



# City Council Agenda Bill

22557

Bill Number

Subject: **Post Point Resource Recovery Project Update**

**Summary Statement:** The Post Point Resource Recovery project will replace the biosolids incinerators with a Class A anaerobic digestion process, production of Renewable Natural Gas (RNG) and an offsite soil blending process for beneficial use. In September 2019, staff provided a briefing on the project status prior to execution of the contract. Engineering design is now underway, leading to a project submittal and approval by the Department of Ecology towards the end of 2021. The project as currently scoped is consistent with and implements the 2018 Bellingham Climate Protection Action Plan. During the September 2019 briefing, Council requested a briefing on energy production associated with the project. Staff and the consultant team will provide an information only briefing.

**Previous Council Action:** Approval of 2019-2020 Budget. Council Briefings on 09/09/2019, 01/28/2019, 10/24/2016, 4/10/2017, 7/24/2017, adoption of the 2018 Climate Action Plan

**Fiscal Impact:** This action has no immediate fiscal impact. Costs associated with the consultant's work are approved in the 2019-2020 Budget. Current total project is at least \$200 million

**Funding Source:** Wastewater Fund (420)

**Attachments:** 1. STAFF MEMO  
2. PRESENTATION SLIDE DECK

Meeting Activity	Meeting Date	Recommendation	Presented By	Time
Committee Briefing - Information Only	1/27/2020	Information/Discussion	Eric Johnston, Interim Public Works Director	15 minutes

**Recommended Motion:**

**Council Committee:**  
Climate Action Committee

**Agenda Bill Contact:**  
Robert Johnston, Superintendent Plants; 778-7735

**Council Action:**

Reviewed By	Department	Date
<i>Eric C. Johnston</i>	Public Works	1/20/2020
<i>Peter M. Ruffatto</i>	Legal	1/21/2020
<i>Seth M. Fleetwood</i>	Executive	1/21/2020



City of Bellingham  
210 Lottie Street  
Bellingham, WA 98225

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## MEMORANDUM

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**TO:** CITY COUNCIL  
**FROM:** ERIC JOHNSTON, INTERIM PUBLIC WORKS DIRECTOR  
**CC:** MAYOR SETH FLEETWOOD  
**SUBJECT:** RESOURCE RECOVERY PROJECT UPDATE  
**DATE:** JANUARY 27, 2020

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The Resource Recovery Project aims to replace the aging biosolids incinerators at Post Point. As described in the technical memos available on the project website ([TM1](#), [TM2](#)), the project involves the construction of on site anerobic digesters producing a Class A biosolids, renewable natural gas (RNG) production and off-site soil blending for beneficial use. The project is projected to cost in excess of \$200 million. Currently the project team is moving forward with the early stages of engineering design leading to a review and approval by the Department of Ecology. A [summary of the project and projected costs was presented](#) to the Council in January 2019.

In September 2019, during a project status update, the Council requested an additional briefing on energy production elements of the project. As outlined in the technical memorandums, the production of RNG combined with pipeline injection has the greatest benefit to reducing greenhouse gas emissions and does more to implement the City policy outlined in the [Climate Protection Action Plan](#) than any other alternative considered. As currently scoped the project will reduce net green house gas emissions from City municipal operations by nearly 40%.

Attached is a summary comparing renewable natural gas production with cogeneration. The consultant team from Brown and Caldwell will summarize the benefits for renewable natural gas production.

The agenda item is for information and discussion, as such there is no recommended action.

## Biogas End Use Alternatives (DRAFT v1)

As part of the City of Bellingham Post Point Wastewater Treatment Plant Biosolids Planning project started in 2017, a triple bottom line (TBL)+ approach was used to compare and evaluate alternatives. TBL+ is based on four overarching considerations that impact any project or program delivered by a municipal utility: (1) environmental, (2) financial, (3) social, and (4) technical impacts. For the evaluation of biosolids and biogas management alternatives, TBL+ evaluation criteria were developed for each of the four categories based on the City's values represented by the 2009 Legacies and Strategic Commitments. In addition, the City's 2007 Climate Action Plan stipulated a goal of reducing GHG emissions from municipal sources by 70 percent from Year 2000 through Year 2020, and included emissions from sources such as electricity, natural gas, and fleet. The City recently adopted a resolution to develop 100 percent renewable energy targets (Resolution 2018-06) with biogas listed as a renewable energy.

Of the 17 criteria developed and used in the evaluation, six criteria, listed below, had significant impact on the selection of biogas end use alternatives. The three environmental criteria reflect the City's strong environmental ethics and priority to improving the local environment. The three financial criteria were identified to support the City's goal of providing quality, responsive services, and supporting a vibrant and sustainable economy.

Environmental and Financial Criteria Significant in Evaluation of Biogas End Use Alternatives		
Criterion	Parameter	Supports these Legacy Goals
<b>Environmental</b>		•
E1. Minimizes carbon footprint	Pursues alternatives that emit the lowest levels of GHG	• Healthy environment (reduce contribution to climate change)
E2. Protects air quality	Reduces air pollutant discharge to minimize human exposure	• Healthy environment (protect and restore ecological functions and habitat)
E4. Minimizes net energy usage	Minimizes the City's energy use	• Health environment (conserve natural and consumable resources)
<b>Financial</b>		•
F1. Optimizes system value	Provides balanced ROI using TBL+ criteria over 50-year life	• Quality, responsive City services (deliver efficient, effective, and accountable municipal services)
F2. Affordability	Consistent with long-term financial, environmental, and social goals of utility	• Vibrant sustainable economy (support a thriving local economy across all sectors and promote inter-dependence of environmental, economic, and social interests)
F3. Minimizes risk of end-use market sensitivity	Limits risk or maximizes benefits from commodity market changes of end-use products	• Quality, responsive City services (deliver efficient, effective, and accountable municipal services)

## Biogas End Use Alternatives

Biogas is a by-product of biological breakdown of organic material during anaerobic digestion of wastewater solids and is principally made up of methane and carbon dioxide. The methane in biogas is a valuable fuel of similar composition to natural gas and is considered a renewable resource because it is biogenic (not a fossil fuel). When biogas is burned, the resulting carbon dioxide emitted is not considered to contribute to GHG emissions, and when used to replace energy from a fossil

fuel, counts toward a net reduction in GHG emissions equal to what would have been emitted by the offset fossil fuel.

Two primary biogas end-uses were considered during planning including combined heat and power (CHP) or cogeneration and upgraded renewable natural gas (RNG) for vehicle fueling or pipeline injection. Flares and boilers are recommended as backup systems to the other end use alternatives and are included as base elements of the project. Therefore, flares and boilers ultimately weren't considered as primary biogas end-uses.

An on-site RNG fueling station could also be considered along with these two primary biogas end-use alternatives, but would require on-site pressurized gas storage and a relatively large fleet of compressed natural gas-fueled vehicles to make full use of the biogas. Based on these considerations, at the planning level, it was determined that an on-site RNG fueling station was not a viable stand-alone end-use alternative, but could be an adjunct end-use based on City and stakeholder input during the upcoming Facility Plan.

### **Cogeneration**

Cogeneration (i.e., CHP) is the process of burning fuel commonly in an engine generator to create electricity while capturing the heat that is produced as a by-product. Wastewater treatment plants typically use the generated heat to maintain target digester temperatures and for space heating needs within the plant. Electricity produced can be used on site and/or can be sold to the local electrical utility by feeding it back into the distribution grid. Without substantial supplemental feedstocks for co-digestion, power generated from CHP is well below plant power needs and is most commonly used within the plant.

Puget Sound Energy (PSE), the local electrical supplier to the City, has an established Green Options program designed to promote renewable energy programs. As of 2018, renewable energy sources make up 9 percent of PSE's power. PSE has set a goal of reaching 15 percent by 2020, with a 50-percent reduction of its carbon emissions by 2040. As such, the GHG benefit of CHP is expected to decrease over time as PSE's utility becomes "greener".

Under a power purchase agreement, the City and PSE would enter into a long-term contract in which the City is obligated to offset or sell up to a certain amount of electricity to PSE. Any amount produced by the City beyond that amount could be utilized by/sold for other uses. Under the offset program, electricity pricing will vary over time with the utility's electricity rates. Utility trend rates have been observed to increase over time, thereby potentially leading to more favorable offset values in the future. Under an electricity export program, the value or price would be fixed for the term of the agreement, providing revenue certainty to the generators.

Use of the cogeneration system would also allow for cost offsets, in the form of renewable energy certificates or credits, to be available as part of the sale of the electricity. Renewable energy credits are tradeable energy commodities that signify 1,000 kilowatt hours (kWh) of electricity was generated using renewable energy. These credits track renewable energy through the electric grid and allow entities to purchase the use of renewable energy. In addition, PSE may be open to providing capital funding for constructing a green energy system through their new construction grants for commercial and industrial customers.

### **Renewable Natural Gas and Pipeline Injection**

The technology for upgrading and compressing gas into renewable natural gas (RNG) is well-established and used widely at landfills and at many wastewater treatment plants nationwide. Upgrading involves removal of carbon dioxide and other contaminants from the biogas, resulting in nearly pure methane, comparable in composition and thermal value to natural gas.

Pipeline injection of biogas has become more popular during the past decade due to the following economic revenue incentives designed to reduce the country's dependency on foreign oil while reducing carbon footprint:

The **Renewable Fuel Standard** program was created under the Energy Policy Act of 2005 and established the first renewable fuel volume mandate in the United States. The program requires oil and gas producers to purchase specified amounts of fuel credits each year to increase the amount of renewable fuel used. Each 77,000 British thermal units (BTUs) of biogas used for vehicle fuel generates a renewable credit, each tracked with a renewable identification number (RIN). RINs are traded on the open market, and their value is dependent upon the price of oil and the "renewable volume obligation" of fuel producers.

The **Low Carbon Fuel Standard (LCFS)** program was created under California's Assembly Bill 32 (Global Warming Solutions Act of 2006) Scoping Plan. The LCFS mandates a reduction in the carbon intensity of transportation fuel in California. Under the LCFS, clean fuel providers can earn credits. These credits can be sold for cash to certain compliance-based buyers in California which include, among many other parties, California's oil refineries and electric utilities. The LCFS credits vary depending on the carbon intensity of the conversion pathway. The LCFS has been adopted in California and Oregon. LCFS legislation has been introduced in Washington and British Columbia.

The result of this market has been that biomethane produced at municipal wastewater treatment facilities and sold as a vehicle fuel commands a premium value in the vehicle fuel marketplace, which is significantly higher than the value of the energy in the biomethane alone. Thus, more agencies are considering upgrading their digester gas to biomethane to take advantage of the environmental and economic benefits of offsetting non-renewable vehicle fuel use.

At RNG facilities, after upgrading, biogas is typically pressurized, odorized, and injected directly into the pipeline of a utility for use with its gas products. The main advantage of this approach is that the biomethane can be injected and sold as the gas is produced and treated—no storage or buffering is needed.

## Recommendation

Both beneficial biogas end use alternatives, CHP and RNG, support the City's policies and goals and were evaluated using the TBL+ analysis. The results of the evaluation, summarized below, have shown significant advantages for RNG with pipeline injection:

- Lower capital and operating cost and greater revenue,
- Greater net energy production/use and GHG reduction.

These benefits result in a more favorable TBL+ score and therefore RNG with pipeline injection is recommended the new Post Point biosolids facilities. RNG with pipeline injection also provides flexibility to incorporate other biogas end-uses (e.g., CHP) in the future without significant stranded investment.

Environmental and Financial Comparison of Biogas End Use Alternatives		
Parameter	RNG with Pipeline Injection	Cogeneration
Capital Project Cost	\$15 million	\$30 million
Potential Annual Revenue	\$0.8 to \$1.8 million	\$0.4 million
Net Annual O&M Credit	\$0.6 to \$1.5 million	\$0.2 million

Greenhouse Gas Emissions Saved Annually	2300 metric tonnes	1700 metric tonnes
Net Energy Produced and Used Annually	3.6 million Btus	1.6 million Btus

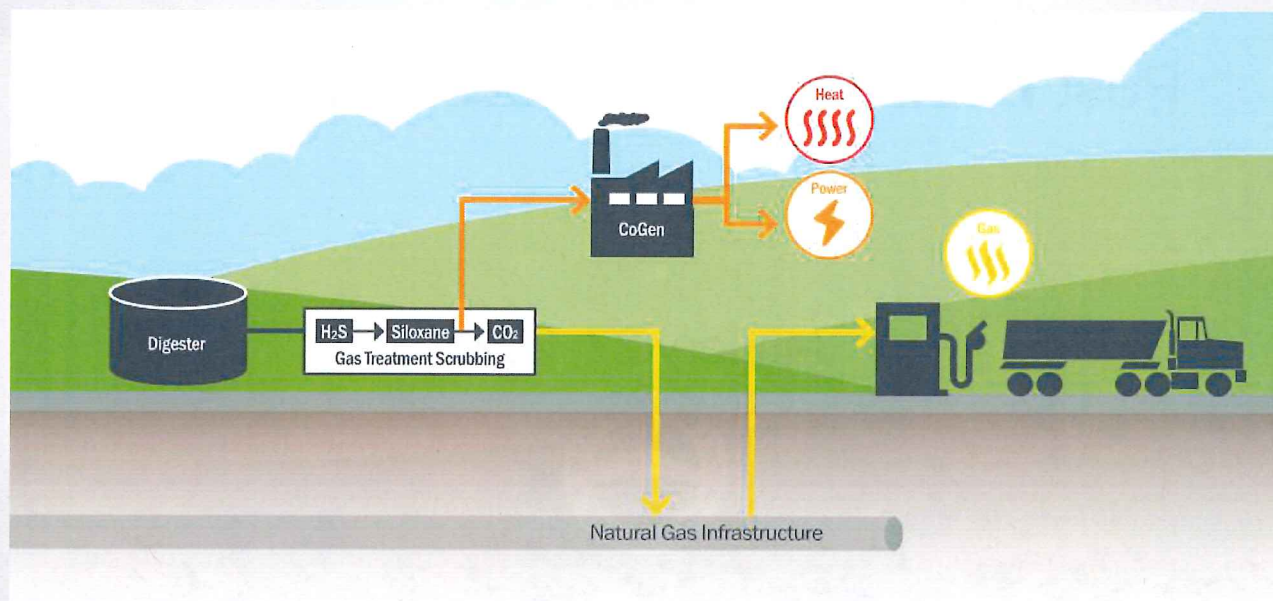
# Post Point Resource Recovery Project

January 27, 2020





## Resource Recovery Project Presents Biogas Use Opportunities





# Renewable Fuel Revenue Opportunities (for Pipeline Injection)

## RINs – Renewable Identification Number

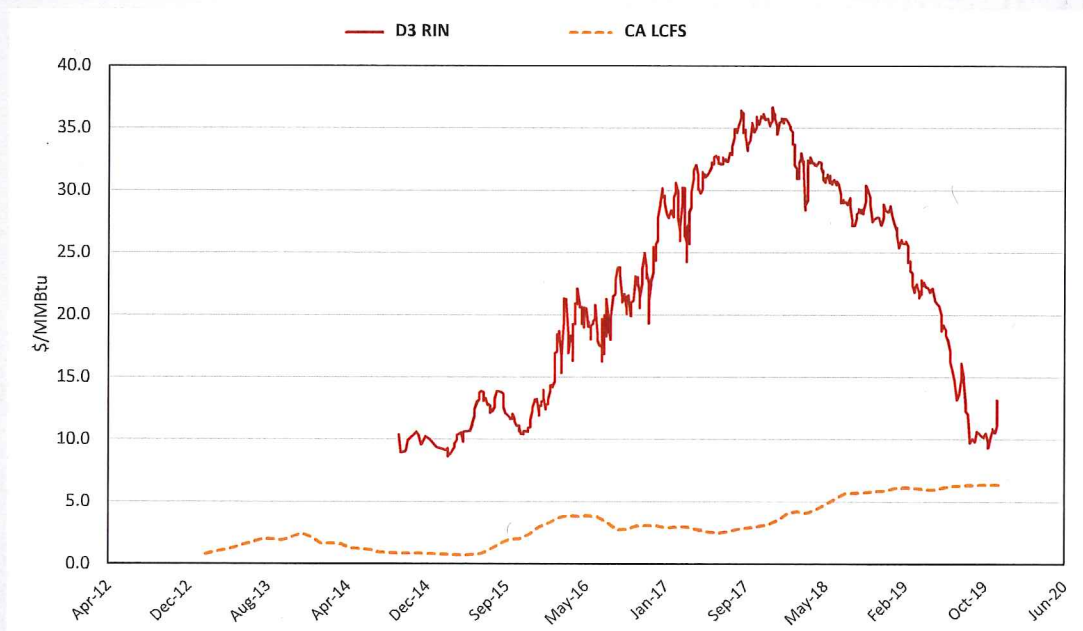
RINs are “currency” of the Renewable Fuel Standard (RFS) program

- Renewable fuel producers generate RINs
- Market participants trade RINs
- Obligated parties obtain and ultimately retire RINs for compliance

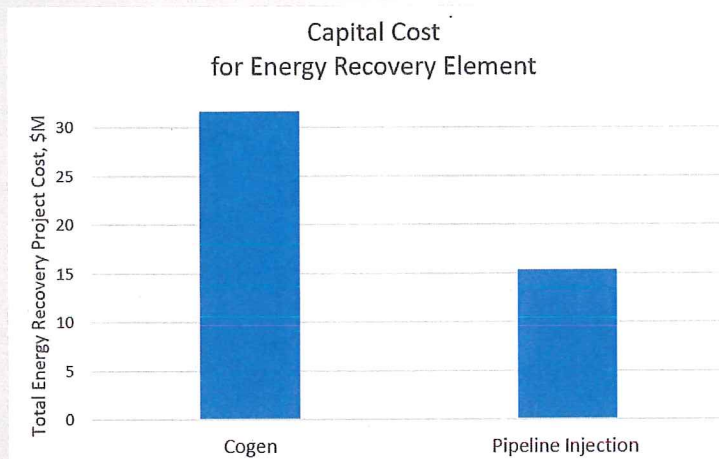
## LCFS Credits – Low Carbon Fuel Standard

- Vehicle fuels required to become cleaner over time – “carbon intensity” of a fuel is regulated
- Adopted programs and markets in California and Oregon
- Fuel producers can meet standard by purchasing LCFS credits from others

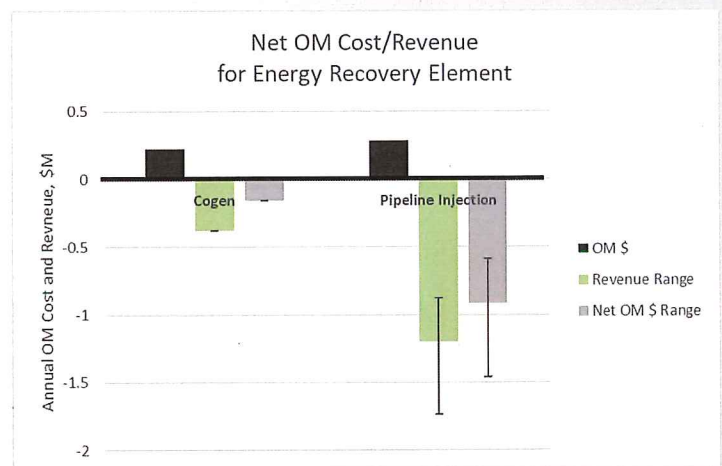
## RINs and LCFS Market Values since 2013



# Cost Comparison

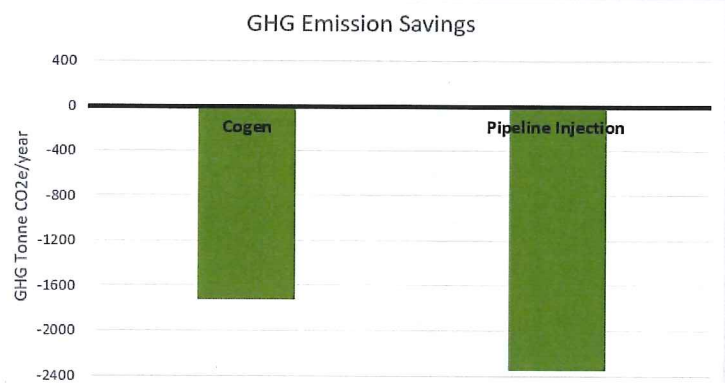
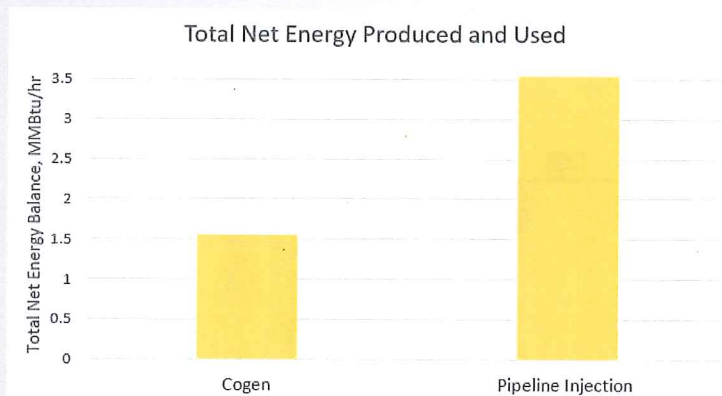


- Both options require some level of gas treatment
- Cogen also requires an engine, generator and other appurtenances



- Favorable RIN and LCFS markets drive high NG value.
- Cogen revenue based on electrical power cost

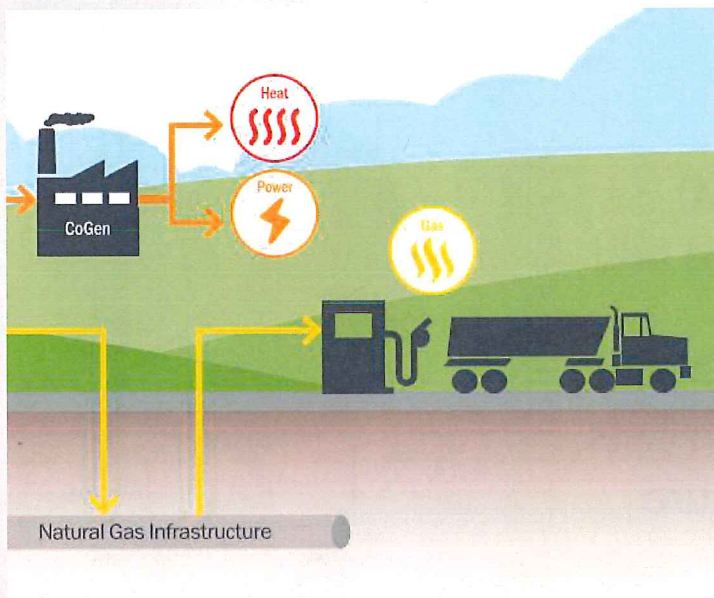
# Environmental Comparison



- The net energy production is reduced for cogen because of the engine inefficiency and not all of the heat can be beneficially used throughout the year
- Pipeline injection offsets use of carbon-based fuels
- As utility power profile becomes more green over time, GHG benefit for cogen would be reduced



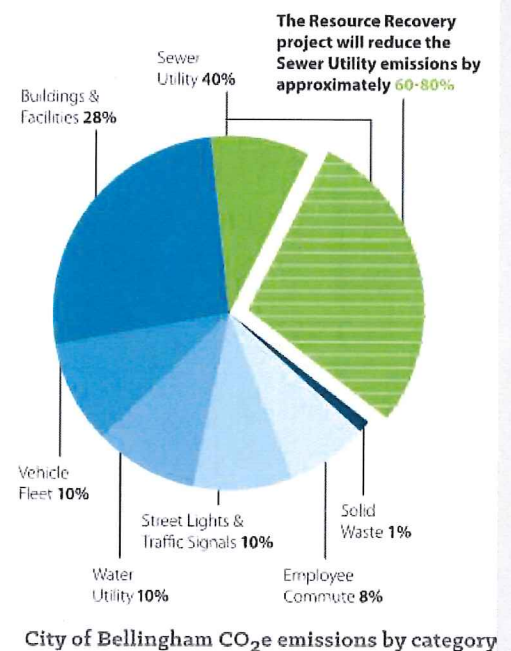
## Other Considerations in Selecting Biogas Use



- Cogen
  - Requires an interconnection agreement with PSE
  - Requires more significant air permitting than pipeline injection
- Pipeline Injection
  - Renewable fuel credits/revenues subject to market changes
  - Significant effort would be required to finalize agreement with natural gas utility
  - Could implement cogen in the future

## Pipeline Injection Recommended to Achieve City Goals

- ✓ Lower capital cost (~\$15M)
- ✓ Lower OM cost
- ✓ Lower 20-year NPW (~\$27M)
- ✓ Greater net energy produced and used (over 2 X)
- ✓ Greater GHG emission savings
- ✓ Fewer air permitting requirements
- ✓ Allows flexibility for other future biogas uses





# Post Point Treatment Plant Resource Recovery Project Update

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