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SERVICES AND SOLUTIONS FOR A LIVABLE REGION

To: Water Committee

From: Terry Hui, Division Manager, Technical Support Services, Water Services
Paul Kohl, Director, Operations and Maintenance, Water Services

Date: March 3, 2021 Meeting Date: March 11, 2021

Subject: **GVWD Electrical Energy Use, Generation and Management**

RECOMMENDATION
That the Water Committee receive for information the report dated March 3, 2021 titled "GVWD Electrical Energy Use, Generation and Management".

EXECUTIVE SUMMARY
The GVWD Electrical Energy Use, Generation and Management report outlines electrical energy use by the water utility, energy generation and energy management projects. GVWD avoids electricity purchases of between $400,000 to $600,000 annually by generating electrical energy at four facilities. Energy management projects completed since 2015 provide an additional estimated annual savings of 2.7 GWh or $180,000.

PURPOSE
To provide the Water Committee with information on the water utility electricity use, generation, and energy management.

BACKGROUND
Metro Vancouver's water system includes an extensive network of reservoirs, pumping stations, and large diameter water transmission mains. Metro Vancouver delivers water from three elevated source lakes: Capilano, Seymour, and Coquitlam. For a large part of the year and for a large portion of the region, gravity conveys water through transmission mains to the treatment plants, pump stations and peaking reservoirs which then supply municipal distribution systems.

Even with the benefit of gravity, additional energy is needed for the treatment and transmission of drinking water. Over the last five years, approximately 90% of total energy used by Metro Vancouver's water system for the treatment and transmission of drinking water was electrical energy. In 2020, Water Services purchased approximately $3.7M in electricity from external producers. Metro Vancouver's *Corporate Energy Management Policy* outlines ongoing commitments to carbon neutrality and fiscal responsibility and also highlights the importance of reducing energy use, where feasible.

ENERGY GENERATION
The natural topography of the region provides opportunities to harness energy from surplus pressure available in the water system. Energy is generated at four water facilities.

1. The Capilano Energy Recovery Facility (CERF) is the largest generation facility in the water utility. CERF receives treated water from the Seymour Capilano Filtration Plant by gravity and surplus pressure is used to drive a water-driven turbine to generate electricity. The electricity generated is used to partially offset the electrical energy requirements of the Capilano Raw Water Pump Station, the largest pumping facility in the water utility. Since CERF started operations in 2016, it has generated 28.1 GWh of electricity, which has avoided electricity purchases of $1.4M. In 2020, CERF generated 6.7 GWh or $340,000 in avoided electricity purchases.

2. The Cleveland Dam Pump House uses gravity flow from the Capilano Mains to drive eight water-driven pumps which supply drinking water to Districts of North Vancouver and West Vancouver. The water-driven pumps offset all electricity needed to pump this water. Installed in the 1950's this pump house has been supplying water to the region for nearly seven decades without the need to purchase electricity for pumping. In 2020, the Cleveland Dam Pump House pumped the equivalent electrical energy requirement of 0.8 GWh or $57,000 in avoided electricity purchases.

3. Cleveland Dam Turbine, located at the Cleveland Dam Pump House, provides water from Capilano Lake to the Capilano Fish Hatchery which is eventually discharged to Capilano River via the fish ladder. The water with excess pressure is used to drive the turbine to generate electricity. The turbine is the primary provider of electricity needs at the Cleveland Dam for lighting and valve operations. In 2020, the Cleveland Dam Turbine generated 0.7 GWh or $53,000 in avoided electricity purchases.

4. Seymour Falls Turbine, installed in the late 1950's, is located at the Seymour Falls Dam and water from Seymour Lake by gravity is used to drive the turbine to generate electricity. The turbine is the primary provider of electricity needs at the Seymour Falls Dam for lighting and valve operations. As there is no access to other electrical power producers, the turbine also supplies electricity to the Seymour River Hatchery for their operations. In 2020, the Seymour Falls Turbine generated 0.4 GWh or $44,000 in avoided electricity purchases.

In 2020, the total amount of electrical energy generated by the four facilities was 8.6 GWh, which avoids electricity purchases of approximately $494,000.

ENERGY MANAGEMENT PROJECTS

In the last six years, Water Services has completed a number of equipment upgrades and process automation improvements that provide ongoing annual electrical energy savings of 2.7 GWh or $180,000.

1 gigawatt hour (GWh) = 1,000,000 kilowatt hours (kWh)

Table 1 – WS Energy Management Projects

Year	Facility	Project	Annual Electricity Savings (kWh)	Annual Electricity Savings ($)
2015	Seymour Capilano Filtration Plant	EcoRay UV Lamps Phase 2	52,900	$4,655
	Seymour Capilano Filtration Plant	Coagulant Mixing Control	69,000	$6,072
2016	Seymour Capilano Filtration Plant	UV Revalidation	104,000	$9,152
2017	Seymour Capilano Filtration Plant	Outdoor Lighting Upgrade	149,441	$13,151
	Seymour Capilano Filtration Plant	HVAC Control Improvements	316,377	$27,841
2018	Seymour Capilano Filtration Plant	Lime Mixer Blower Shutdown	152,638	$13,432
	Coquitlam Water Treatment Plant	Minimum Ozone Dose Reduction	121,977	$11,100
2019	Port Mann North and South Valve Chambers	Heating Energy Reduction	183,000	$24,705
2020	Seymour Capilano Filtration Plant	LED Interior Lighting Upgrade	800,000	$70,400
		TOTAL	2,700,254	$180,508

In 2020, Water Services upgraded interior lighting at Seymour Capilano Filtration Plant to LED technology. The LED interior lighting upgrade project provides an annual energy savings of 0.8 GWh or $70,000.

Continuous improvements in energy savings projects and optimization projects have been a motivation for staff at the Coquitlam Water Treatment Plant as they are currently looking for innovative ways to reduce operating costs while maintaining high standards for drinking water quality. Operations staff have been working with the Energy Management team to examine historical operating data to optimize and reduce periods when excess ozone is being added to the process beyond what is required for water quality. This commitment to continuous improvement contributes to keeping greenhouse gas emissions for the water utility steady.

ALTERNATIVES

This is an information report; no alternatives are presented.

FINANCIAL IMPLICATIONS

The GVWD generates 8 to 10 GWh of electricity annually which results in avoided electricity purchases of $400,000 to $600,000. Energy Management projects completed since 2015 provide estimated annual savings of 2.7 GWh or $180,000.

CONCLUSION

The water utility is committed to the *Corporate Energy Management Policy,* ensuring targets and key performance indicators are developed and tracked. The water utility takes advantage of the region's natural topography to avoid pumping and to generate energy. Additionally, equipment upgrades and process automation improvements throughout the utility contribute to continuous improvement and ongoing electrical energy savings.

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SERVICES AND SOLUTIONS FOR A LIVABLE REGION

To: Water Committee

From: Lucas Pitts, Acting Director, Policy, Planning and Analysis, Water Services

Date: February 22, 2021 Meeting Date: March 11, 2021

Subject: **Drinking Water Management Plan Update**

RECOMMENDATION

That the Water Committee receive for information the report dated February 22, 2021, titled "Drinking Water Management Plan Update".

EXECUTIVE SUMMARY

The Drinking Water Management Plan (DWMP) sets the direction for Greater Vancouver Water District (GVWD) staff and will help guide Water Services strategic decision making in a defensible and transparent way. It has been almost 10 years since the DWMP was updated and a current update is needed to reflect the evolution of our regional drinking water system and how it will adapt to future challenges such as population growth, financial constraints, and climate change impacts. Unlike the previous versions of the DWMP, Metro Vancouver is working to produce a set of measurable outcomes and benefits that will make the plan more effective and efficient. Water Services and Liquid Waste Services will develop a "One Water" approach, uniting the management of all water in the form of drinking water, stormwater, and wastewater, in areas where synergies and overlap exist. The plan is scheduled for development over three years for endorsement by the Board.

PURPOSE

To provide the Water Committee with information regarding the ongoing update to the Drinking Water Management Plan.

BACKGROUND

The Drinking Water Management Plan (DWMP) is the guiding document for Metro Vancouver providing strategic direction and establishing priorities for drinking water initiatives. It is being updated to provide a clear vision for the GVWD future with a number of measurable goals. The first DWMP was approved by the GVWD in 2005 to provide "direction and priority for drinking water initiatives in a sustainable region". The plan was updated in 2007 to incorporate watershed management goals and strategies. It was then updated again in 2011 to reflect the Board's strategic direction and the Sustainable Region Initiative, an overarching action plan that tied a suite of Metro Vancouver management plans together to achieve a long-term sustainable vision for the region.

All versions of the DWMP maintained the same three high-level goals and each of these goals contained a set of strategies and actions:

Goal 1: Provide clean, safe drinking water
Goal 2: Ensure the sustainable use of water resources
Goal 3: Ensure the efficient supply of water

Those goals, strategies, and actions largely reflect operational work or planned capital projects with no defined goalposts or performance targets beyond planned projects. While this approach served a purpose in the past, for this update Metro Vancouver is proposing a more actionable and forward-looking management plan.

DRINKING WATER MANAGEMENT PLAN UPDATE PROCESS AND CONSIDERATIONS

Themes of the DWMP Update

Unlike in the previous versions of the DWMP, staff plan to develop and include measurable outcomes and benefits that will make the plan more effective and efficient. Overall the plan will act as a resource guide to aid decision making in a defensible and transparent way. This update may consider many themes that were not reflected in the last update, including resiliency and equity, economic prosperity, continuous improvement, accountability, asset management and renewal, climate change, One Water opportunities, and reconciliation.

"One Water" Opportunities

The DWMP and the Integrated Liquid Waste and Resource Management Plan (ILWRMP) will be developed over the same time period, allowing for the plans to be developed concurrently. Drinking water, wastewater, and stormwater have traditionally been separated into independent silos and managed as separate resources. A "One Water" approach shifts away from these separate silos and moves towards an integrated management approach.

The "One Water" approach allows for a more sustainable and inclusive way to turn challenges into opportunities with initiatives such as water reuse, energy, green infrastructure, and innovative ways to optimize planning for operations and finances. Staff will identify priorities, strategies, and actions shared by both plans to work towards efficient, resilient, and sustainable water and wastewater systems.

DWMP Update Approach

Based on work completed by staff to date, it is anticipated that a three-phase process over approximately three years will be required to complete the review and update of the DWMP. An engagement strategy is currently being developed and the work in 2021 is anticipated to include internal engagement and engagement with Regional Engineers Advisory Committee (REAC) and Regional Engineers Advisory Committee Water Subcommittee (REAC WSC). Technical work will focus on identifying preliminary DWMP visions, goals, and strategies. Updates to the Water Committee are scheduled annually with the next update occurring prior to public engagement (anticipated during the first half of 2022). The final DWMP is anticipated to be complete in 2024.

Collaborative Approach
Through this update process, the aim will be to collaboratively set measurable goals as a region. The GVWD is planning to build increased accountability for the goals and actions into the plan and our member jurisdictions will be an important part of the process.

A key gap already identified is the lack of measurable goals and accountability for both Metro Vancouver as well as member jurisdictions.

ALTERNATIVES
This is an information report; no alternatives are presented.

FINANCIAL IMPLICATIONS
This is an information report. No financial implications are presented.

CONCLUSION
Metro Vancouver has initiated a review and update of the 2011 *Drinking Water Management Plan*. Water Services will work collaboratively with Liquid Waste Services during the DWMP update to incorporate a "One Water" approach that supports the integration of water management within the organization. The final DWMP is anticipated to be completed in 2024.

References
Drinking Water Management Plan (2011)

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