WHISTLER

# REPORT | ADMINISTRATIVE REPORT TO COUNCIL

| | | | |
|---|---|---|---|
| **PRESENTED:** | August 17, 2021 | **REPORT:** | 21-094 |
| **FROM:** | Infrastructure Services | **FILE:** | 420 |
| **SUBJECT:** | CHEAKAMUS CROSSING DISTRICT ENERGY SYSTEM RATE STRUCTURE UPDATE | | |

## COMMENT/RECOMMENDATION FROM THE CHIEF ADMINISTRATIVE OFFICER

**That** the recommendation of the General Manager of Infrastructure Services be endorsed.

## RECOMMENDATION

**That** Council consider giving first, second and third readings to "Cheakamus Crossing District Energy System Fee Amendment Bylaw No. 2311, 2021".

## REFERENCES

Schedule A - Cheakamus Crossing District Energy System Fee Amendment Bylaw 2311, 2021 (not attached)

Cheakamus Crossing District Energy System Fee Bylaw No. 1951, 2010 (not attached)

## PURPOSE OF REPORT

The purpose of this Report is to present an update to the rates charged for energy use in the Cheakamus Crossing District Energy System (DES) for Council consideration, to explain the rationale for the new rate structure, and outline anticipated next steps in expansion and improvement of the Cheakamus Crossing DES.

## DISCUSSION

### Background

Space heating and domestic hot water heating in the Cheakamus Crossing Neighborhood is primarily provided by the DES. The DES extracts heat energy from treated wastewater at the Wastewater Treatment Plant to provide space and domestic hot water heating to approximately 500 dwellings or 55,000$m^2$ of habitable space. The DES uses heat exchangers to transfer heat from the treated effluent water to the DES loop, with natural gas boilers used to top up the supply temperature if required. The DES is a low-temperature system that circulates water in a closed loop to heat pumps at each of the connected buildings, where water sourced heat pumps (more efficient that air-sourced heat pumps) are used to provide space and hot water heating to the buildings.

Currently the DES fee bylaw charges an annual flat rate of $4.58/m$^2$ of heated space which has not seen an increase since the system was first commissioned in 2010. This rate applies to all buildings connected to the DES, has offered good value to the DES users, and is less expensive than the energy charges associated with electric resistance space and hot water heating (commonly used in Whistler). While we are aware that the maintenance costs have been significant for the DES heating systems, since 2015 electricity rates have increase by 21.5% in Whistler and had electric space and hot water heating been chosen for the Cheakamus Crossing neighbourhood, all residents in the neighbourhood would have experienced this increase in their heating costs.

There are now several tiers of buildings built to higher energy efficiency standards in Cheakamus Crossing, and some future buildings may only use the DES for domestic hot water (DHW) heating. There are also different "step code" requirements for multi-unit residential buildings (subject to Part 3 of the BC Building Code) and for single-family homes (subject to Part 9 of the BC Building Code). This report recommends a tiered rate structure that considers the different energy use of more efficient buildings, but also acknowledges that a significant reserve fund needs to be built up to ensure long-term renewal of the DES. The proposed changes will result in a more-fair rate structure and encourage the construction of high performing buildings.

In 2020, KWL Consulting Engineers were engaged to review the rates being charged to the DES customers, review the long-term operating and capital upgrade costs, and evaluate the possible future expansion of the Cheakamus Crossing DES.

Since the DES rate structure analysis began, we have a clearer picture of how the second phase of Cheakamus Crossing will be developed. That additional information has been included in the rate structure analysis and has allowed us to more accurately predict future operating and maintenance costs, future replacement costs, and expected revenues.

The proposed update to the DES rate structure is as follows:

| Building Type | Rate Structure | 2021 Rate ($/m$^2$/yr) | Discount |
|---|---|---|---|
| | | | |
| Part 3 / Part 9 | Conventional Building | 4.58 | 0 % |
| Part 9 | Step 3 | 3.66 | 20 % |
| | Step 4 | 3.66 | 20 % |
| | Step 5 | 3.66 | 20 % |
| Part 3 | Step 2 | 3.66 | 20 % |
| | Step 3 | 3.66 | 20 % |
| | Step 4 | 3.66 | 20 % |
| | Passive Construction | 3.66 | 20 % |
| Part 3 / Part 9 | DHW Only | 2.29 | 50 % |

The base rate will increase by 3% each year from 2022 to 2026. The annual rate increase will happen on the first DES invoice of the calendar year.

Another rate structure review should be done in 2026 to determine if the DES reserve fund is on-track to be able to provide sustainable renewal of expected infrastructure replacements, or could be done sooner if other changes in the system warrant a review.

## Rationale for Annual Increase and new Rate Structure

## Annual Increase

In previous rate structure models it had been assumed that the reserve fund would provide 50 per cent of the required infrastructure renewal costs, while the other half would come from grant funding from senior levels of government. Our recent grant application experience indicates that it may be optimistic to assume we will receive that level of grant funding in the future for simple infrastructure replacement projects, and it is expected that projects that provide additional GHG emission reductions (like replacing natural gas boilers with heat pumps to "top-up" the DES heat requirements) may be more likely to secure grant funding. In consultation with KWL, staff recommend a revised assumption of the reserve fund providing 75 per cent of the infrastructure renewal, with only 25 per cent coming from potential grant funding. This change requires the accumulation of a larger reserve fund than previously assumed.

KWL's analysis has shown that the majority of the Operations and Maintenance costs for the DES are expected to increase at a rate between 2 and 3 per cent per year. The largest categories of costs are labour, materials, and energy purchases (both electricity and natural gas are consumed by the DES operation).

Building up a sufficient financial reserve in order to fund expected infrastructure replacement costs also requires an increase in the annual contribution to the reserve. Increasing the current contribution to reserves by 3% per year, combined with the additional revenue expected from Phase 2 buildings will allow the reserve to grow to the levels required by 2030. In 2030 the system will be 20 years old and replacement of some mechanical equipment (pumps, boilers, and heat exchangers) is expected to be necessary.

Combining both the requirements to meet Operations and Maintenance costs, and build-up the reserve fund, an annual rate increase of 3% for the next five years is recommended.

## Rate Structure

More complicated rate structures (different rates for each Step Code and different types of buildings) were evaluated, but due to the high ratio of fixed to variable expenses as the energy efficiency of the new buildings increases, it is predicted that the more efficient buildings will only marginally reduce the costs to operate the DES. The proposed rate discounts were established for the following reasons:

- Twenty per cent reduction for Step Code buildings reflects the projected energy cost savings for the DES operation; and,

- Fifty per cent reduction for DHW-only buildings, which reflects a proportional reduction in peak capacity requirements compared to full service.

## Potential DES Upgrades / Improvements

In 2021 the RMOW has engaged an independent specialist with experience in DES operations in other municipalities. This specialist has visited several of the multi-family residential and commercial buildings in Cheakamus Crossing and has developed a prioritized list of recommendations to improve the performance of both the individual buildings and the DES system as a whole.

The heating systems in several WHA rental buildings, two WHA ownership-restricted apartment buildings, the Hostel, the High Performance Athletes Centre, and an open-market apartment building were reviewed in this process. The most common issued found was the lack of flow control in the heat exchange systems within the buildings. When flow control valves are not operating correctly, the warm

DES supply water is simply bypassed into the return piping increasing the temperature of the water returning to the DES plant, and thereby reducing the ability to extract more heat from the effluent water.

The recommendations for upgrades in the building heat exchange systems include:

- Programming and activation of flow control valves (where they already exist), and installing these valves on several systems where they do not exist.
- Installation of flow meters in some locations to better understand the performance of the building systems.
- Removal of uncontrolled bypass valves in some locations.

The goal of these recommendations is to improve the efficiency in each of the buildings and increase their use of the DES while reducing their reliance on their back-up systems (either electric or natural gas). A Class D (+/- 50%) cost estimate has been prepared for each building and the cost estimates range from $3,000 to $13,000. Funding of these upgrades is discussed in the Budget section of the report.

With improvements to the utilization of the DES, we expect the return temperature of the DES loop to be reduced, improving heat transfer and efficiency at the DES plant, and reducing the amount of time that the natural gas boilers are required to operate.

## Future DES Capacity

As the RMOW explores ways to reduce its carbon footprint and greenhouse gas emissions in the future, one option will be to install a water source heat pump to provide additional heat to the DES loop water rather than adding a third natural gas boiler to the system. By sizing the heat pump to replace at least the capacity of the additional boiler, the capacity of the system will be expanded without increasing the carbon footprint of the system. This option will be evaluated in detail for the next required expansion of the DES system, or if a boiler replacement is required.

The estimated capital cost to install a heat pump is significantly more than to install a natural gas boiler, so the appropriate time to evaluate and make this change is when a new boiler purchase is being considered. Once installed, the operating costs for the heat pump are predicted to be less than the natural gas boiler and the GHG emissions will be significantly less.

# POLICY CONSIDERATIONS

## Official Community Plan

### Goals, Objectives and Policies

The recommendations in this report directly support the following goals, objective and policies:

10.3. Goal

Substantially reduce GHG emissions from buildings and infrastructure.

10.3.2. Objective

Create an incentive structure to encourage energy-efficient, low-carbon construction, renovation and development practices.

10.3.2.2. Policy

Work to structure municipal fees and charges on development to reflect energy efficiency and lower-environmental-impact development.

10.3.3. Objective

Evaluate additional opportunities for low-carbon, district-based energy systems.

10.3.3.1. Policy

After energy conservation and efficiency measures have been optimized, and where sufficient demand exists, the municipality supports the exploration and potential development of district heating and cooling systems that are designed to reduce emissions, promote energy efficiency, stabilize end-user energy costs and increase the share of total energy requirements met by renewable energy sources.

### Other Policy Considerations

Section 219 Green Building Covenants have been registered on the properties in Phase 2 of Cheakamus Crossing to ensure continued use of the DES and the associated energy and GHG reduction benefits.

Improving the financial and overall performance of the Cheakamus Crossing DES is consistent with Whistler's BIG Moves Climate Action Strategy to reduce GHG emissions created by the buildings in Whistler.

## BUDGET CONSIDERATIONS

The new rate structure more fairly apportions the costs of operating, maintaining and, in the future, replacing the Cheakamus Crossing DES infrastructure. The lower rate for more efficient buildings will encourage new buildings to be built to higher efficiency standards, while acknowledging their reduced impact on the DES operating costs. These changes to the rate structure are recommended to ensure the long-term financial viability of the DES system.

Upgrades at the DES plant will be financed through the DES reserve fund. If there is sufficient financial benefit to the overall operation of the DES system, utilizing DES reserve funds for the building upgrades will also be explored.

## COMMUNITY ENGAGEMENT AND CONSULTATION

The proposed rate structure update has been reviewed by the Whistler Housing Association (WHA) and other building owners in Cheakamus Crossing to help them determine the impact of these changes on their operation. The comments received included a request to ensure that a capital reserve is built-up gradually to avoid any one-time special levies for infrastructure replacement, that new high efficiency buildings are expected to increased the use of the DES for cooling, and a concern around the different meanings of the step code depending on whether it is applied to a single-family home (a "Part 9" building) or a multi-unit residential building (a "Part 3" building). The proposed new rate structure addresses these comments.

## SUMMARY

This report recommends a tiered rate structure for the Cheakamus Crossing DES that includes a discounted rate for higher step code buildings (including passive construction), and those buildings that will only utilize the DES for domestic hot water heating. These changes will result in a more equitable rate structure and encourage the construction of high performance buildings, while helping to ensure sufficient funding for the operation, maintenance, and long-term replacement costs of the DES.

Respectfully submitted,

James Hallisey, P.Eng.
GENERAL MANAGER OF INFRASTRUCTURE SERVICES

for

Virginia Cullen
CHIEF ADMINISTRATIVE OFFICER