



# Bonnybrook Wastewater Treatment Plant Cogeneration Plant Expansion

Information Booklet

March 6, 2017



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# Introduction to Proposed Upgrades and Expansions at the Bonnybrook Wastewater Treatment Plant

The City of Calgary's Water Utility is committed to protecting public health and the environment while delivering on our promise to provide clean drinking water, safely treat sanitary wastewater and provide stormwater management services for more than one million Calgarians.

The Bonnybrook Wastewater Treatment Plant (BBWWTP) is the largest of Calgary's three wastewater treatment plants, with a capacity to treat the sanitary wastewater from approximately one million people. Calgary and surrounding regions that are served by the BBWWTP (Cochrane, Airdrie, Elbow Valley and the Tsuut'ina First Nation) have experienced significant population growth in recent years, which has resulted in an increase in the amount of wastewater requiring treatment. While growth in Calgary and the surrounding regions has slowed with the current economy, the upgrades and expansions to the BBWWTP are required to meet the recent increase in demand for wastewater treatment capacity and the long-term projected growth. Some enhancements are also being completed to improve environmental performance, energy efficiency, resiliency to flooding and to continue to protect the Bow River for future generations.

The City of Calgary is investing in a number of infrastructure improvements at the BBWWTP, including:

- lifecycle replacements of some existing equipment
- upgrades to improve energy efficiency and reliability
- expansion of treatment capacity through the addition of new infrastructure
- a flood resiliency component to reduce flooding of the plant during high water events
- upgrades to improve environmental performance

The upgrades and expansion of the BBWWTP will ensure advanced wastewater treatment for the long-term, while minimizing impacts to the Bow River.

The City of Calgary is committed to providing information and consulting with stakeholders in the communities adjacent to the BBWWTP throughout the upgrades and expansions. This Bonnybrook Wastewater Treatment Plant Cogeneration<sup>1</sup> Plant Expansion Information Booklet introduces one of the infrastructure improvement projects – the cogeneration plant expansion project. You are receiving this booklet as you have been identified as a stakeholder in the communities adjacent to the BBWWTP. While this booklet may not answer all questions, The City of Calgary encourages feedback from stakeholders. Please refer to page 14 for contact information.

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<sup>1</sup> "Cogeneration" means the system will generate both electricity and heat (or steam) from combustion of the same fuel. Cogeneration systems are very efficient, because they harvest much of the energy potential of a fuel.

# Bonnybrook Wastewater Treatment Plant Cogeneration Expansion Project

One of the improvements to the BBWWTP, pending approvals from the Alberta Utilities Commission (AUC) and Alberta Environment and Parks (AEP), is the expansion of the existing Power Generating and Heating (PGH) plant that produces electricity and heat for the BBWWTP facility. The expansion is referred to in this booklet as the cogeneration plant expansion project. Applications to the AUC and AEP for approvals of the cogeneration plant expansion project are anticipated to be submitted in March or April 2017.

The existing PGH plant consists of three 1.6 megawatt (MW) reciprocating engine generators (Figure 1). The existing PGH is a cogeneration facility, producing both electricity and hot water for heating.

The cogeneration plant expansion project includes the addition of a new 4.5 MW gas combustion turbine generator and a new 0.4 MW steam turbine generator (Figure 1).

The expanded cogeneration plant will have a total electricity generating capacity of approximately 9 MW. The new system will also produce steam required for a new thermal hydrolysis process that is part of the BBWWTP expansion.

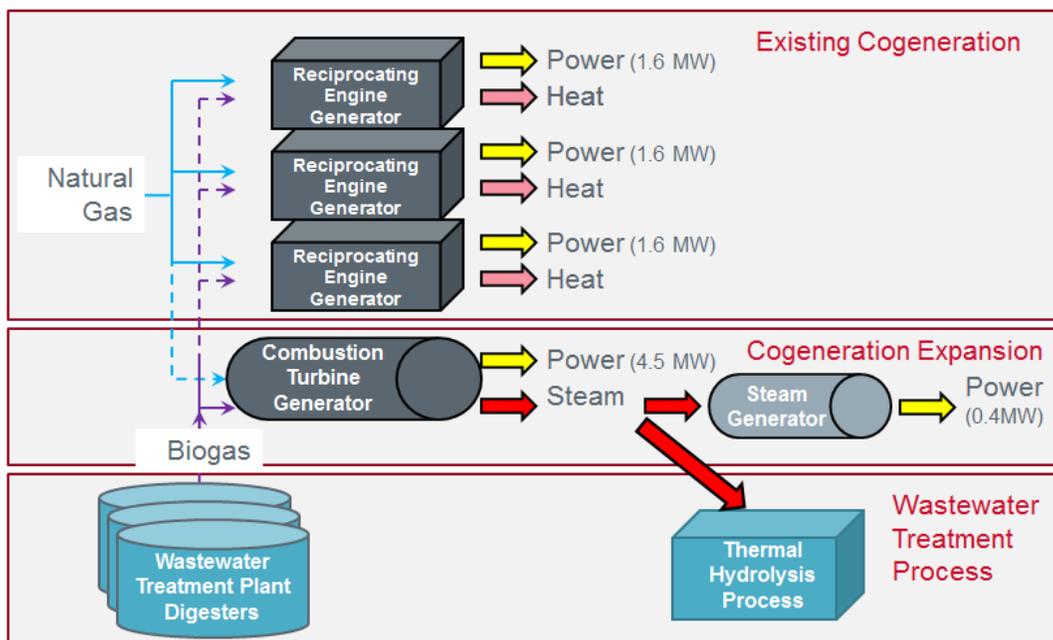


Figure 1: Schematic diagram of the cogeneration system at the Bonnybrook Wastewater Treatment Plant, showing the existing cogeneration units, the proposed cogeneration expansion and the major tie-ins to the wastewater treatment process.

## Benefits

The combination of the existing and expanded cogeneration plant will result in an efficient and flexible system, which will enable the BBWWTP to approach energy self-sufficiency. The expansion of the cogeneration plant will use biogas to efficiently generate steam and electricity for the BBWWTP's operations. Biogas is a renewable energy source that is produced as a by-product of the wastewater treatment process.

The expansion to the cogeneration plant will use all current and future amounts of biogas fuel produced by the BBWWTP to generate steam and electricity. Once operational, it is expected to produce enough electricity to meet about half of the peak electrical demands of the BBWWTP and during low demand periods may export electricity to Alberta's power grid.

The cogeneration plant expansion will reduce air emissions as biogas generated through the wastewater treatment process is used as fuel, offsetting flaring of this gas and consumption of natural gas for power generation and heat.

Generating electricity at the BBWWTP will reduce the need to purchase electricity generated using non-renewable fuels from the Alberta electricity grid. The cogeneration plant expansion will result in a significant reduction in the emission of greenhouse gas (GHG) substances resulting from operation of the BBWWTP – preliminary estimates are that the cogeneration plant expansion could reduce GHG emissions by as much as 28,000 tonnes<sup>2</sup> per year.

## **Location**

The expansion to the cogeneration plant will be located on a previously disturbed site adjacent to the existing PGH plant building and will fit entirely within the current fence line of the BBWWTP.

Figures 2 to 6 show the location of the BBWWTP within The City of Calgary, the location of the cogeneration facility within the BBWWTP site and artist renderings of the expanded facility. The renderings are based on the design of the facility at the time of writing and are subject to change as the final design is completed.

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<sup>2</sup> Carbon dioxide equivalents (CO<sub>2e</sub>)



Figure 2: Location of the Bonnybrook Wastewater Treatment Plant within The City of Calgary (north is at the top of the figure).



Figure 3: Location of the existing Power Generation and Heating cogeneration facility within the Bonnybrook Wastewater Treatment Plant (north is at the top of the figure).



Figure 4: Artist rendering of the aerial view (looking towards the southwest) of the Bonnybrook Wastewater Treatment Plant as it would look after construction of the cogeneration plant expansion project. Some upgrades and expansions being considered for the Bonnybrook site are not shown on this figure, as details sufficient for rendering were not available at the time the figure was produced.

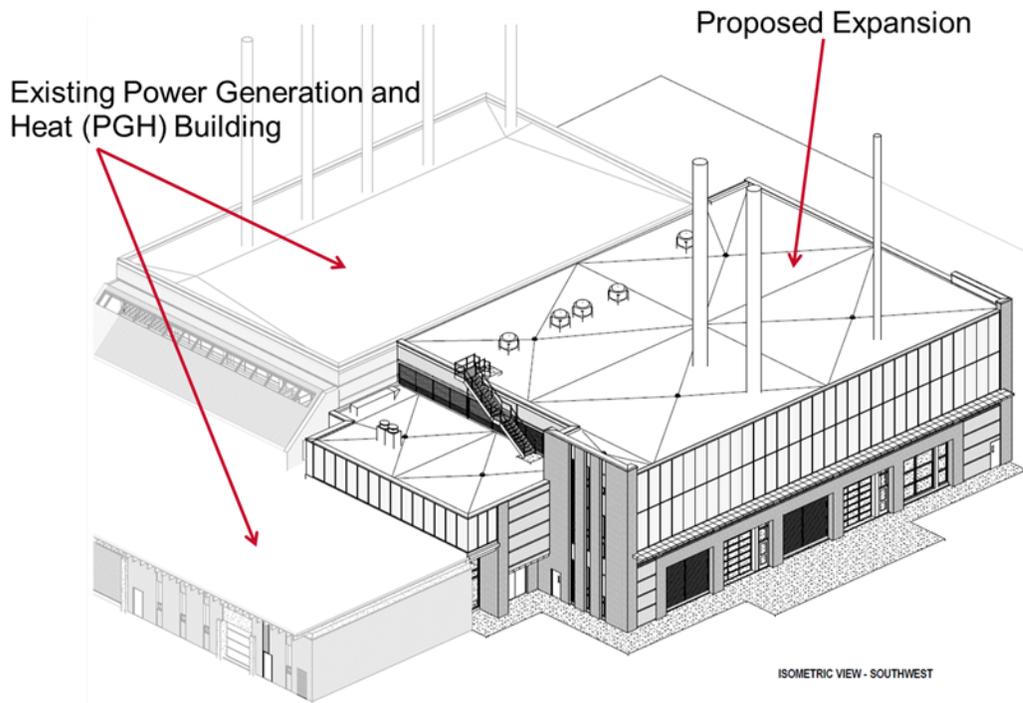


Figure 5: An isometric view of proposed cogeneration plant expansion (based on preliminary design).



Figure 6: Artist rendering of the cogeneration plant expansion (based on preliminary design).

# Project Schedule

Project Phase	Activity	Date
Design	Technology options analysis	February 2016
	Preliminary design complete	December 2016
	Detailed design complete	August 2017
Regulatory applications	Ambient noise monitoring in Bonnybrook community	August 2016
	Participant Involvement Program in accordance with AUC Rule 007	January to April 2017
	Applications filed with AEP and AUC	April 2017
Construction and procurement	Equipment pre-selection request for proposals	Spring 2016
	Requests for proposals issued for construction and major equipment	Anticipated fourth quarter 2017
	Site preparation	Anticipated third quarter 2018
	Construction phase	Anticipated third quarter 2018 to third quarter 2020
Operation and post-operation	Start of normal operation	Anticipated third quarter of 2020
	End of design life – refurbish or decommission	About 2050

## Construction Phase Effects

Construction of the cogeneration plant expansion is expected to take approximately two years and begin in early 2018.

During the peak construction period, it is estimated that there would be fewer than 30 staff working on-site for construction of the cogeneration expansion project. Residents and occupants in the area of the BBWWTP may notice the following temporary construction impacts:

- minor increases in noise and dust during certain phases of the construction

- minor increases in traffic for certain periods during construction, as contractors, equipment and materials are brought onto the site.

There are no temporary or permanent road closures anticipated as a result of the cogeneration plant expansion project.

## Environmental Features and Protection

The City of Calgary is conducting a number of environmental studies to support the applications to AEP and the AUC. These studies assess the potential operational effects of the cogeneration plant expansion on air, noise, water and other natural components of the environment. The studies are conducted by an independent environmental consultant on behalf of The City of Calgary and will be made available to the public, upon request.

The cogeneration plant expansion will be designed to meet applicable provincial and federal environmental guidelines and will result in no significant effects to land, air, noise or water when compared to the current facility.

### Air

The expansion to the electricity cogeneration plant is expected to reduce air emissions from the BBWWTP operations as biogas produced through the wastewater treatment process is used as fuel to generate electricity and steam, offsetting flaring of this gas.

The expanded cogeneration plant will use both commercially available natural gas and biogas generated by the wastewater treatment process at the BBWWTP and will convert these into power to be used on-site and to be sold into the Alberta electricity grid (subject to approval by the AUC). The cogeneration expansion will use otherwise wasted biogas that is produced by the processes at the BBWWTP, lower energy consumption and reduce the emission of GHGs from the BBWWTP.

### Water and Wastewater

The expanded cogeneration plant will use small amounts of water for cooling and steam production that will be supplied by the existing processes at the BBWWTP. Small volumes of wastewater will be produced that will be treated by the existing BBWWTP.

### Noise

Residents and people working in the adjacent communities will not likely notice a change in noise levels as a result of the cogeneration plant expansion, as the new equipment that is included in the expansion will be designed to be low in noise emissions, and/or will be enclosed in acoustic enclosures. There are a number of significant noise sources in the area surrounding the BBWWTP, including:

- industrial facilities
- major railway infrastructure
- major roadways (for example Deerfoot Trail)
- commercial aircraft corridor

Major equipment and the building associated with the cogeneration plant expansion will be designed to meet the requirements of the AUC rule on noise control (AUC Rule 012).

## Land

The cogeneration plant expansion will be located on a previously disturbed site adjacent to the existing PGH building and will fit entirely within the fence line of the BBWWTP. The BBWWTP is an industrial site and is considered poor habitat for wildlife, native plants and other biological resources. The impacts of the cogeneration plant expansion project on these environmental features will be negligible.

The cogeneration plant expansion will not impose any additional restrictions on the development of adjacent lands beyond those already in place as a result of the BBWWTP.

## Visual Design

The building that will house the cogeneration plant expansion is being architecturally designed to blend into the existing buildings at BBWWTP. The design calls for three new stacks to be installed on the building; these will be the same height as the existing stacks (shown in Figure 6).

# Regulatory Requirements

## Federal

The BBWWTP is located at the southern end of the Calgary International Airport Vicinity Protection Area. The height of structures associated with new developments must be considered in project design. Applications will be submitted to NAV Canada and Transport Canada for the cogeneration expansion project. The tallest structures associated with the cogeneration expansion project will be three new stacks, as shown in Figure 6. The City of Calgary's Water Utility is currently reviewing the requirements for stack lighting with the responsible federal regulatory agencies.

## Provincial

The cogeneration plant expansion will require authorization from AEP under the Alberta *Environmental Protection and Enhancement Act* (EPEA) in the form of an amendment to the existing operating approval for the BBWWTP. The application for an amendment to the approval will determine whether the cogeneration plant expansion will have impacts on the environment, if any identified impacts can be mitigated and if the cogeneration plant expansion is in accordance with the *Act* and associated regulations. Application review will address design plans, site suitability, proposed environmental monitoring programs if required, and procedures for minimizing the generation, use, and release of waste and other substances.

The cogeneration plant expansion will also require approval from the AUC pursuant to Section 11 of the *Hydro Electric Energy Act* under Rule 007. This approval will allow the cogeneration plant expansion to produce and sell power to the Alberta electricity grid should excess power over that required by the BBWWTP be generated. The AUC's mandate is for the protection of the social, economic and environmental interests of Alberta. The application for approval will include a review of the environmental effects of the cogeneration plant expansion.

Public consultation is an important component of both the AEP and AUC application processes. It is a requirement for The City of Calgary to consult with the public and stakeholders as part of the application process and to record and document any feedback or concerns about the cogeneration plant expansion. These concerns must be addressed to the satisfaction of the AUC before approval can be issued.

The applications will also be reviewed by the Alberta Aboriginal Consultation Office (ACO) to determine consultation requirements for First Nation and Aboriginal Groups in proximity to the cogeneration plant expansion. The ACO's determination of consultation adequacy and completeness is required before the AEP can make a final decision and approve the cogeneration plant expansion under the EPEA. The ACO works closely with AEP to ensure that mitigation measures for potential impacts to treaty rights and traditional land uses are implemented before approval.

An application has also been filed with Alberta Culture and Tourism (ACT) for approval under the *Historical Resources Act* (HRA). This approval will ensure the cogeneration plant expansion will not have impacts on historical and paleontological resources that may exist within the cogeneration plant expansion's area of development.

## **Municipal**

The City of Calgary and the Water Utility operate under the mandate of protecting public health and the environment. The Water Utility has determined that the optimization of power generation at the BBWWTP will result in a reduction in natural gas and electricity costs and will improve services as delivered through the department.

An application for a Development Permit from the Planning and Development department at The City of Calgary for expansion projects ongoing at the BBWWTP is being prepared and will include the cogeneration plant expansion project. This application is anticipated to be submitted to the Planning and Development department by April 2017.

## **Consultation**

The City of Calgary and the Water Utility is committed to all citizens in the community throughout the entire BBWWTP upgrades and expansion, including the expansion of the existing electricity cogeneration plant. The City of Calgary encourages citizen participation in the BBWWTP cogeneration plant expansion.

The City of Calgary's consultation related to the BBWWTP cogeneration plant expansion includes:

- this information booklet
- up-to-date information on the Bonnybrook Wastewater Treatment Plant Upgrades and Expansion website at [www.calgary.ca/bonnybrook](http://www.calgary.ca/bonnybrook)
- individual face-to-face meetings and/or phone meetings

The City of Calgary will be conducting in-person meetings during the month of March 2017. Please contact us using the contact information provided below to schedule a convenient time for a City of Calgary employee to discuss the cogeneration plant expansion with you.

## Contact the City of Calgary Project Team

Please contact the Bonnybrook Wastewater Treatment Plant Cogeneration Plant Expansion team to schedule a face-to-face or phone meeting during the month of March 2017 at:

Hugh McLeod, P.Eng.

Leader, Project Engineering

Phone: (403) 268-3816

Email: [Hugh.McLeod@calgary.ca](mailto:Hugh.McLeod@calgary.ca)

Rick Robinson, Ph.D

Team Lead, Environmental Compliance

Phone: (403) 268-4769

Email: [Rick.Robinson@calgary.ca](mailto:Rick.Robinson@calgary.ca)

## Contact the Regulator

The City of Calgary's Water Utility encourages you to be informed and become involved, if you would like, in the regulatory application process for the cogeneration expansion project. Included with this information booklet is a copy of the AUC pamphlet entitled: "Public involvement in a proposed utility development". An electronic version of the pamphlet is available on the AUC website at: <http://www.auc.ab.ca/AUCPublicInvolvement>.

You may also contact the AUC directly at their Calgary head office using the contact information below:

Alberta Utilities Commission

Fifth Avenue Place

Fourth Floor, 425 1<sup>st</sup> Street S.W.

Calgary, AB T2P 3L8

Phone: 403-592-8845