



***Metro Nashville***  
**DISTRICT ENERGY SYSTEM**

*DES Customer Meeting*

*Spring FY24*

*June 7, 2024*

*Presented by:*

*MNDES Project Administrator*

*Thermal Engineering Group, Inc*



# *Agenda*

1. Welcome!
2. Historic Customer Expenses
3. Historic Customer Consumption
4. Historic System Efficiency
5. Natural Gas Pricing
6. DES FY24 Costs to Date
7. Water Treatment
8. DES Projects
9. Questions and Answers
10. Adjourn

# 1. *Welcome DES Customers!*



# *DES Contacts*

- ❖ Thermal Engineering Group, Inc – Dan Coyle, Contract Administrator  
615-264-2611 ([dcoyle@thermalegi.com](mailto:dcoyle@thermalegi.com))
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Ext. 30 ([michael.winters@constellation.com](mailto:michael.winters@constellation.com))
- ❖ Constellation – Chuck Tucker, Customer Service 615-742-1883  
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- ❖ Constellation – Rosalyn Manning, Invoicing 615-742-1883  
Ext. 29 ([rosalyn.manning@constellation.com](mailto:rosalyn.manning@constellation.com))
- ❖ Metro Water Services – Adrienne Fancher, Metro Liaison  
615-862-4820 ([adrienne.fancher@nashville.gov](mailto:adrienne.fancher@nashville.gov))

## *2. Historical Customer Expenses*

- ❖ Figure 2A. Historical Chilled Water Variable Unit Costs
- ❖ Figure 2B. Historical Steam Variable Unit Costs
- ❖ Table 2. Rolling Twelve Month Expenses

# *Customer Charges*

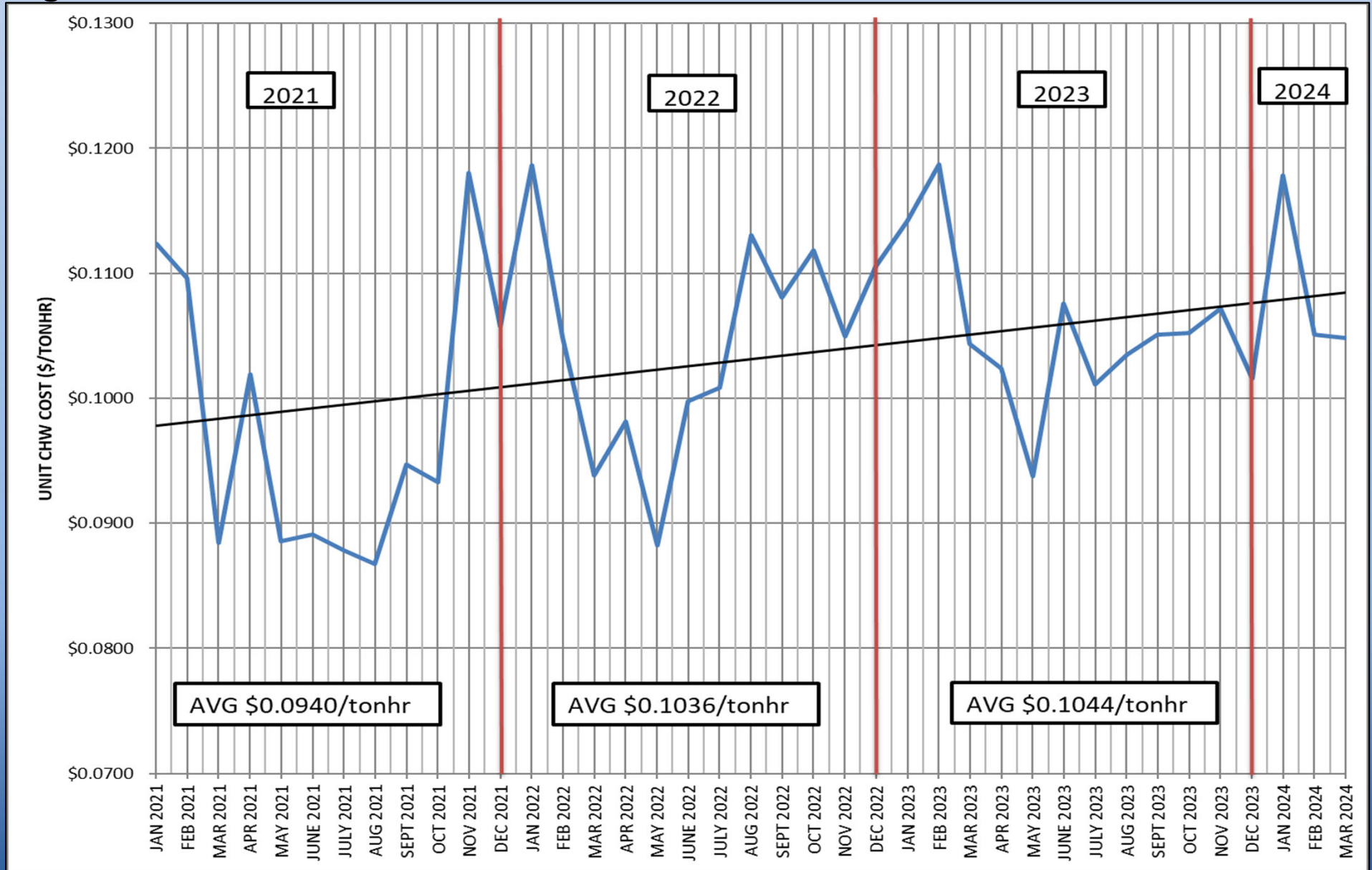
- Customer charges include fixed and variable costs
- Fixed costs are based on contract demand:
  - Contract Capacity Charge
  - Fixed Operating Charge
  - EDS Improvement Charge
  - Metro Incremental
  - Engineering
  - Insurance
  - EDS Maintenance Allocation
  - EDS Electricity
- Variable costs based on monthly consumption:
  - Utilities
  - Chemicals

## *Customer Charges*

- Variable costs vary each month based on actual costs and pro rata portion of monthly metered consumption (tonhrs and lbs)
- Capacity Charges + Variable Costs + Taxes = Total Invoice
- Avg Unit Cost =  $\frac{\text{Total Invoice}}{\text{Monthly Consumption}}$  (\$/tonhr or \$/Mlb)
- If consumption is low in a month, variable costs and total invoice will be low but Avg Unit Cost will be high.
- If consumption is high, variable costs and total invoice will be high, but Avg Unit Cost will be low.



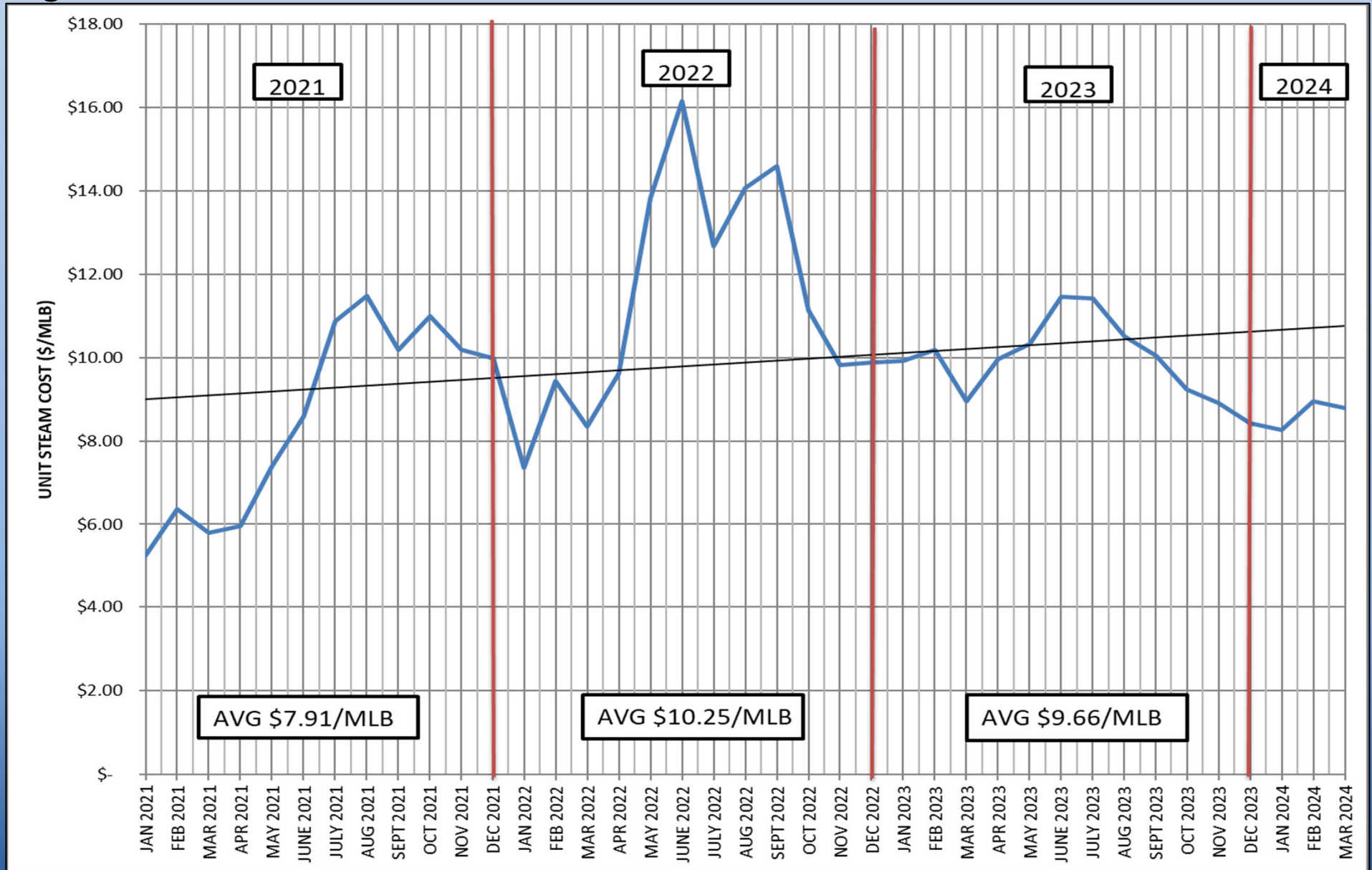
Figure 2A. Historical CHW Variable Unit Costs



Includes water, sewer, electricity, chemicals, EDS electricity and FEA



Figure 2B. Historical Steam Variable Unit Costs



Includes water, sewer, electricity, chemicals, EDS electricity, FEA, gas consultant, natural gas and propane

## Table 2. Rolling Twelve Month Expenses

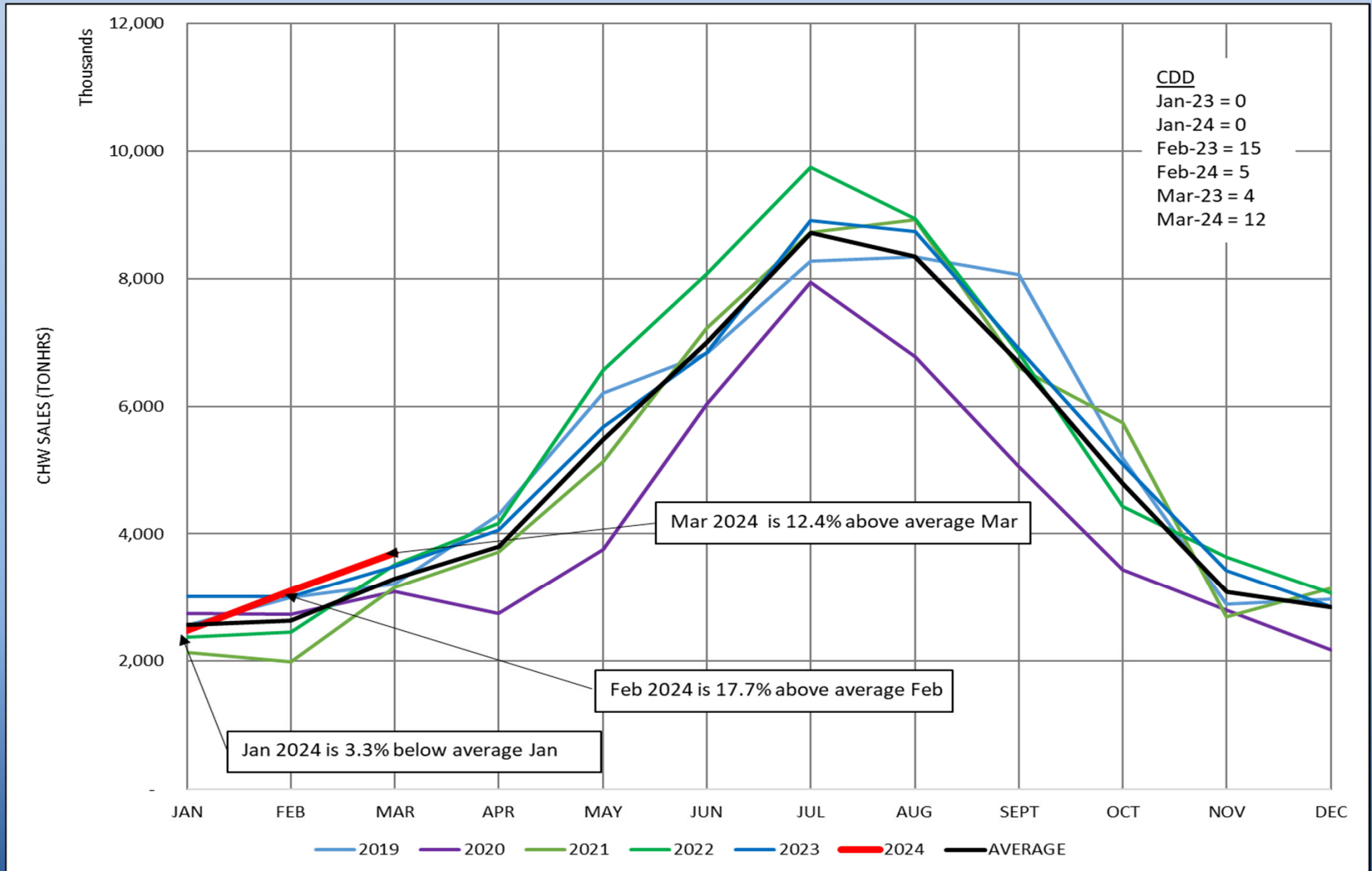
	Steam - Rolling 12 Month			Chilled Water - Rolling 12 Month		
	Apr 2022- Mar 2023	Apr 2023- Mar 2024	% Diff.	Apr 2022- Mar 2023	Apr 2023- Mar 2024	% Diff.
<b>Private</b> Cost	\$ 1,796,226	\$ 1,686,486	-6.11%	\$ 4,627,769	\$ 4,502,232	-2.71%
Usage (lbs or tonhrs)	94,042,066	96,642,016	2.76%	23,625,674	21,988,652	-6.93%
<b>State</b> Cost	\$ 2,307,024	\$ 2,072,589	-10.16%	\$ 3,546,793	\$ 3,505,870	-1.15%
Usage (lbs or tonhrs)	114,254,268	105,619,768	-7.56%	14,445,087	13,264,078	-8.18%
<b>Metro</b> Cost	\$ 2,290,836	\$ 2,045,984	-10.69%	\$ 5,134,396	\$ 5,087,979	-0.90%
Usage (lbs or tonhrs)	136,214,341	133,122,446	-2.27%	26,913,888	26,527,950	-1.43%
<b>Aggregate</b> Cost	\$ 6,394,087	\$ 5,805,060	-9.21%	\$13,308,958	\$13,096,081	-1.60%
Usage (lbs or tonhrs)	344,510,675	335,384,230	-2.65%	64,984,649	61,780,680	-4.93%
<b>Unit Cost</b>	<b>\$ 18.56</b>	<b>\$ 17.31</b>	<b>-6.7%</b>	<b>\$ 0.205</b>	<b>\$ 0.212</b>	<b>3.50%</b>

MFA, True-up, late fees and misc. are not included in values shown

## *3. Historical Customer Consumption*

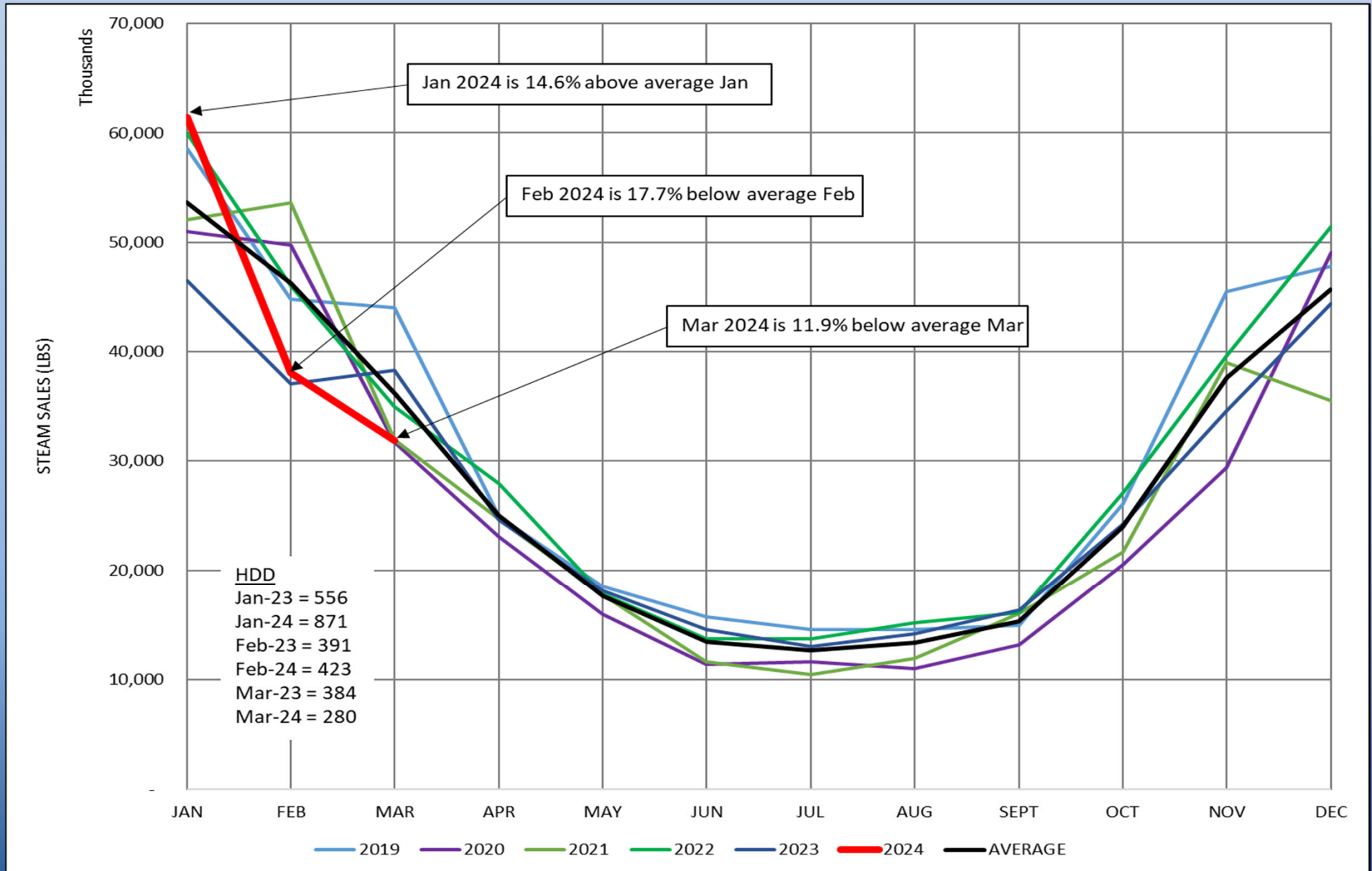
- ❖ Figure 3A. Historical CHW Consumptions
- ❖ Figure 3B. Historical Steam Consumptions

*Figure 3A. Historical CHW Consumptions*



Averages include the years 2019, 2020, 2021, 2022, and 2023.

*Figure 3B. Historical Steam Consumptions*



Averages include the years 2019, 2020, 2021, 2022, and 2023.

## 4. *Historical System Efficiency*

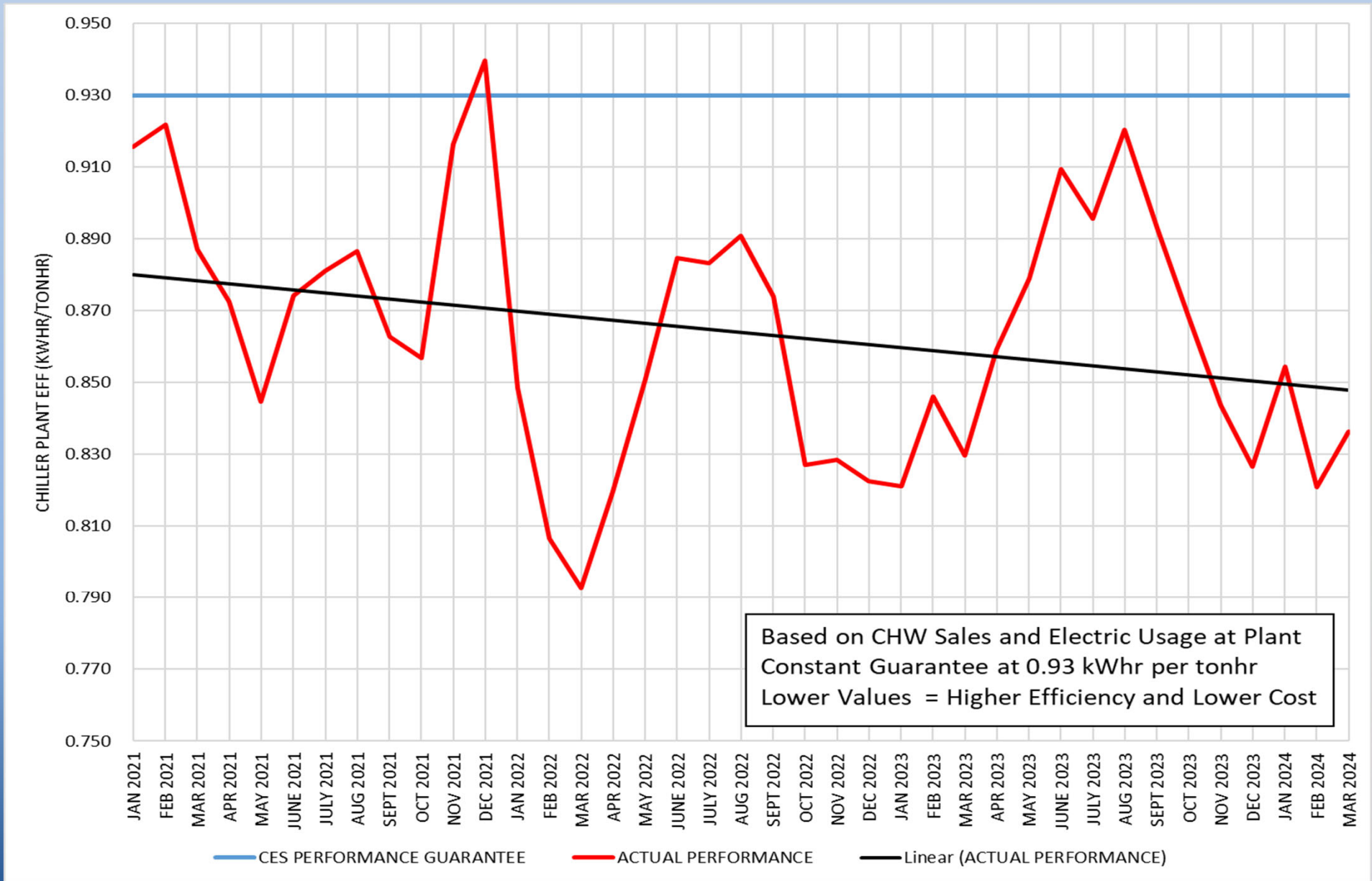
- ❖ Five Efficiency Metrics:
  - ❖ CHW: Electricity per unit of sales (kWhr/tonhr)
  - ❖ CHW: Water per unit of sales (equation) (gallons/tonhr)
  - ❖ STM: Fuel per unit of sendout (equation) (dktherm/Mlb)
  - ❖ STM: Water per unit of sendout (equation) (gallons)
  - ❖ STM: Electricity per unit of sales (kWhr/Mlb)

- ❖ Cost benefit to customers based on CES's operation of system – Fuel Efficiency Adjustment
  - ❖ Customer costs are “capped” based on efficiency guarantees
  - ❖ CES pays 100% of the cost associated with not meeting the performance guarantee each month
  - ❖ Customers receive 75% of the cost savings when CES exceeds the performance guarantee each month
  - ❖ CES receives 25% of the cost savings when they exceed the performance guarantee each month



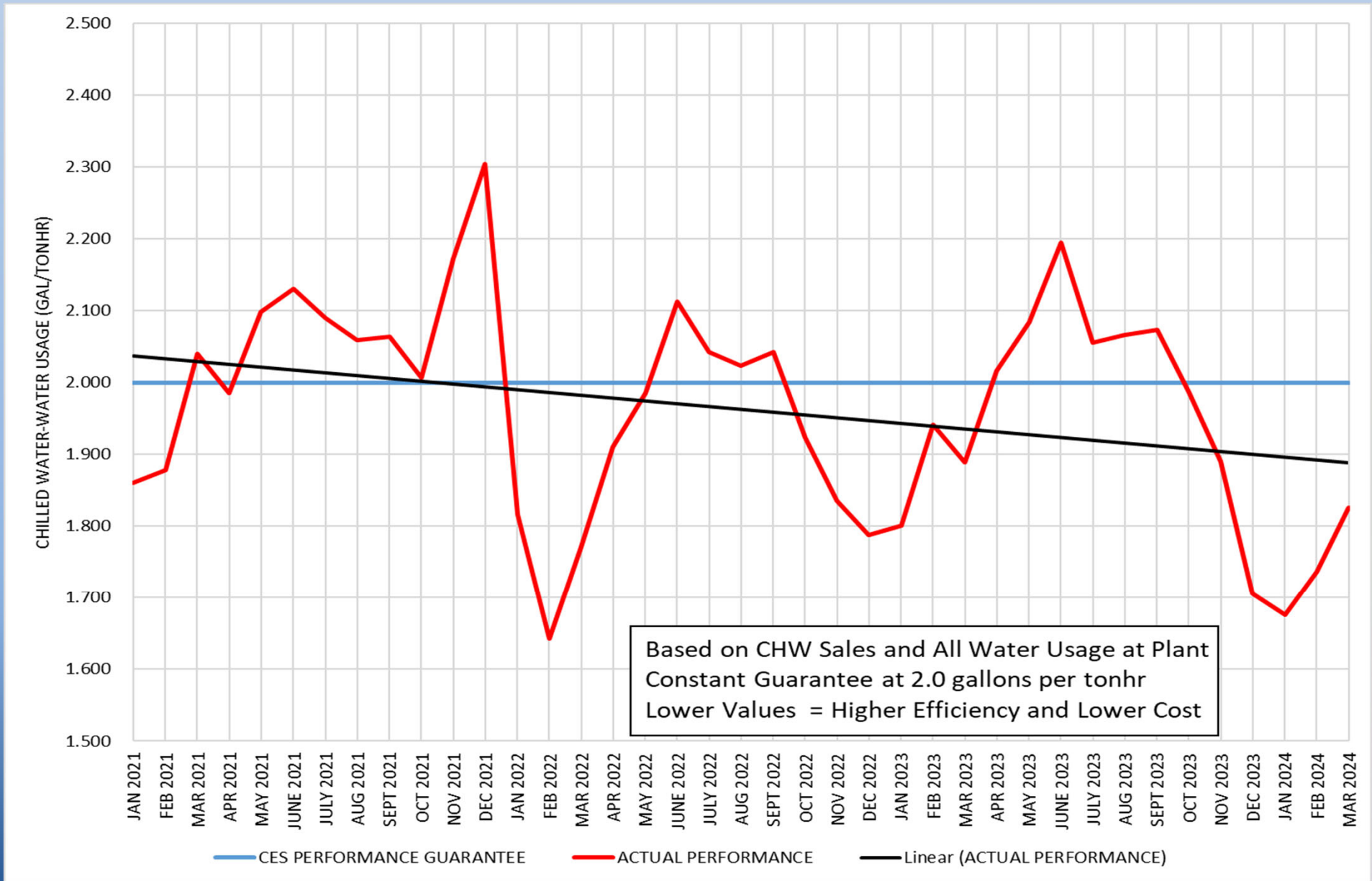


# Chilled Water: Electric



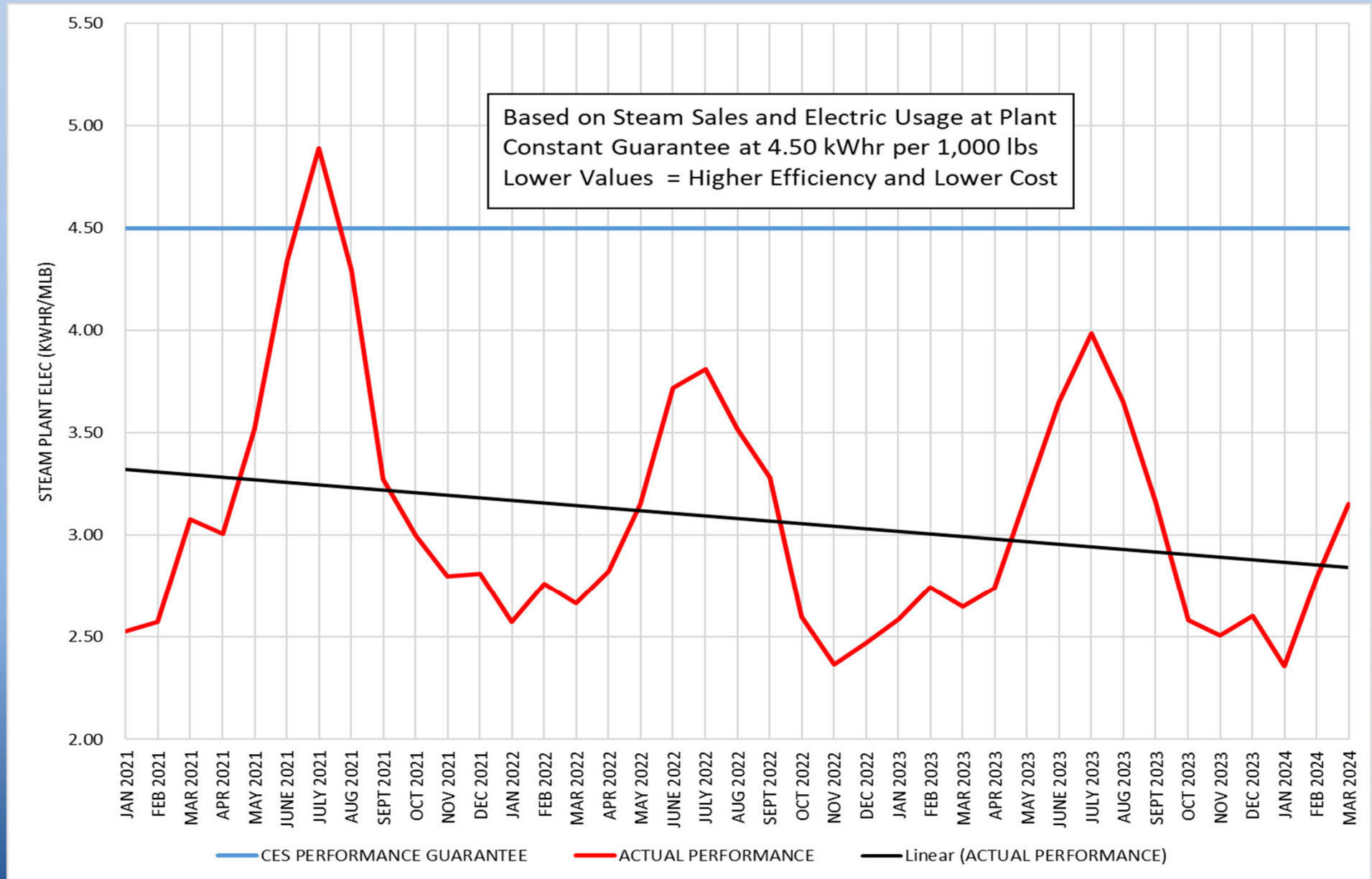


# Chilled Water: Water

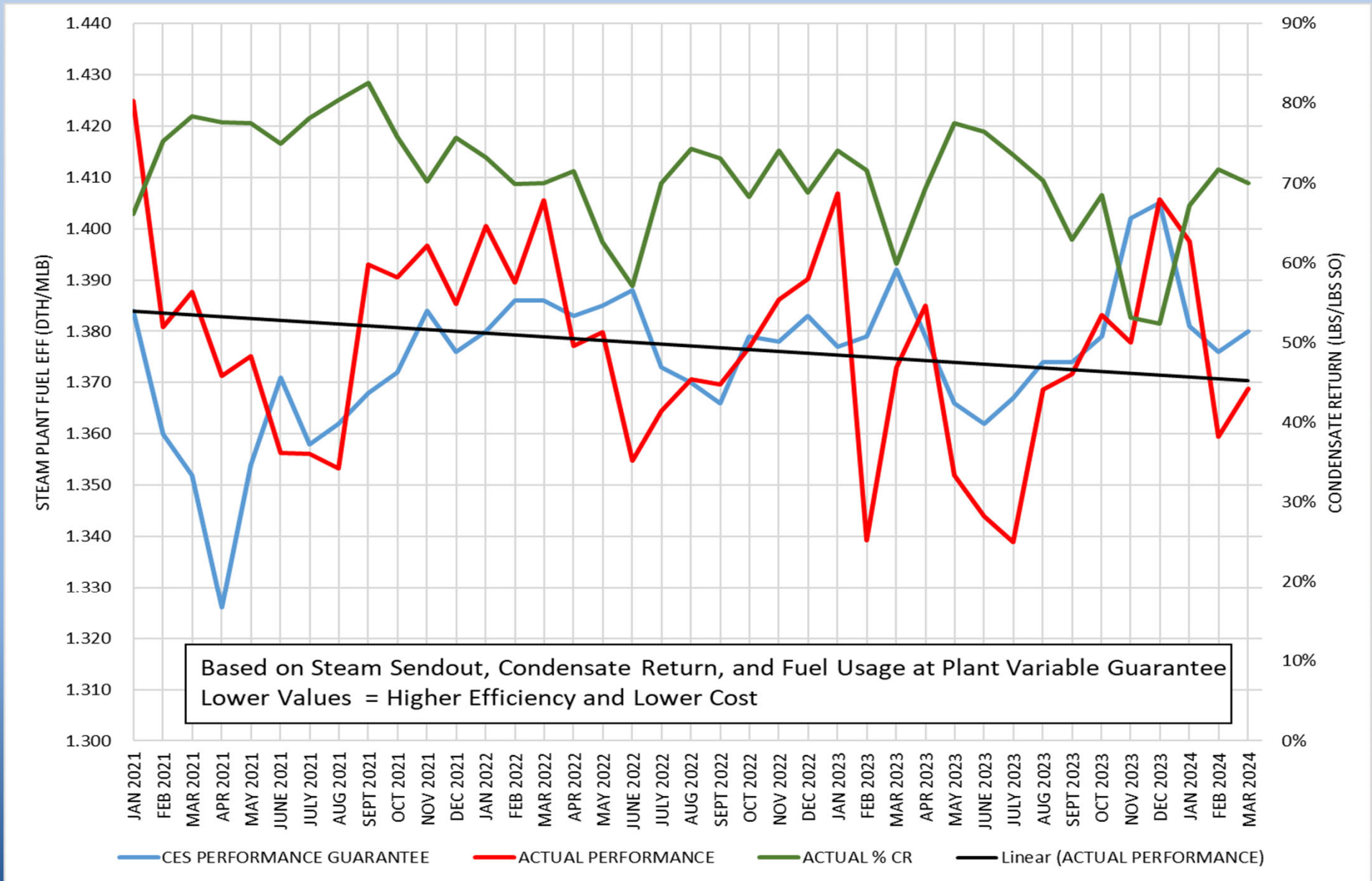




# Steam: Electric



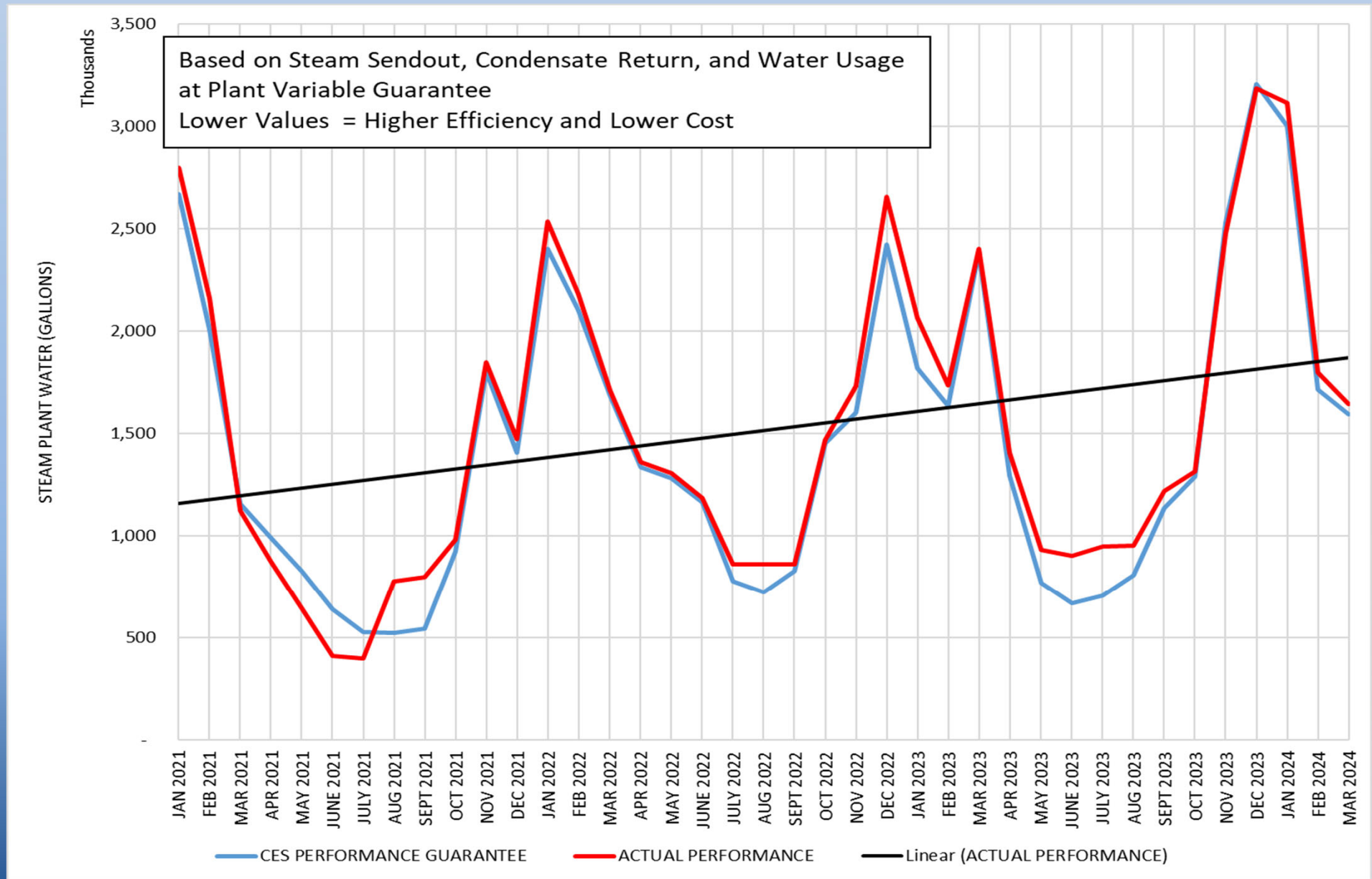
# Steam: Fuel







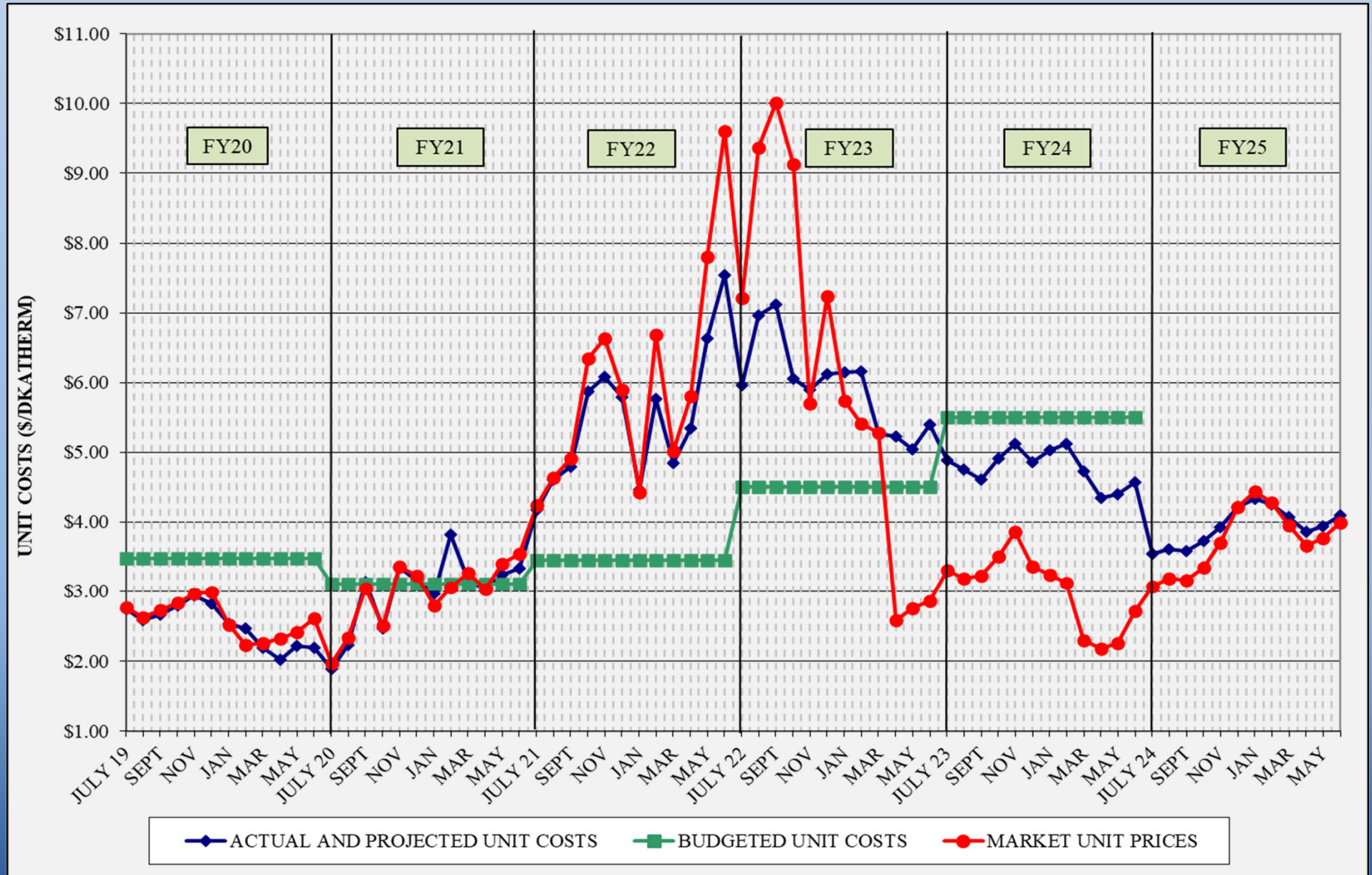
# Steam: Water



# *What Can You Do To Improve System Efficiency?*

- ✓ Return chilled water at a high temperature (high delta T's!)
  - ✓ Reduces building and system pumping cost
  - ✓ Reduces or eliminates TIFs
- ✓ Report or repair all steam, condensate, and chilled water leaks
  - ✓ Reduces make-up water to systems
  - ✓ Reduces additional water treatment
  - ✓ High condensate return increases boiler plant efficiency and reduces fuel use
  - ✓ Make sure your steam traps are working properly
  - ✓ Return the condensate!
- ✓ Prevent contamination of condensate
  - ✓ Cross contamination from hot water in heat exchangers increases hardness
  - ✓ Iron contamination from building piping and equipment

# 5. Natural Gas and Propane Pricing



Currently hedging 70% of natural gas through FY24 and 40% through FY25; transportation costs included.



## Table 5: FY24 Gas Spending & Budget Comparison

	<b>Actual FY24 To Mar 31</b>	<b>Budget FY24</b>	<b>Percent Difference</b>
Steam Sendout (Mlbs)	320,286	342,643	-6.5%
Fuel Use (Dth) (includes propane)	441,888	491,007	-10.0%
Plant Eff (Dth/Mlb)	1.380	1.433	-3.7%
Total Gas Cost (includes propane)	\$2,174,066	\$3,301,274	-34.1%
Unit Cost of Fuel (\$/Dth)	\$4.920	\$6.525	-24.6%

Excludes consultant fees, FEA, and pre-purchased and stored propane; Includes transportation and actual propane costs and usages. Budget values include price and weather contingencies.

## 6. DES FY24 Costs to Date

Item	FY23 Budget	FY24 Budget	FY24 Actual to date	Percent of FY24 Budget
FOC's	\$ 4,006,800	\$ 4,127,000	\$ 3,095,267	75.00%
Pass Throughs				
Administrative Costs	\$ 932,100	\$ 638,300	\$ 540,658	84.70%
Chemicals	\$ 255,700	\$ 331,200	\$ 208,394	62.92%
R&I Fund Transfers	\$ 303,700	\$ 312,900	\$ 234,675	75.00%
Water/Sewer	\$ 773,400	\$ 1,152,000	\$ 808,539	70.19%
Fuel Base	\$ 2,797,256	\$ 3,422,700	\$ 2,256,072	65.91%
Fuel Contingency	\$ 677,044	\$ 764,200	\$ -	0.00%
Electricity	\$ 6,394,800	\$ 6,476,700	\$ 3,938,431	60.81%
ORF Deposit	\$ 85,800	\$ 188,200	\$ 141,150	75.00%
Debt Service	\$ 4,311,300	\$ 4,774,000	\$ 3,613,237	75.69%
<b>Total Expenses</b>	<b>\$ 20,537,900</b>	<b>\$ 22,187,200</b>	<b>\$ 14,836,423</b>	<b>66.87%</b>
<b>Total Revenues</b>	<b>\$ 20,163,600</b>	<b>\$ 21,802,800</b>	<b>\$ 14,906,004</b>	<b>68.37%</b>
<b>Metro Funding</b>	<b>\$ 374,300</b>	<b>\$ 384,400</b>	<b>\$ 288,300</b>	<b>75.00%</b>



## 7. *Water Treatment*

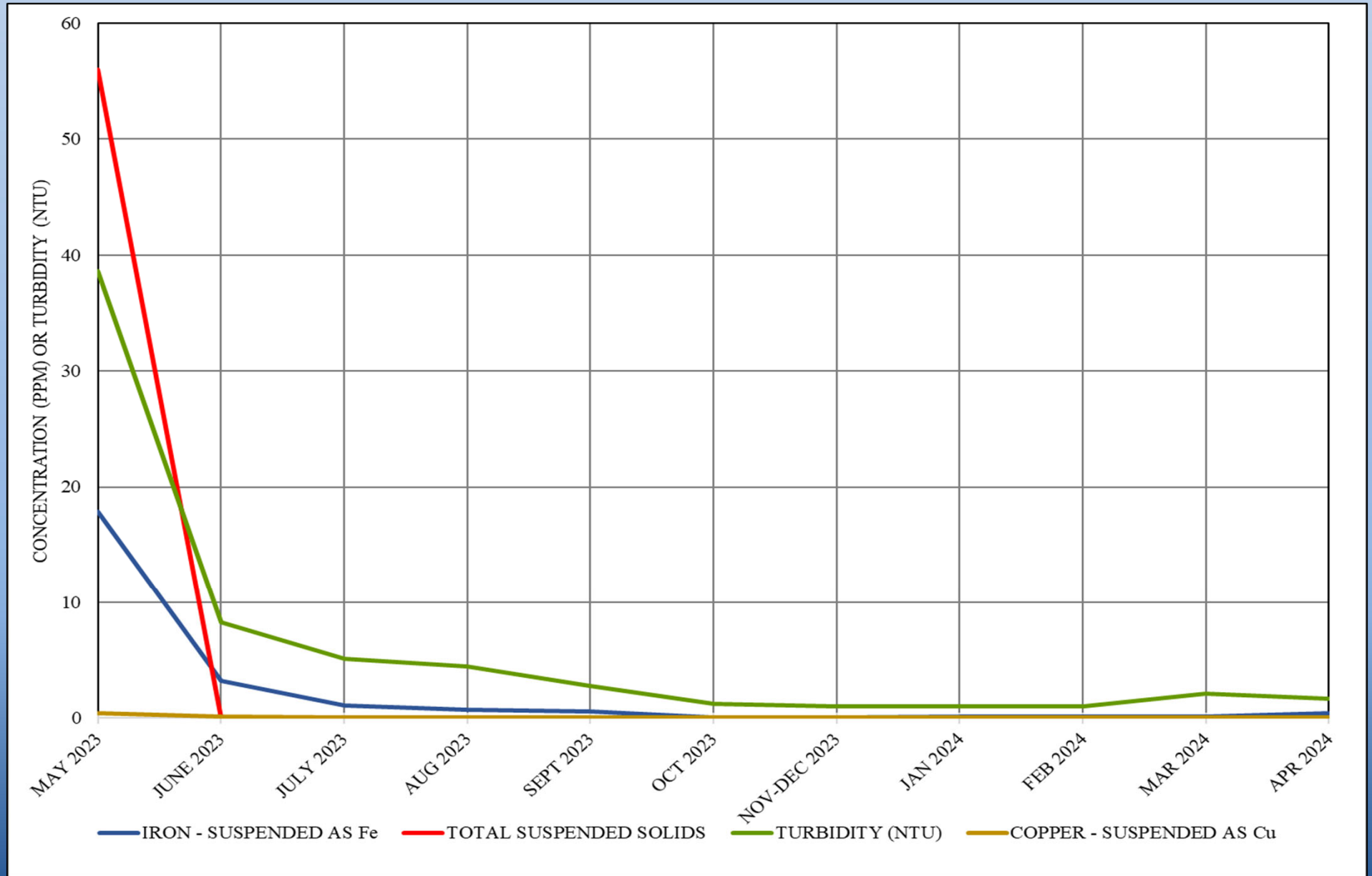
- ❖ **Steam and Condensate (Condensate Return 72%)**
  - ❖ City Water Conductivity (260  $\mu$ mhos)
  - ❖ Feedwater Iron (0.02 ppm)
  - ❖ Condensate Hardness (0.08 ppm CaCO<sub>3</sub>)
  - ❖ Condensate Iron (0.05 ppm)
  - ❖ Condensate pH (8.3)
- ❖ **Condensing Water**
  - ❖ 4.2 Cycles
  - ❖ Biologicals ( $10^1$  CFU/ml)
- ❖ **Chilled Water**
  - ❖ Conductivity (314  $\mu$ mhos)
  - ❖ Corrosion
  - ❖ EGF and Customer Biologicals ( $10^0$  CFU/ml)
  - ❖ Side Stream Filter

## *Side Stream Filter*

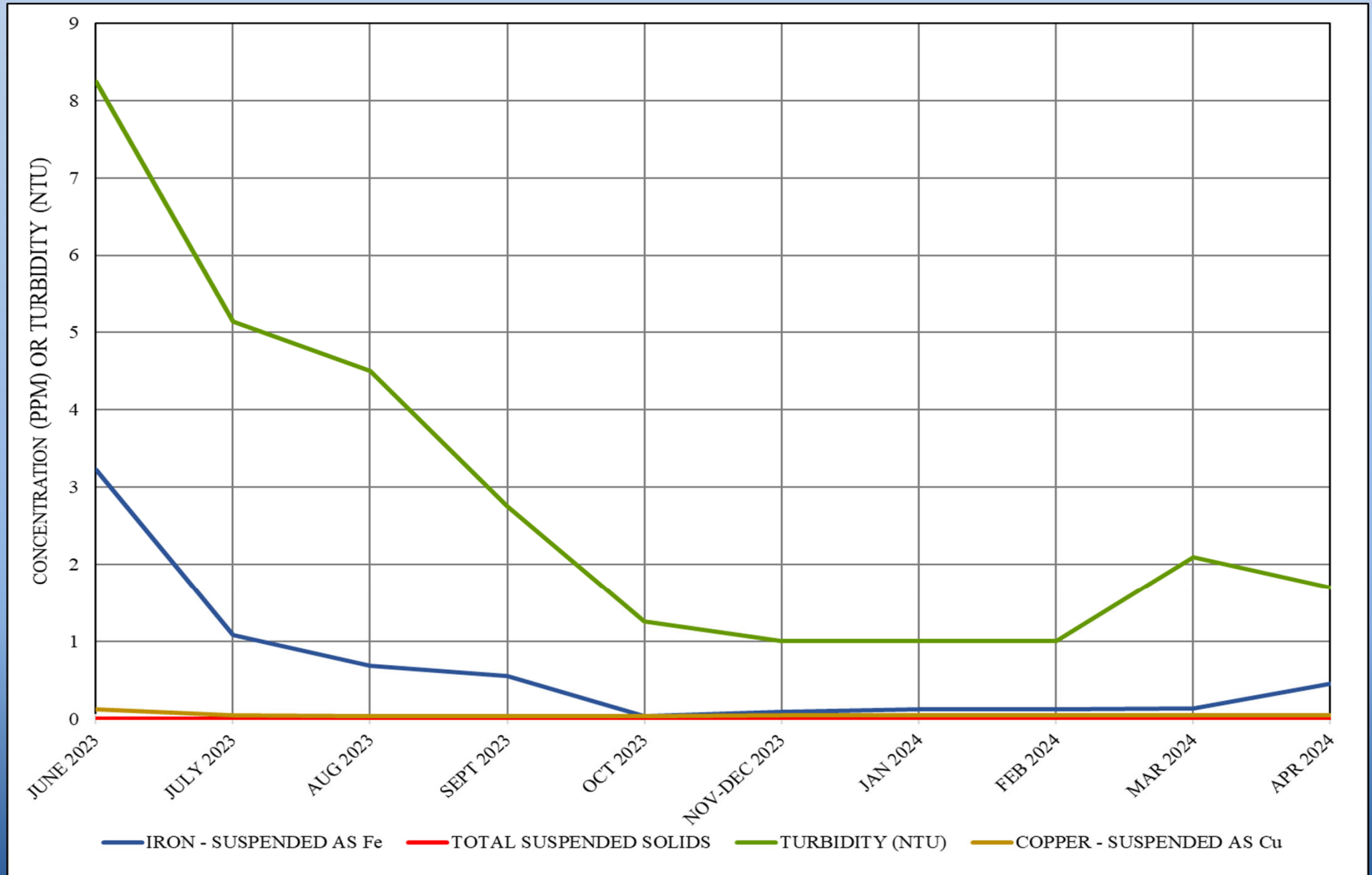
- Filter installed on chilled water return at EGF May 2023
- Filters chilled water at 500 gpm filtering all the water in about two months
- Will remove suspended solids down to 0.5 micron
- Improves water quality delivered to customers which may also improve heat transfer



# Side Stream Filter Performance



# Side Stream Filter Performance



Slight increase in iron and turbidity in Mar and Apr believed to be due to increase in CHW usage.

## 8. *DES Projects*

- ❑ **Active Capital Projects – General & Marketing**
- ❑ DES 163: Peabody Union – working with developer on Guthrie St. impact to DES; demolition of wall began in January.
- ❑ DES 192: Peabody St. Developments – survey of routing down Peabody; DES plan for expansion in area with new customers.
- ❑ DES 195: DES Parking Area – on hold pending Guthrie St. mods.
- ❑ DES 201: East Bank Development – ongoing development and marketing activities related to the East Bank.
- ❑ DES 202: 7<sup>th</sup> and Commerce Hotel –building development on hold; intends to use DES CHW and STM.
- ❑ DES 203: Printer’s and Banker’s Alley Building – building development on hold; intends to use DES CHW.
- ❑ DES 217: DES Service to Auto Nashville Hotel, LLC (8<sup>th</sup> and Demonbreun) – expecting service during construction in late 2025; 1,300 tons chilled water contract capacity with no steam.



# *Capital Projects Review*

## **Active Capital Projects – Corrosion Repair/Prevention**

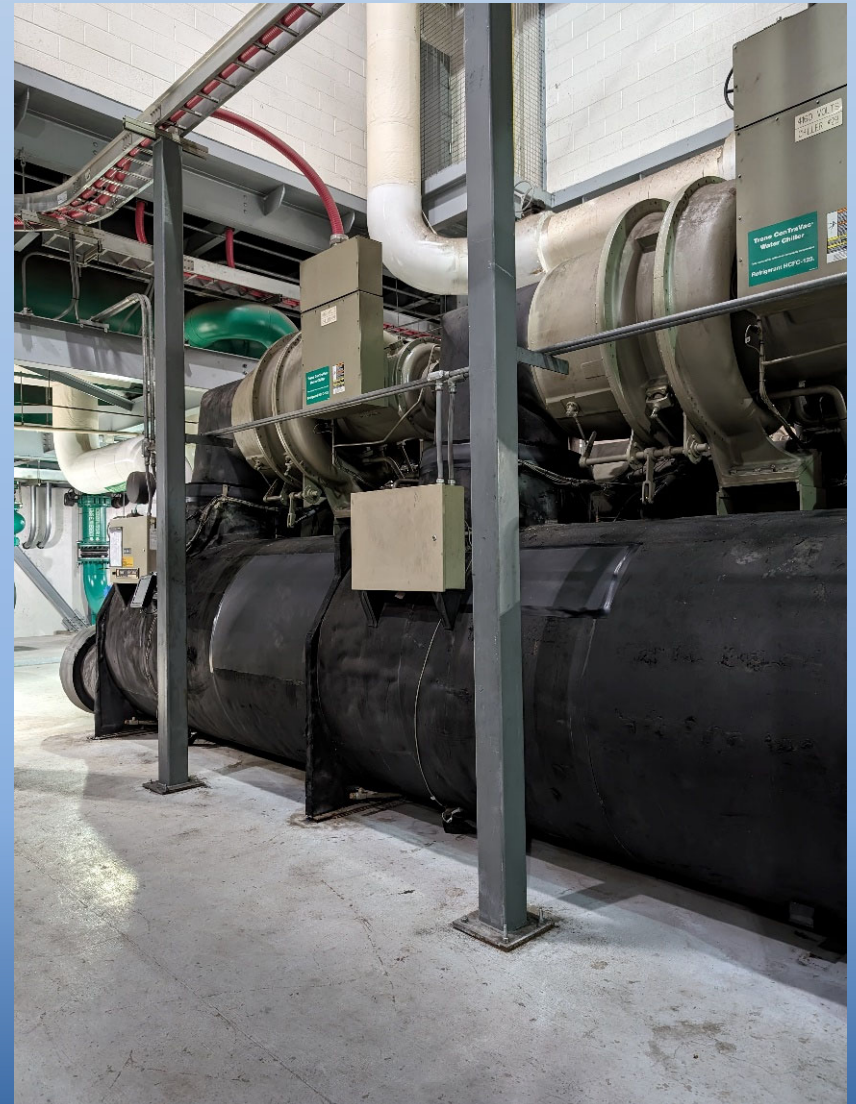
- ❑ DES 211: AA Birch Tunnel and MH D Repairs
  - ❑ cleaning and coating of structural steel pipe and platform supports; work anticipated starting 4<sup>th</sup> Qtr FY24.
- ❑ DES 218: Manholes B2, B6, B7, B8, B9 and 22B Repairs
  - ❑ corrosion clean-up and coating, concrete patching and sealing water infiltration; began during the 3<sup>rd</sup> Qtr; anticipate completion 4<sup>th</sup> Qtr FY24.

## *Capital Projects Review*

- ❑ **Active Capital Projects – Repairs/Modifications**
- ❑ DES 213: 4th, 7th & Broadway Tunnel Piping Slide Support Repairs
  - ❑ repair and replacement of pipe slides; bidding anticipated in 4th Qtr FY24.
- ❑ DES 219: 7th Ave Tunnel Shotcrete Extension
  - ❑ relocation of Metro Library steam and condensate return service piping for tunnel repairs and water infiltration mitigation; bidding anticipated 4th Qtr FY24.
- ❑ DES 220: MH 20 Condensate Piping Repair and Grating Addition
  - ❑ replacement of corroded condensate piping and the installation of grating over shaft to 7th Ave Tunnel; anticipate completion in 4th Qtr FY24.
- ❑ DES 221: War Memorial and Legislative Plaza Renovation
  - ❑ State is renovating the two buildings requiring demo of piping and rework of DES meter stations; building offline until late 2024/early 2025.

## *DES-217: Chiller 2 R'newal*

- Chiller 2 had rotor bar failure October 2023
- Trane proposed a R'newal program to make repairs and provide new 7-Year warranty
- All rotating parts replaced plus new control panel
- Repair falls into CES responsibility but Metro agreed to pay two-thirds of cost to have new warranty
- Chiller repairs completed and fully operational March 19, 2024
- **No cost to customers!**





## *Capital Expenditures*

	<b>Spent to End of FY23</b>	<b>FY24 Spending</b>	<b>Balance to Date (04/24/24)</b>
R&I Projects	\$4,644,774	\$339,340	\$199,684
49116-DES Infrastructure Fund	\$5,011,324	\$1,018,950	\$3,343,597
Total	\$9,656,098	\$1,358,290	\$3,543,281

## *9. Questions and Answers*

*Please complete and submit survey*

## *10. Adjourn*