6,822.46				
CNE Mar 2021 R&I	04/21/21	-	CNE	$ 28,724.61				
		Sub-Total Third Quarter		**$ 227,303.81**	**$ 72,975.00**	**$ -**	**$ (154,328.81)**	**$ 1,193.03**
CNE Apr 2021 R&I	05/18/21	-	CNE	$ 649.11				
CNE May 2021 R&I	06/16/21	-	CNE	$ 3,262.62				
EMR20-003 Union St CND Repair	06/16/21	-	CNE	$ 8,515.26				
CNE June 2021 R&I	07/21/21	-	CNE	$ 13,790.89				
		Sub-Total Fourth Quarter		**$ 26,217.88**	**$ 72,975.00**	**$ -**	**$ 46,757.12**	**$ 47,950.15**
		FY21 Year to Date		**$ 383,359.85**	**$ 291,900.00**	**$ 20.97**	**$ 47,950.15**	**$ 47,950.15**

B. Preventive Maintenance

Preventive maintenance, tunnel and manhole inspections and reviews of customers' mechanical rooms were performed during the quarter. The principal 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 run-off.
   c. CNE continues to replace trap assemblies within the EDS as needed.

d. CNE has been cleaning areas of minor corrosion and then painting those areas with a cold galvanizing paint. If maintained, this should help reduce/slow down the progression of some areas of corrosion.

2. Customer metering station calibration checks were completed as scheduled.
3. Water chemistry samples at customer buildings were taken as scheduled.
4. 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 2021 walkthrough was conducted on June 2, 2021. The manholes that were visited included A, B, K, L, M, N1, N2, S5, 25, 26, S6 and the chilled water piping suspended underneath the Woodland Street Bridge. 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 of DES-152 for the cleaning and coating of the pipe support steel. TEG has provided CNE with contractor pricing and its recommendation to proceed with these repairs. CNE should execute a contract and proceed with these repairs immediately.
   c. There is some corrosion on the steel supports. These supports were cleaned and painted as a part of DES-107 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 demonstrating that the surfaces were properly prepared, and the paint was applied per specifications, the paint manufacturer stated that the failure was caused by preparation and 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 will be combined with paint repairs in Manholes B and M. TEG has provided CNE with contractor pricing and its recommendation to proceed with these repairs. CNE should execute a contract and proceed with these repairs immediately.

2. Manhole B
   a. There was a small amount of water in the floor of both sides of this manhole
   b. The link seals at the southern steam and condensate return wall penetrations and the northern steam penetration are starting to become dislodged. CNE should attempt to push the links back in place and tighten them. However, from prior experience with similar situations, the link seal will not go back in place, therefore CNE might have to remove the link seal and then remove any mud, dirt, etc. from the annular space so that the link-seal can be positioned back in place.
   c. The paint applied to the piping supports and anchors under DES-107 is beginning to fail and there is some corrosion on some of the supports. TEG has added this manhole to the scope of DES-152 which includes the cleaning and re-coating of steel pipe supports in manholes A and M. TEG has provided CNE with contractor pricing and its recommendation to proceed with these repairs. CNE should execute a contract and proceed with these repairs immediately.
   d. 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. **This item appeared on last year's report and still requires immediate attention.**
   e. The end can of the steam penetration at the western wall on the chilled water side of the manhole is corroded and it appears that a small amount of groundwater is seeping through this penetration. CNE should monitor this penetration and report any changes to TEG. TEG will include this section of piping in its "Comprehensive Repair and Replacement Plan."

3. Manhole M
   a. The 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 remove the link-seal and then remove the dirt, mud, gravel, etc. from the annular space and reposition the link-seal and tighten it. (A similar situation exists in Manhole B, therefore CNE should probably attempt this at one location to determine if it can be done successfully before attempting numerous locations.}
   c. The bases of the piping supports have some rust stains caused by "creep" because the underside of the baseplates could not be painted under DES-107. However, there is also some corrosion on the baseplates. This manhole is included in DES-152 to make these repairs. TEG has provided CNE with contractor pricing and its recommendation to proceed with these repairs. CNE should execute a contract and proceed with these repairs immediately.
   d. There is insulation debris remaining from DES-153 work. CNE should have the contractor clean/remove this debris as soon as possible.

4. Manhole L
   a. Repairs were recently made in this manhole under DES-153.
   b. The manhole has a "trough" in the floor which accumulates mud and debris. This area was cleaned within the scope of DES-153. CNE should monitor this trough area and clean it as required.

5. Manhole K
   a. Mud accumulates in the floor of this manhole continuously. It is believed that this mud is coming from the joint between the manhole walls and the floor, or from the chilled water piping penetrations in the manhole floor. Sealing of these joints may remedy this mud accumulation problem. To determine if sealing these areas will be effective in prevention of this mud accumulation, CNE has been instructed to seal a much smaller manhole (Manhole N2) as a "test." If sealing this small manhole is successful, CNE will be instructed to seal Manhole K using the same methodology.
   b. There is some corrosion of the structural steel components in this manhole. The same company that does the sealing of the manholes also does the cleaning and coating of the structural steel. Therefore, to reduce costs, if it is determined that the sealing methodology mentioned in item 5.a. is effective, CNE will be instructed to have the sealing of Manhole K executed under the same contract that the structural steel will be 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 check valve in the trap piping appears to "stick" which prevents the trap from functioning properly. CNE should replace this check valve as soon as possible.
   e. The strainer upstream of the steam trap does not have a blowdown valve. CNE has attempted to add a blowdown valve but due to the piping configuration, there is not sufficient space to make this addition. CNE needs to reconfigure the trap piping so that a blowdown valve can be added to the strainer.
   f. The bottom of the access ladder has some minor corrosion. CNE needs to clean this area and apply cold galvanizing paint to help mitigate the propagation of this corrosion.

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 and iron components, and the surface condensation has resulted in some corrosion. Therefore, the surface corrosion should be cleaned and coated to prevent further corrosion and the non-insulated piping in this manhole should be insulated. This project has been postponed in several of the recent budgets,

however it has now been approved. TEG will provide updated scope/specifications to CNE for this work to be accomplished.

7. Manhole G
   a. This is an abandoned manhole located in a grass median near the intersection of 1st Avenue North and Union Street. It is reviewed to ensure its structural integrity is not compromised.
   b. No issues were identified.

8. Manhole N2
   a. There was water in this manhole, and it required pumping prior to entry.
   b. Groundwater accumulates in this manhole on a regular basis. It is believed that the groundwater is seeping in at the joint between the manhole walls and the floor. CNE has been instructed to have the water and mud removed from this manhole and have it sealed to determine if the sealing can prevent the groundwater infiltration. If the sealing is successful, this sealing methodology will be done to Manhole K.
   c. The CHW bypass piping and isolation valves 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 has been postponed in several of the recent budgets, however it has now been approved. TEG will provide updated specifications to CNE to have the uninsulated piping in this manhole insulated. This work should be completed after the manhole has been sealed to prevent groundwater infiltration.
   d. There is a chain link fence around this manhole, which was installed to prevent the storage of dirt, sand, sod, etc. for Nissan Stadium from obstructing access to the manhole. The storage of these materials is now beside the fence; however, the fence has suffered some damage due to heavy equipment loading/unloading the sand, dirt, sod, etc. TEG is going to contact a representative of the Stadium and discuss a resolution of this problem.

9. Manhole S5
   a. No deficiencies to report.

10. Manhole S6
   a. The piping in this manhole is uninsulated. In addition, the steam piping in this manhole is operated at 60 – 70 psig which, due to its relatively low operating temperature (300-315°F) makes the piping susceptible to corrosion. Therefore, the piping in this manhole needs to be insulated. This project has been postponed in several of the recent budgets, however it has now been approved. TEG will provide updated specifications to CNE to have the uninsulated piping in this manhole insulated.

b. There is an anchor in this manhole which is corroding and requires replacement. TEG has completed a replacement design and will issue drawings for CNE to replace this anchor as soon as possible.

11. Manhole 25
    a. These manholes/valve boxes house the chilled water supply and return valves for the State Supreme Court service. One of the two valve boxes was inaccessible due to a road plate partially on top of the manhole cover.
    b. No deficiencies to report in the observed valve box.

12. Manhole 26
    a. These manholes/valve boxes house the chilled water supply and return valves for the State Library and Archives service.
    b. No deficiencies to report.

13. Chilled Water Piping Underneath Woodland St. Bridge
    a. There is a section of an angle siderail missing from the north side of the grated walkway underneath the bridge. This section is close to the west side of the river. A new section of angle which matches the existing angle siderails needs to be installed immediately. Once installed, the siderail section needs to be painted to match the existing.
    b. There are some missing bolts which attach siderails to the bridge structure. New bolts need to be installed at these locations.
    c. Portions of the chilled water piping insulation and jacketing are deformed with depressions/creases. It is unclear how these depressions occurred. CNE needs to monitor these and report any jacketing breaches or changes to TEG.
    d. There are two structural guides on the vertical piping on the east side of the river that are corroded and need to be cleaned and coated. This work will require the use of a bucket truck or lift to reach these areas. CNE should coordinate having this work accomplished.
    e. There is some corrosion on the vertical piping insulation jacketing on the east side of the river. The corrosion occurs at joints between sections of insulation jacketing. These jacketing sections need to be removed and replaced along with any damaged insulation. If needed, the new insulation should match the existing. The existing insulation jacketing is galvanized steel. The replacement jacketing can be aluminum per TEG standard specifications. This work will require the use of a bucket truck or lift to reach these areas. CNE should coordinate having this work accomplished.

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 expeditious and professional manner.

A. Marketing

The original design and development team for the two proposed hotels at 1st Ave S and KVB have been placed been replaced by a new development team. TEG has made efforts to contact this new team and determine their intentions with the site. The project DES168 that had been used to track costs to date has been closed during the quarter. Should an additional opportunity arise for DES service to this site, a new project number will be created.

TEG has continued its negotiations with the development team for Lot K (Peabody Union). Service from DES appear economically favorable to all parties and further design and development of the scope are anticipated in the First Quarter FY22. This project is tracked under DES 163.

TEG remained in contact with the potential customer at 333 Union St. This small boutique hotel is currently in the design phase but demolition and renovation work on the property began earlier in the fiscal year. This development remains on hold pending approval of financing from the developer.

Another potential customer is a proposed hotel to be located near Peabody and 8th Ave S. Although initial discussions with this potential customer were favorable, it is believed that progress on this development has slowed due to the pandemic.

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.

- 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.
- The temperature control valve at the condensate tempering station at the Fairlane Hotel failed during the quarter and was replaced by CNE. The failure of this valve

did not affect the customer but caused a significant increase in the amount of EDS water usage during the Third and Fourth Quarters.

- CNE coordinated several partial steam outages during the quarter.
- The AA Birch Building and the Metro Courthouse requested the bypasses to their chilled water heat exchangers be transferred over during the quarter so that they could be cleaned.
- Other minor issues and customer interactions are noted in the monthly reports from CNE.

VII. Recommendations

CNE is obligated to meet the standard of good utility practice as required by the ARMA. In TEG's opinion, CNE needs to continue to improve the operations of the EGF to ensure compliance with the ARMA and to bring the operation of the EGF in compliance with the performance guarantees. CNE has improved their EDS maintenance over the last two quarters, however there are still items which have been repeated in TEG's quarterly reviews for several cycles. CNE needs to address these long outstanding items.

Based on the review of the Fourth Quarter FY21 EGF and EDS operations, the following recommendations are made.

- CNE needs to address the maintenance and repair items included in the EGF and EDS Walkthrough sections of this report as soon as possible.
- CNE has made a sincere effort at cleaning the cooling towers; however, additional items remain to be addressed. They also need to work towards restoring the chiller plant efficiency and water usage to their historic values.
- CNE needs to increase their preventative maintenance program to decrease the number of equipment trips within the EGF or otherwise improve the operation of the system to prevent such frequent occurrences in the future.
- CNE needs to address their inability to meet the new performance guarantees for the EGF. Failure to meet the performance guarantees for twelve consecutive months may be considered an Event of Default according to section 18.02 (B)(4) of the ARMA.
- CNE needs to improve the overall cleanliness and orderliness of the EGF.
- Corroded structural steel within the vaults and tunnels should be cleaned and coated and/or repaired/replaced.
- Insulation that is absent or in disrepair in the vaults and tunnels should be repaired/replaced through Amendment 2 of CNE's contract or through capital and R&I projects.
- Steam traps which need repair or replacement should be addressed as soon as possible.
- Expansion joint leaks should be repaired by either re-packing the joint or injection of a sealant once the leak(s) is sufficient for the repair to be effective.
- CNE should continue to remove debris and mud from manholes.