EBMUD 2024 Greenhouse Gas Inventory

Sustainability Committee

November 25, 2025

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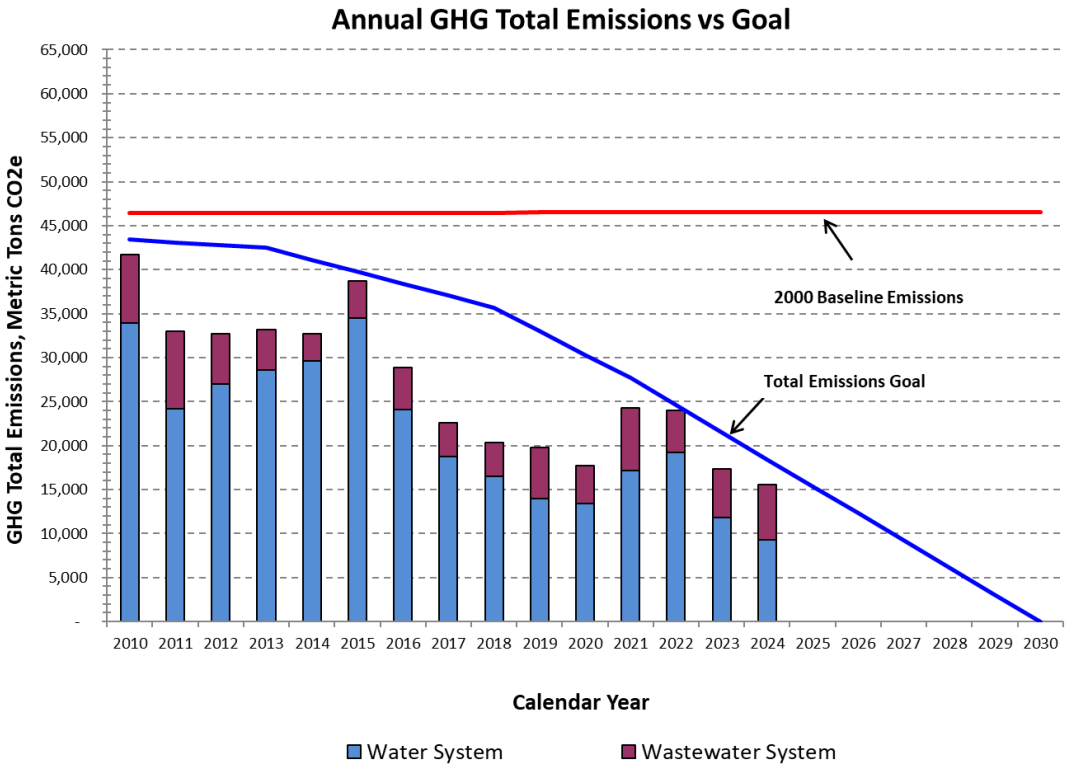
Agenda

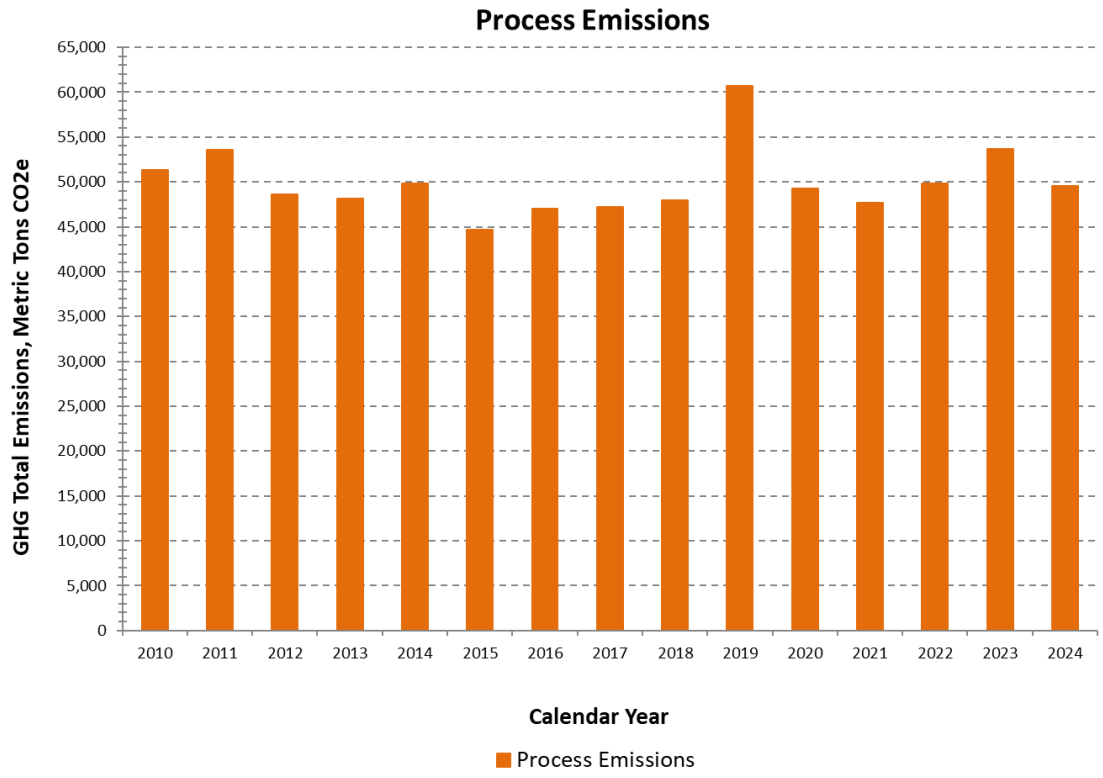
- 2024 Inventory Results
- Greenhouse Gas (GHG) Reduction Plan
- Process Emissions
- Policy Updates
- Offsets

2024 Inventory Results
Districtwide Totals



2024 total is 15,583 MT CO2e*
vs Goal of 18,459 MT CO2e

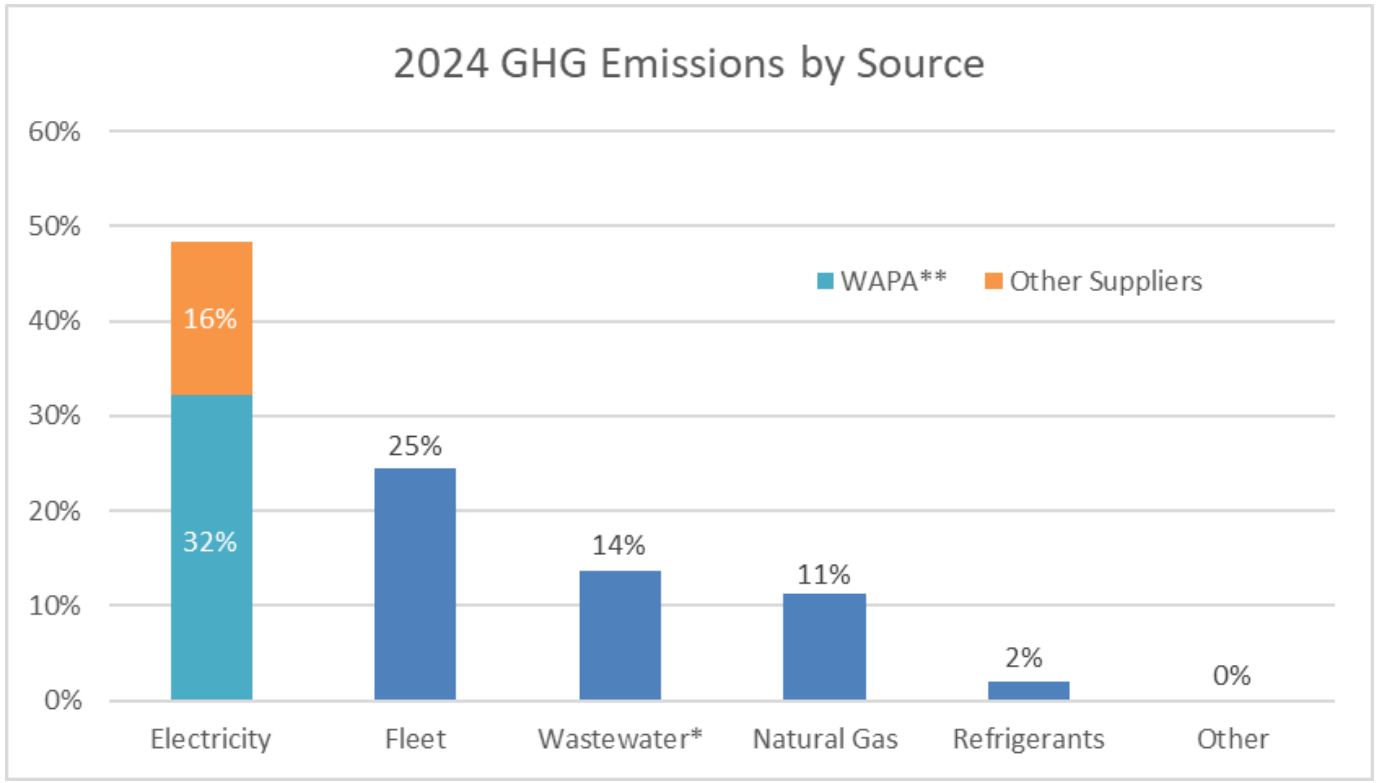
**MT CO2e = Metric Tons of Carbon Dioxide Equivalent*



2024 total is 49,547 MT CO2e

Process emissions are not included in the District GHG goal

2024 Inventory Results
GHG By Source



Source	GHG MT CO2e
Electricity	7,545
Fleet	3,823
Wastewater*	2,141
Natural Gas	1,749
Refrigerants	318
Other	6
TOTAL	15,583

* *Wastewater emissions are from stationary combustion at the Main Wastewater Treatment Plant. Other wastewater emission sources are reported in appropriate source category.*

** *WAPA is the Western Area Power Administration*

2024 Inventory Results - Fleet

- GHG emissions are from gasoline combustion
  - Renewable diesel emissions are biogenic (calculated but not in inventory)
- Gas and hybrid vehicles are being replaced at end of service life with Zero Emission Vehicles (ZEVs)
- 30% of the gas vehicles do not currently have ZEV replacements
  - Larger trucks (e.g., F-450, F-550)
  - Custom utility body vehicles

Vehicle Type	Number in Fleet
Gas Vehicles	651
Hybrid Vehicles	83
Electric Vehicles	23
Diesel Vehicles	263
Construction Equipment – Diesel	276
Construction Equipment - Gas	7

GHG Reduction Plan

- Carbon neutrality by 2030
  - Current Plan– use offsets and renewable energy certificates (RECs)
    - Aligns with existing policy
    - Less expensive
  - Accelerated Plan – more electricity alternatives and equipment upgrades
    - More expensive
- Annual cost estimates to achieve carbon neutrality in 2030 are presented
  - Cost estimates reflect cost increases over current and anticipated budget
- Residual emissions will always be part of the GHG inventory and require offsets to reach the carbon neutrality goal
- Process emissions are excluded from this plan and discussed later in presentation

GHG Reduction Plan - Electricity

- Current Plan
  - Keep WAPA (no additional cost)
  - Purchase RECs to offset WAPA emissions - $160,000 (20,000 MWh x $8/REC) per year
  - Purchase offsets for other electricity emissions - $30,000 (1,000 MT x $30 MT) per year
- Accelerated Plan
  - Replace WAPA with low-emission electricity - $6,000,000 per year
  - Convert all electricity accounts to zero-emission electricity – $1,000,000 per year
- Existing policy is to pursue least cost option but prioritize green energy purchases before purchasing RECs or offsets
- Costs will be higher in drought years for supplemental water pumping
  - Green power, when available, may be purchased to meet GHG emissions goal

GHG Reduction Plan - Fleet

- Current Plan
  - Continue to replace ~50 vehicles per year with ZEVs and install related EV charging
  - Purchase offsets to achieve carbon neutrality - $75,000 (2,500 MT x $30/MT) per year
- Accelerated Plan
  - Double ZEV replacement rate to ~100 vehicles per year and install related EV charging - $7,000,000 per year more than budgeted for additional vehicles and charging stations
  - Purchase offsets to achieve carbon neutrality - $24,000 (800 MT x $30/MT)
- Alternative Option (align with California regulations)
  - Return to purchasing hybrids/combustion engines for light duty vehicle

GHG Reduction Plan – Wastewater

- Current Plan
  - Purchase offsets to achieve carbon neutrality - $60,000 (2,000 MT x $30/MT) per year
- Accelerated Plan
  - Replace cogeneration engines and old flares - $5,000,000/year (amortized 20-year cost)
    - Modern equipment has higher methane destruction efficiency and would reduce about 1,500 MT CO_2e per year
    - Eliminating diesel pilot on cogeneration engines would remove about 200 MT CO_2e per year
    - Capital project not in the 10-year Capital Improvement Program and would require extensive evaluation of options prior to consideration
  - Purchase offsets for remaining emissions – $9,000 (300 MT x $30/MT) per year

GHG Reduction Plan – Natural Gas

- Current Plan
  - No electrification requirement for buildings
  - Water heater and furnace replacements comply with local Air District rules
  - Purchase offsets to achieve carbon neutrality - $52,500 (1,750 MT x $30/MT) per year
- Accelerated Plan
  - Accelerates building electrification schedule – $500,000* per year
    - About 500 MT emissions per year are from building natural gas combustion
  - Purchase offsets to achieve carbon neutrality - $37,500 (1,250 MT x $30/MT)
- Some natural gas sources (e.g., pilot lights in wastewater flares) are required for equipment reliability

**Costs may be significantly higher if major electrical upgrades are needed to supply additional power*

GHG Reduction Plan – Refrigerants and Miscellaneous Water Sources

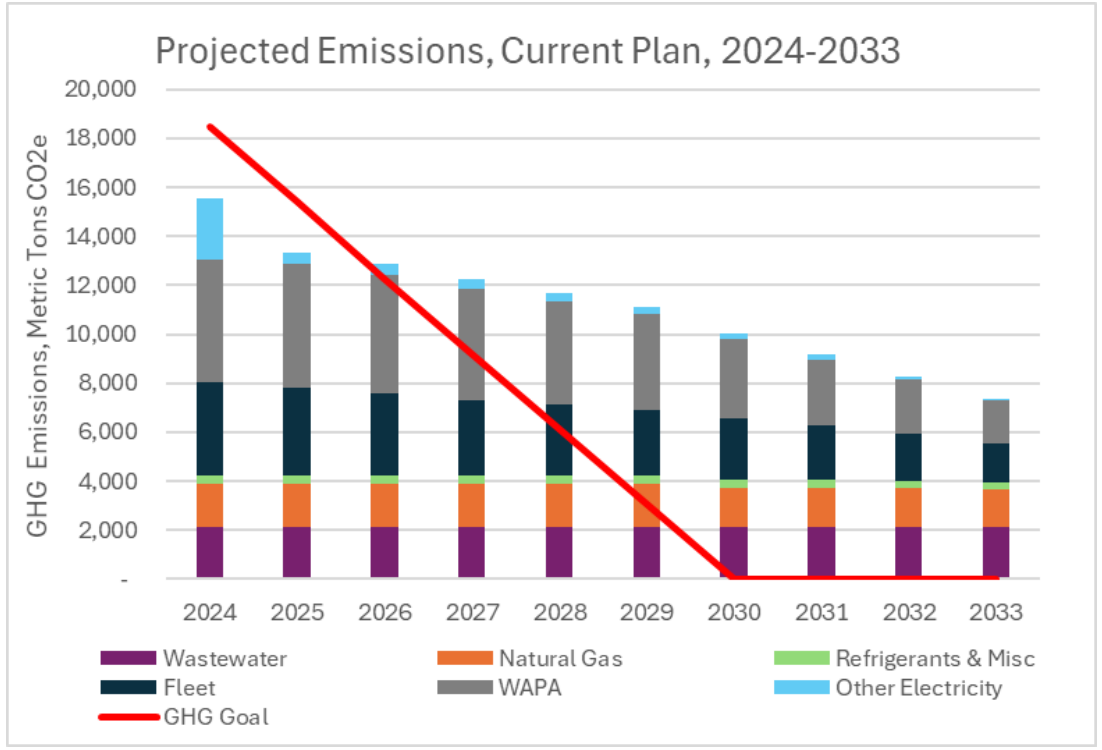
- Current Plan
  - Purchase offsets to achieve carbon neutrality - $10,000 (333 MT x $30/MT) per year
- Accelerated Plan
  - No viable alternative
- Emissions cannot be eliminated due to technological and/or reliability issues

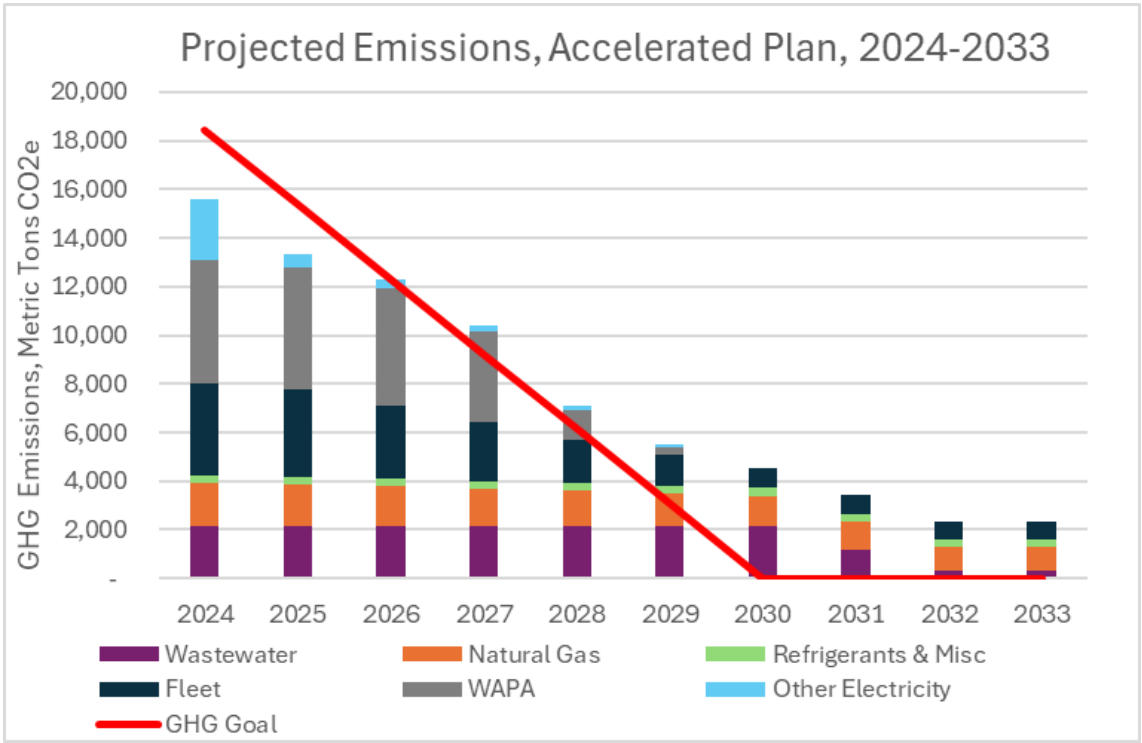
GHG Reduction Plan - Summary

GHG Source	Current Plan	Unbudgeted Annual Cost	Accelerated Plan Options	Unbudgeted Annual Cost
Electricity	Buy offsets and/or RECs	$190,000	Replace WAPA* Purchase solely green power	$6,000,000 $1,000,000
Fleet	Purchase ~50 ZEVs/year Install additional chargers Offset remaining emissions	$0 $0 $75,000	Double ZEV replacement Install additional chargers** Offset remaining emissions	$4,000,000 $3,000,000 $24,000
Wastewater	Buy offsets	$60,000	Replace engines and flares Offset remaining emissions	$5,000,000 $9,000
Natural Gas	Buy offsets	$52,500	Electrify appliances when replaced, upgrade electrical Offset remaining emissions	$500,000 $37,500
Refrigerants / Other	Buy offsets	$10,000	Buy offsets (No practical emission reduction path)	$10,000
Total		$387,500		$19,580,500

***Charger cost estimates remain uncertain but are very expensive if service upgrades are needed*

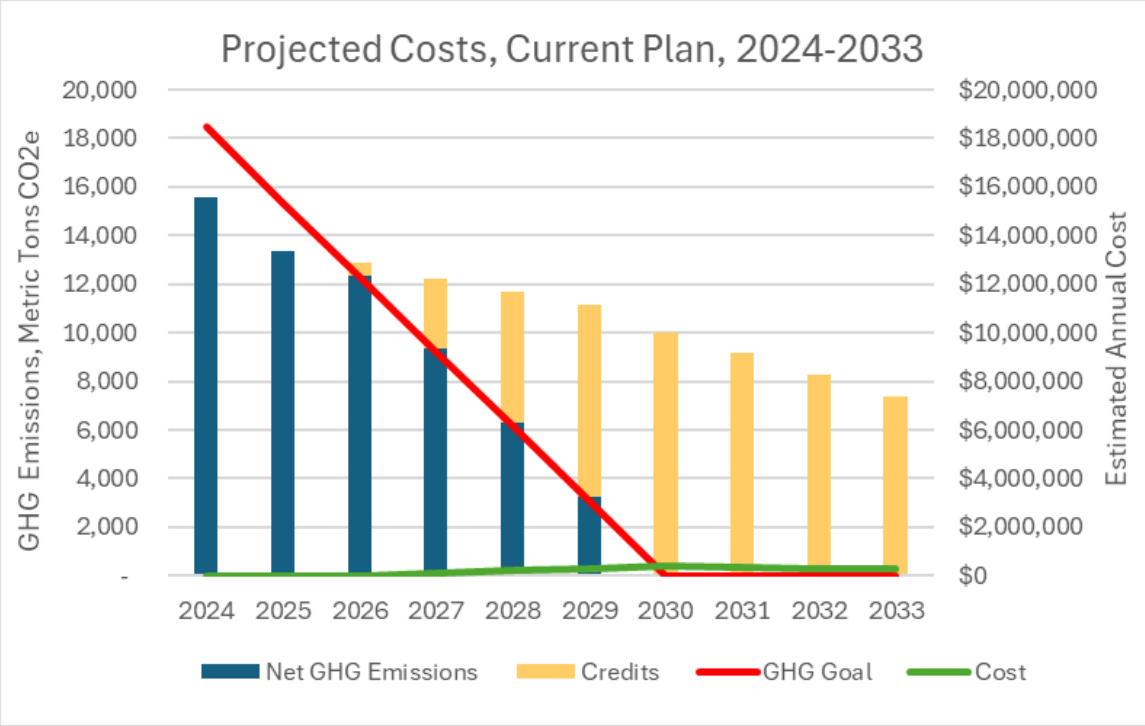
GHG Reduction Plans – Projected Emissions

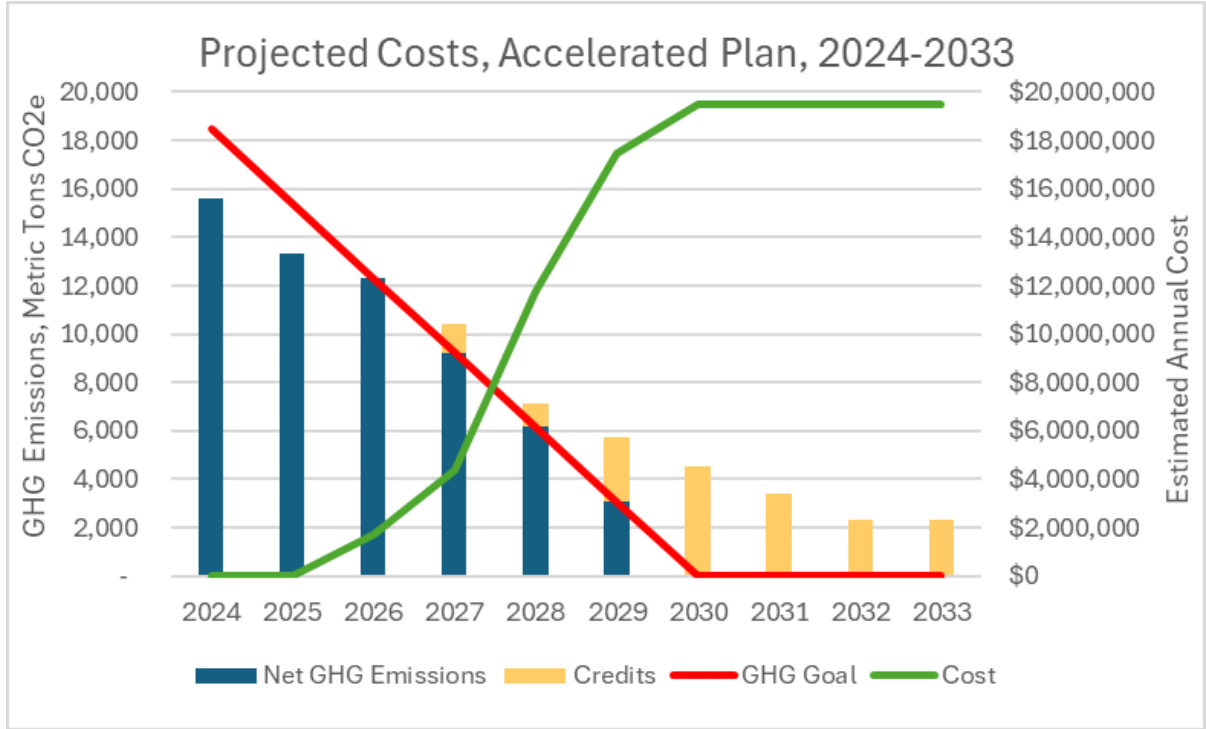




All emissions above the red goal line will require credits (RECs or offsets) to achieve carbon neutrality.

GHG Reduction Plans – Projected Costs





Process Emissions

- Wastewater Treatment and Discharge Emissions are in the Water-Energy Nexus (WEN)
  - Emissions were not included in past
  - Some were included in 2019
  - Large increase in 2022 due to updated emission factors
- Other Process Emissions occur but are excluded from the WEN
  - Reservoir emissions (20,000 MT CO2e)
  - Wastewater collection system emissions (no estimate available)

Process Emission	2024 Emissions (MT CO2e)
Treatment methane	9,157
Treatment nitrous oxide	31,358
Discharge methane	2,156
Discharge nitrous oxide	6,812
Total	49,547

Process Emissions

- Science is evolving slowly
- Quantification of process emissions is improving
  - Methane emissions are well quantified in many studies
  - Nitrous oxide emissions are variable and continue to be studied to improve confidence
- Emissions reduction science is not well established
  - Emissions can be reduced, but not eliminated
  - Current areas of focus
    - Identification and abatement of point source leaks of methane
    - Process parameter control for nitrous oxide
- Nutrient reduction mandated by regional permit will increase treatment-related process emissions in entire region, including EBMUD

Process Emissions

- Options to Address Process Emissions
  - Continue to exclude from goal and track emissions
    - No cost
  - Include process emissions in carbon neutrality goal
    - Carbon neutrality goals using the WEN would be met
    - Offset cost could be $1,500,000 per year

GHG Policy Updates

- Upcoming Policy Changes – will present to Sustainability and Finance/Administration Committees in 2026
- Policies to be Updated
  - 7.15 Climate Action
  - 7.07 Energy
  - 7.05 Sustainability and Resilience
- New GHG Inventory and Management Procedure

Staff Recommendations

- Actively manage electricity purchases within existing District policy
  - Purchase low emission retail power
  - Continue purchasing WAPA power
  - Utilize RECs for WAPA and/or other high emission power to meet goals
- Continue ZEV conversion at planned pace
- Remain involved in workgroups and projects researching wastewater process emission issues
- Track local, beneficial offset projects for future use in inventory if offset quality standards are met

Questions?

Fall Colors