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SUBJECT: Renewable Natural Gas Facility Update
DATE: July 8, 2026

DS RACPP

PRESENTATION TYPE:
Informational Briefing

SUMMARY:
Environmental Services (ES) staff will brief the Infrastructure, Planning, and Sustainability Committee (IPS) on the performance of the renewable natural gas (RNG) facility located at the City's Central Wastewater Treatment Plant (CTP).

The facility has not met its production or revenue goals since coming online in 2022. Production continues to improve through operational changes and more proactive maintenance, but the facility still under-performs relative to design expectations and does not yet generate enough revenue to cover ongoing costs.

The facility cannot function without large natural gas inputs. This natural gas usage has limited the City's progress toward the 2030 Climate Action Plan facilities emissions reduction target and prevents the RNG facility from meeting its objective of reducing flaring at CTP.

Staff will continue monitoring performance and seeking operational improvements and propose returning to IPS in one year with further status updates.

BACKGROUND:

Wastewater Biogas Introduction

At CTP, solids separated from wastewater are treated using anaerobic digestion, a process in which microorganisms break down solids in sealed tanks without oxygen. The treated solids then undergo further processing before becoming TAGRO, Tacoma's award-winning Class A biosolids gardening product.

As the microorganisms break down the sludge, they produce a byproduct called "biogas," which is roughly 60 percent methane and 40 percent carbon dioxide, with small amounts of other gases such as hydrogen sulfide. Because methane is a potent greenhouse gas and biogas creates safety and odor concerns, it cannot simply be vented to the atmosphere. This leaves three options for managing it, with the second and third providing energy recovery:

1. Burn off the methane using a flare, as commonly seen at landfills and treatment plants.
2. Combust biogas for beneficial use; e.g. use boilers to produce heat for other treatment processes.
3. Extract the methane content of the biogas to sell as RNG.

Tacoma's First RNG Facility

The City first pursued RNG production at CTP in 1992. The first facility compressed and stored RNG onsite for a future CNG powered vehicle fleet. However, onsite compression and storage

proved costly and maintenance -intensive, and CNG vehicle technology did not develop as quickly as expected. Without a safe and viable gas storage option or vehicles able to use the gas, the facility was decommissioned in 1994.

Tacoma's Current RNG Facility

The City renewed its interest in RNG in the mid-2010s. At this time, the CTP boilers were using roughly half of the plant's biogas output to generate heat for biosolids treatment and TAGRO production, but the remaining biogas continued to be flared. Capturing and selling that flared methane offered potential emission and revenue benefits.

Following early investigation and outreach to City Council, the City entered into an Energy Service Company (ESCO) contract in 2018 to design and construct a new RNG facility. The contract included guaranteed RNG production and energy savings metrics. To avoid challenges of onsite compression, the project added a pipeline connection to Puget Sound Energy's (PSE) distribution system, allowing the City to sell and route RNG directly to PSE instead of storing it onsite.

After commissioning in 2021, the completed facility was turned over to the City in 2022. The City expected the facility to generate enough revenue over time to cover its operating and debt service costs.

ISSUE:
The RNG facility has experienced a high volume of operational issues, leading to unplanned shutdowns, reduced operating time ("uptime"), and lower-than-expected RNG production and revenue. Operations and Maintenance (O&M) and Engineering staff have been diligent in reviewing operating protocols, tuning and optimizing system controls, and increasing proactive maintenance of the system. While initial targets for the facility have not been met, staff efforts have led to steadily increased uptime and production.

With continued review of the facility's design and operating data, staff have found that the facility's reliance on natural gas inputs prevents it from meeting its initial emissions objectives. The facility does not reduce flaring at CTP, the RNG produced at the facility has a carbon intensity nearly equal to fossil natural gas, and operating the facility inhibits progress toward the 2030 Climate Action Plan facility emissions reduction target. These aspects of the system would require a capital cost-intensive system redesign and overhaul to remedy.

Operation and Production

Three main issues have inhibited uptime and production, which are listed below:

1. Siloxane filtration → Strict siloxane discharge limits, limited number of accredited laboratories, limited testing methods, steep learning curve for maintenance cleanliness.
2. Mechanical failure and parts availability → Startup challenges, steep learning curve for City maintenance personnel, unique and single vendor provided components, lack of redundancy.
3. System controls and tuning → Frequent adjustments needed due to lack of system redundancy and more required tuning and optimizing.

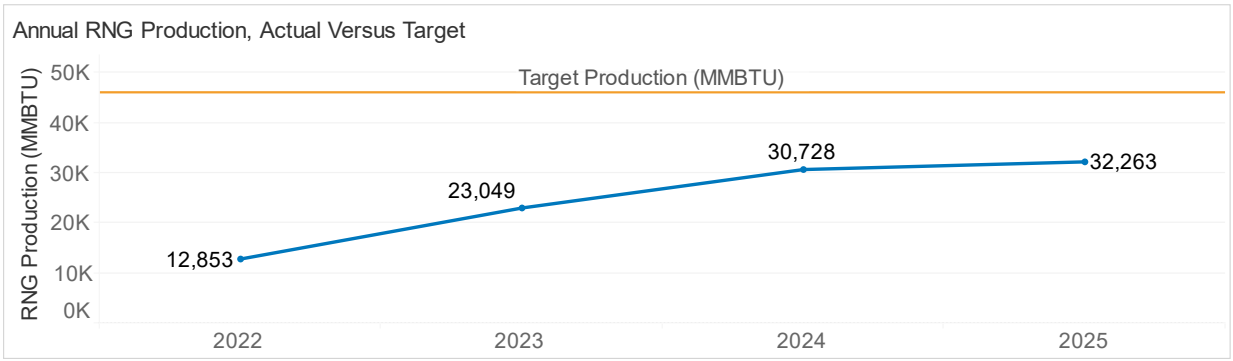
Issue No. 1 is stubbornly persistent. Siloxanes, chemical compounds commonly found in wastewater due to their prevalence in cosmetic and personal care products, must be removed from biogas through specialized filtration media to meet strict RNG standards in the Puget Sound region. Bi-weekly sampling is required to confirm siloxane content is below certain limits before

PSE will approve its purchase. Siloxane exceedances have been traced to faulty siloxane test methods and contamination introduced during facility maintenance events. While the City still has intermittent challenges with siloxane exceedances, introducing alternate testing methods, following best practices during maintenance, and proactively changing siloxane removal media have helped to reduce the frequency of exceedances.

Issue No. 2 has been largely addressed. Where possible, the Operations and Maintenance team now keeps a backstock of parts prone to failure to reduce downtime, and increased familiarity with the facility has also improved proactive maintenance.

Issue No. 3 is an ongoing effort. Seasonal adjustments and system optimization have improved efficiency and increased production while the facility is operational, but production remains limited by overall uptime.

RNG production has increased steadily since 2022, but the guaranteed minimum production level of 46,000 MMBTU annually would be difficult to achieve under current operating conditions.



Financial Performance

The RNG facility cost $15.5M to construct, with a small offset of $350,000 in grant funds. Most of the cost was financed through a $12.8M state loan with a 20-year term and 2.1 percent interest rate. At the intended production amount of 46,000 MMBTUs of RNG annually identified during the design phase, the City initially projected that revenues would exceed combined operating expense and debt service costs.

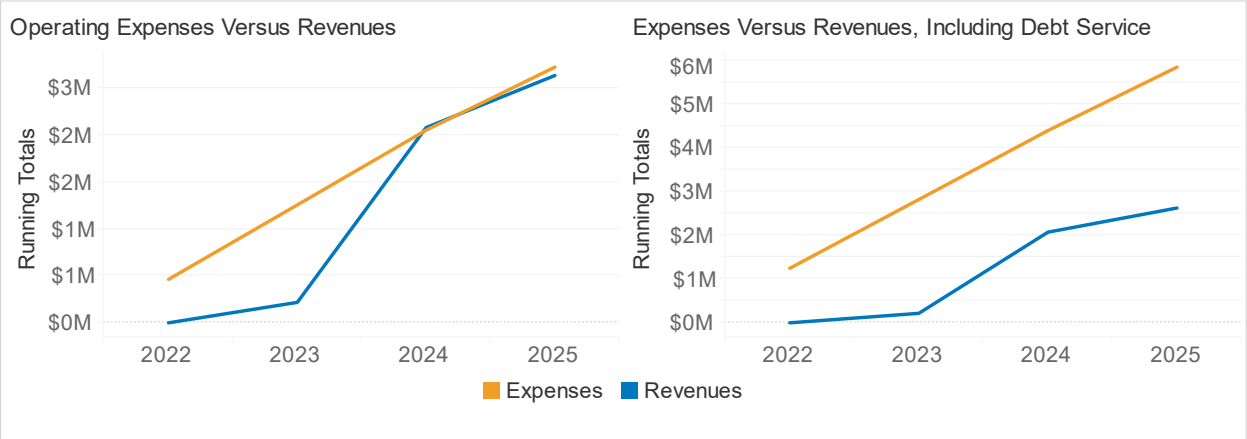
The City receives RNG-related revenues in two different ways, (1) from the sale of the physical RNG to PSE, and (2) from the sale of the Renewable Information Number (RIN) credits, a federal credit generated by the EPA for production of renewable fuel. RINs make up the bulk of the facility's revenue.

Lower-than-anticipated RNG production has translated to lower-than-expected revenues. Price volatility in both RNG and RIN markets has further reduced revenues.

Operating expenses, capital expenses, and debt service combined have exceeded revenues in all years except 2024. However, 2024's revenues are artificially inflated by RIN credits generated in 2023 but sold in 2024. If RIN revenues were matched to the year they were generated, no year would be revenue positive.

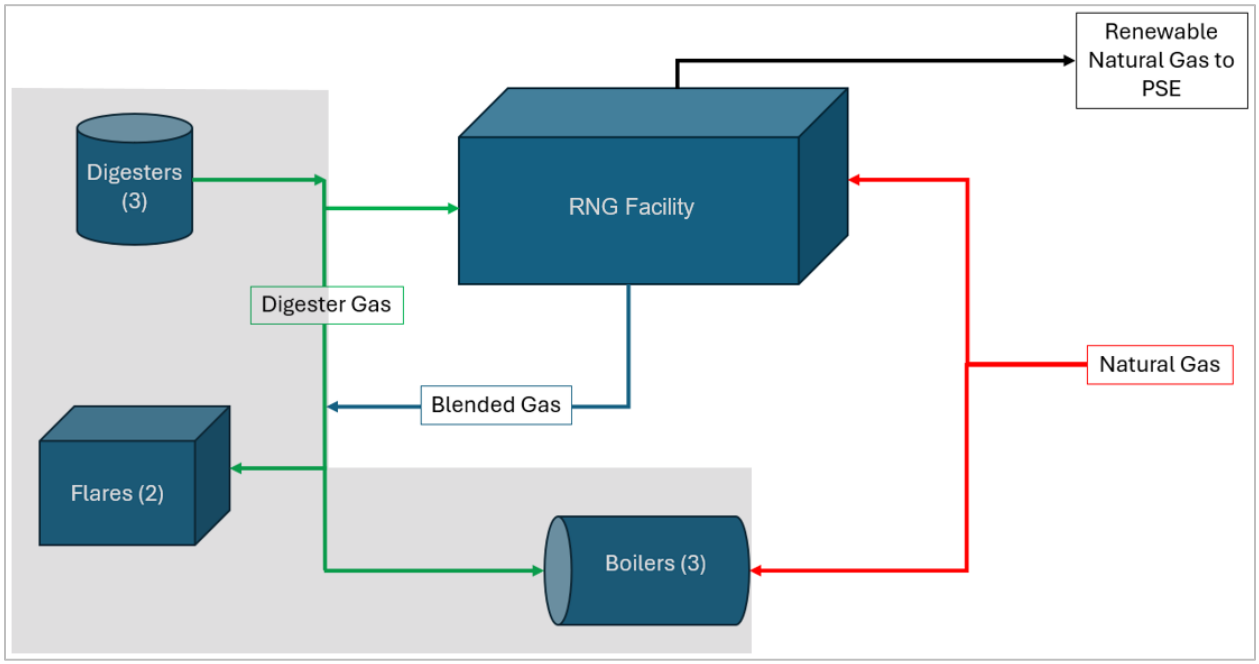
	2022	2023	2024	2025
REVENUES				
Biogas	$0	($215,582)	($65,766)	$(64,914)
RIN Credit	$0	($2,126)	($1,795,012)	$(489,389)
Total Revenue:	**$0**	**($217,708)**	**($1,860,778)**	**($554,302)**
EXPENSES				
Operating Expense	$462,440	$788,264	$769,052	$671,096
Capital Expense	$0	$4,228	$26,732	$0
Debt Service	$787,088	$785,683	$784,040	$784,040
Total Expense:	**$1,249,528**	**$1,578,175**	**$1,579,824**	**$1,455,136**

Setting aside debt service payments, which will conclude when the loan is repaid in 2040, revenues are almost on par with operating expenses through 2025. If ongoing optimization efforts result in sustained RNG production increases, revenues may exceed operating expenses in future years, subject to RIN and commodity price fluctuations.



Emissions

A detailed review of the RNG facility's operational data and design characteristics suggests that the facility cannot meet its emissions-related objectives, because as currently configured, the facility requires roughly one unit of purchased natural gas to produce one unit of RNG. The diagram below provides a high-level overview of gas flows into and out of the facility.



Before the facility was constructed, the system consisted of the digesters, flares, and boilers (elements of the diagram shaded in gray). Biogas from the digesters flowed to the boilers where it would be combusted to produce heat for the biosolids process, a beneficial use of biogas. Excess biogas was flared. This excess quantity of gas going to the flares was a major target of the RNG project as initially conceived.

The RNG facility was integrated into this preexisting system. Digester Gas (biogas) now flows into the "Gas Utilization Facility" component of the diagram for methane extraction, and purified methane Renewable Natural Gas exits to the PSE pipeline via the black line at the top of the diagram.

The blue Blended Gas line and the red Natural Gas line are where design constraints introduce a function that is largely incompatible with the RNG program's initial emissions and flaring reduction objectives.

After the purified methane is removed to sell, a byproduct called "tailgas" remains that is approximately 20 percent methane and 80 percent carbon dioxide. The 20 percent methane content is above the concentration that regulations allow for releasing to atmosphere, but below the 55-60 percent concentration necessary for combustion in the existing flares or boilers. Tailgas is a byproduct that the facility can neither use nor dispose of without modification.

The design solution for this problem was to inject fossil fuel Natural Gas purchased from PSE into the system (the red lines in the diagram). The facility blends this purchased natural gas with the unusable tailgas until it has been supplemented with enough methane content to be combustible by the boilers and flares, creating Blended Gas.

The amount of methane reinjected into the tailgas to create blended gas must be roughly equal to the amount of methane the facility removed from the initial biogas stream to sell as RNG; raw biogas from the digesters has a roughly 60 percent methane content, and the floor for what CTP's

boilers and flares can combust is currently around 55-60 percent. This means that the facility requires approximately one-part fossil natural gas to produce one-part renewable natural gas.

This operational constraint has three consequences related to emissions:

1. Operating the facility introduces significant natural gas loads that work against the 2030 CAP facilities emissions reduction target.
2. By the federal 45Z Clean Fuel Production Credit method of calculation, RNG produced at the facility has a carbon intensity nearly equal to that of fossil fuel natural gas.
3. The facility cannot meaningfully reduce flaring of biogas or gas byproducts, because just as much gas is reinjected to supplement the tailgas as is removed as RNG.

The City's Climate Action Plan adopted a target of reducing facilities emissions by 30 percent from 2019 levels (prior to the RNG facility's operations) by 2030. It distinguishes between industrial facilities related to wastewater and solid waste and the remainder of the City's facilities (commercial facilities). The City has made steady progress toward the 30 percent emissions reduction target within its commercial facilities portfolio, but this improvement is more than offset by increased emissions at industrial facilities, which is almost entirely attributable to increased natural gas loads associated with the RNG facility's operations.

Sector	Indicator Target Description	Metric	
Municipal Carbon Neutrality	Reduce greenhouse gas emissions from municipal buildings & infrastructure by 30%.	Commercial facility emissions (MT CO2e)	Baseline: 2,752; 2,113; 2030 Target: 1,898
		Industrial facility emissions (MT CO2e)	2,071; Baseline: 873; 2030 Target: 611

Under standard carbon accounting practices, the emissions benefits of renewable fuel production accrue to the customer who purchases and uses the fuel, not the fuel producer. As a result, the City absorbs the emissions associated with operating the RNG facility but cannot realize any benefits associated with the RNG in its own emissions portfolio.

ALTERNATIVES:
This is an information briefing only. There are no alternatives presented.

FISCAL IMPACT:
This is an information briefing only. There is no fiscal impact.

RECOMMENDATION:
This is an information briefing only. There is no recommendation.