

Liquid Waste Services
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June 8, 2018

File: CP-03-04

Mr. Patrick Wruck, Commission Secretary
British Columbia Utilities Commission
6th Floor – 900 Howe Street
Vancouver, BC V6Z 2N3

Dear Mr. Wruck:

Re: Greater Vancouver Sewerage and Drainage District Application for an Exemption from Part 3 of the Utilities Commission Act – Response to British Columbia Utilities Commission Information Request No. 1

The Greater Vancouver Sewerage and Drainage District's (GVS&DD) response to British Columbia Utilities Commission (Commission) Information Request No. 1 is enclosed.

We are of the view that the Application is straightforward and that the requested exemption order should be granted.

As set out in the Application, regulation is not needed with respect to GVS&DD's project to recover heat energy from effluent at the North Shore Wastewater Treatment Plant and supply the recovered heat energy exclusively to the Lonsdale Energy Corporation (LEC). The reasons for public utility regulation are not present in this case. The elected governing bodies of the LEC and GVS&DD will protect the public interest in all respects of the supply of heat energy to LEC, as they are required to do. Exempting GVS&DD will enable GVS&DD and LEC to proceed with the effluent heat recovery project on the terms they have agreed to, ensure certainty of contract and avoid unnecessary regulatory burden.

The GVS&DD and LEC have entered into a contract respecting the supply of heat energy to LEC recovered at the North Shore Wastewater Treatment Plant, which is currently in the early stages of construction. The Thermal Energy Sale and Purchase Agreement has been approved by the respective elected governing bodies of GVS&DD and LEC. A copy of the agreement and a letter of support from LEC were filed with the Commission on November 21, 2017, and are provided again with this submission.

A year has passed since we filed our Application on June 14, 2017, and many of the information requests seek information that is not related to the Application. GVS&DD is not asking the Commission to approve the effluent heat recovery project. The project and the agreement with LEC have been approved by the respective elected governing bodies of GVS&DD and LEC. GVS&DD is asking the Commission for an order exempting the GVS&DD from Part 3 of the *Utilities Commission*

Act in relation to the project, with the support of the LEC. We ask that the Commission's proceeding to review the Application move efficiently to resolution.

Contact Information

For further information, please contact:

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Sincerely,



Peter Navratil, P.Eng, MPA
General Manager

PN/RG/lz

cc: Janice Joly, Regulatory Governance Coordinator, FortisBC Energy Inc.
Ben Themens, Executive Director, Lonsdale Energy Corporation
Ian Webb, Lawson Lundell LLP

Attachment: Greater Vancouver Sewerage and Drainage District's Response to BCUC Information Request No.1

**GREATER VANCOUVER SEWERAGE AND DRAINAGE DISTRICT'S
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**1.0 Reference: REQUEST FOR QUALIFICATIONS
Exhibit B-1 (Application), Section 3, p. 3
Greater Vancouver Sewerage and Drainage District's (GVS&DD)
Planned Effluent Heat Recovery Project**

On page 3 of the Application, GVS&DD states:

In 2014 GVS&DD issued a request for qualifications and information to assess the level of interest in using heat recovery at the North Shore WWTP for off-site purposes. The Lonsdale Energy Corporation ("LEC") was the sole qualified respondent.

1.1 Please explain GVS&DD's request for qualifications (RFQ) process. In your response please include key dates and timescales, advertisement strategies, number of responses from interested parties, mandatory requirements such as experience, facilities, proximity, certifications etc. and their respective weighting.

RESPONSE:

The request for qualifications and information (RFQ) was advertised on the BC Bid website and on the Metro Vancouver website (Attachment 1). The RFQ was open for three weeks, from publication on October 17, 2014 until closing on November 7, 2014 at 16:30. Letters of invitation were also emailed directly to the City of North Vancouver, Corix Utilities, District of North Vancouver, District of West Vancouver, FortisBC Alternative Energy Services, Lonsdale Energy Corporation, Squamish Nation, and Urban Development Institute.

Two responses were received: one from Lonsdale Energy Corporation (LEC) and the other from a heat exchange equipment supplier. Submissions were evaluated as follows:

- Respondent's Corporate Experience (30%)
- Respondent's Technical Experience (30%)
- Proposed Heat Load Suitability (40%)

The heat exchange equipment supplier responded only to express interest in supplying equipment for the project and did not meet the qualification criteria. Lonsdale Energy Corporation met the qualification criteria.

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1.1.1 Please discuss the success of the RFQ process given that LEC was found to be the 'sole qualified respondent.'

RESPONSE:

The feasibility of a heat recovery system depends on the proximity of the customer to the source of heat. The North Shore WWTP is located in the District of North Vancouver. GVS&DD met with staff from the two nearest municipalities, the District of North Vancouver and the City of North Vancouver, to explore whether existing or future developments might be able to receive thermal energy from the North Shore WWTP. The Marine/Capilano Village Centre development (now called Lions Gate Village) in the District of North Vancouver was considered, but ultimately district energy was not planned for the development. At the time of the RFQ (and today), LEC is the only district energy system in proximity to the North Shore WWTP site.

The process verified that LEC is the only feasible customer for thermal energy recovered at the North Shore WWTP. The process was a success – it resulted in an agreement with LEC that enables GVS&DD to proceed with its effluent heat recovery project on acceptable terms.

1.1.1.1 Please elaborate on whether GVS&DD considered extending the timescales of the RFQ process to attract other qualified respondents.

RESPONSE:

GVS&DD did not consider extending the timeline of the RFQ process, since a qualified respondent was identified, and since no other nearby district energy systems were known to be planned at the time.

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1.2 Please explain the next steps for the contract award process. Please include key dates and timelines

RESPONSE:

GVS&DD and LEC entered into a Thermal Energy Sale and Purchase Agreement on October 5, 2017. The agreement was provided to the BCUC on November 21, 2017 and is provided again (Attachment 2).

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On page 3 of the Application, GVS&DD states that the “North Shore WWTP is expected to be fully commissioned by June 2021.”

1.3 Please confirm, or explain otherwise, that the Planned Effluent Heat Recovery Project (Project) will also be fully commissioned by June 2021.

RESPONSE:

The Project is expected to be fully commissioned by June 2021.

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**2.0 Reference: PROPOSED EFFLUENT HEAT RECOVERY PROJECT
Exhibit B-1, Section 3, p. 3
GVS&DD's Planned Effluent Heat Recovery Project – Design and
Operation**

On page 3 of the Application, GVS&DD states:

The North Shore WWTP has the potential to be a net producer of energy. GVS&DD is looking at an opportunity to install equipment at the North Shore WWTP to recover heat from treated effluent, transfer the heat to a high temperature hot water loop, and supply this heat to a third-party district energy system via hot water supply and return pipelines.

2.1 Please provide the Project's estimated installed capacity (MW) and energy generation (MWh).

RESPONSE:

The installed capacity of the Project is 5 MW. The Project's energy generation is expected to be 29,420 MWh in 2021, increasing to an expected 40,100 MWh in 2040. The Project will only generate energy in response to requests from LEC, so actual energy generation in a given year will depend on demand from LEC.

2.1.1 Please explain if the Project will meet the North Shore Wastewater Treatment Plant's (WWTP) on-site energy demands.

RESPONSE:

The Project will not meet the North Shore WWTP's on-site needs. It will serve only LEC's district energy system.

2.1.1.1 If so, please provide the estimated on-site demand and the proportion of which will be met by the Project. Please explain the source for any periods of energy deficit.

RESPONSE:

Not applicable.

2.1.1.2 If not, please explain how the North Shore WWTP's energy demands will be met.

RESPONSE:

The North Shore WWTP's energy demand will be met by the following installed capacity:

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- 6.3 MW electricity from BC Hydro
- 5.9 MW biogas boilers (natural gas backup)
- 4.2 MW on-site heat recovery (separate from the Project)
- 2.4 MW on-site biogas cogeneration (natural gas backup)

2.1.2 Please provide LEC's Mini-Plant #7's (MP-7) demand and the proportion of which will be met by the Project. Please explain how GVS&DD and LEC would address periods of energy deficit or surplus.

RESPONSE:

LEC's MP-7 is one of several mini-plants LEC operates to generate thermal energy which LEC distributes through insulated piping to heat about 5.3 million square feet in 70 buildings in the City of North Vancouver. LEC is targeting completing interconnection of their three services areas, Lower Lonsdale, Central Lonsdale and the Harbourside/Marine Drive areas of the City of North Vancouver, by 2019. Once these systems are interconnected, LEC will be able to optimise all of its eight mini-plants to redundantly serve the thermal energy needs of all its customers across the City of North Vancouver. The interconnection will be completed before the Project begins supplying energy to LEC.

LEC presently uses a combination of high efficiency natural gas boilers, ground source heat pumps, heat recovery from building cooling, and solar thermal panels to heat hot water. The Project is estimated to provide 67 per cent of LEC's annual energy consumption in 2021 and 59 per cent in 2040, for an average of 62 per cent over the first twenty years of the Project's operation.

The Project's heat pumps are capable of providing 2 MW to 5 MW of heat. The Project will produce heat only in response to requests for heat from LEC's control system that fall between 2 MW and 5 MW. When LEC's load is less than 2 MW, the heat pumps will shut off and LEC will produce heat using the other sources described above (natural gas boilers, ground source heat pumps, heat recovery, solar thermal panels). When LEC's load is more than 5 MW, the heat pumps will supply 5 MW and the other sources will provide the additional heat required by LEC. The agreement between Metro Vancouver and LEC provides for interruptible service and LEC is building redundancy to maintain customer service when heat is not available from Metro Vancouver. LEC has also sufficient alternative energy options that they may not be purchasing any heat from Metro Vancouver during summer months.

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2.2 Please explain whether opportunities exist for the expansion of the Project to supply other service areas.

RESPONSE:

The Energy Centre will not have space to expand the effluent heat recovery works. The Thermal Energy Sale and Purchase Agreement (s. 3.1) provides that GVS&DD will supply thermal energy recovered at the North Shore WWTP exclusively to LEC for the term of the agreement. There are no other opportunities during the term of the agreement with LEC.

Over 30 MW of additional energy is available in the treated effluent that will be conveyed from the WWTP to the outfall at First Narrows. The additional energy in the effluent conveyance pipe will be available for offsite heat extraction by others as governed by GVS&DD's Liquid Waste Heat Recovery Policy (Attachment 3). For such offsite heat extraction, GVS&DD would only provide other parties access to the treated effluent from the conveyance pipe. The other parties would own all facilities and equipment to recover the heat from the effluent and deliver the heat to their own loads.

2.2.1 Please discuss whether the design of the Energy Centre will allow for future expansion.

RESPONSE:

The Energy Centre will be located inside a building of the North Shore WWTP. The 5 MW heat pump output capacity of the Project is limited by space constraints within the Energy Centre. There will be no room for expansion on the WWTP site.

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2.3 Please provide an overview of the consultation process carried out in relation to this project (for example, how was the project advertised? How were invitations for participation in the consultation process sent out?)

RESPONSE:

GVS&DD worked closely with North Shore communities, special interest groups, local governments and First Nations since 2012 to learn about their values, interests and concerns in connection with the North Shore WWTP. The engagement included public and community meetings, and a Lions Gate Public Advisory Committee (LGPAC) formed to provide input during the design and construction phase of the project, including input to the RFP that forms the basis of the design-build contract. The committee also assisted the project team in understanding the community impacts of the project and exploring educational opportunities at the new plant. Mr. David Knee who has submitted a letter of comment (Exhibit E-1) in this proceeding was a member of the LGPAC.

Effluent heat recovery was identified as a goal of the project early in the project definition phase, and was discussed at the public and community meetings and with the LGPAC.

The information presented at the public and local community meetings and the LGPAC meetings, and summaries of these meetings, are all available on Metro Vancouver's website:

<http://www.metrovancouver.org/services/liquid-waste/construction-maintenance/north-shore-wwtp/community-input/public-local-community-meetings/Pages/default.aspx>

2.3.1 If no consultation process has been completed, please explain the reasons why.

RESPONSE:

There has been extensive consultation since 2012. Please refer to the response to BCUC IR 2.3.

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On page 3 of the Application, GVS&DD states:

The equipment consisting of heat pumps, distribution pumps, pipes, control systems and related equipment would be contained in a separate room (the "Energy Centre") in the operations and maintenance building on the North Shore WWTP site.

2.4 Please provide an overview of the Project's design and operation, including a Piping & Instrumentation Diagram (P&ID), if available. In your response please provide information on the following and identify the party responsible for the operation and maintenance of each aspect of the system:

- **Service areas (on-site, MP-7, expansion areas etc.);**
- **Design parameters;**
- **Heat recovery process;**
- **Key equipment used;**
- **Control methodology;**
- **Metering;**
- **Back-up systems; and**
- **Method of integration with LEC's MP-7.**

RESPONSE:

The detailed design of the Project is currently at the 60% design stage. Piping & Instrumentation diagrams are not provided in this response since revisions are ongoing.

The Project will not provide on-site heat for the WWTP. The Project will serve LEC's district energy system. The three service areas of the LEC district energy system will be interconnected before connecting to the Project. LEC is responsible for operation and maintenance of its service areas and expansion areas.

GVS&DD and LEC have agreed on the following design parameters. GVS&DD is responsible for providing heat pumps that will:

- be capable of continuously exporting a minimum of 5 MW_t of hot water at a peak operating supply temperature of 82°C with a return temperature range of 55°C (based on current conditions) to as low as 45°C (based on future conditions);
- be capable of lowering the hot water supply temperature to as low as 70°C while still maintaining a minimum of 5 MW_t hot water export capacity at the above return water temperatures;
- have a minimum output capacity of 2 MW_t and be capable of turndown to 2 MW_t;
- provide heat according to the outdoor air temperature (OAT) reset schedule:

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- OAT less than or equal to -8°C ; hot water supply temperature equals 82°C ;
- OAT greater than or equal to 15°C ; hot water supply temperature equals 70°C ;
- OAT greater than -8°C but less than 15°C ; hot water supply temperature based on a linear profile between the point described by an OAT of -8°C and a supply temperature of 82°C and the point described by an OAT of 15°C and a supply temperature of 70°C ;
- be able to operate with variable flow on the hot water side (condenser side) and constant flow on the secondary effluent side (evaporator side).

Heat recovery will be provided by three mechanical vapour compression heat pumps in series. GVS&DD is responsible for operating and maintaining the heat pumps along with other key equipment in the Energy Centre including:

- secondary effluent circulation pumps;
- hot water distribution pumps;
- volumetric expansion tank(s);
- HVAC and lighting for the Energy Centre space;
- electrical system for the Energy Centre;
- control system capable of communicating with the WWTP's CDAC system and with LEC's SCADA system.

Thermal energy will be supplied by GVS&DD in response to requests from LEC's control system for:

- a hot water supply temperature setpoint ($^{\circ}\text{C}$); and
- a heating capacity setpoint (MW).

GVS&DD is responsible for thermal energy metering. To determine the amount of energy provided to LEC, the heat pump supply and return flows will be metered. The energy metering system will:

- measure and monitor the total thermal energy delivered from the heat pumps;
- be factory certified as being able to meet the CSA standard C900.6-06 and international standards OIML R75 and EN 1434 for thermal energy metering;
- use a self-contained energy calculator (integrator) that utilizes factory installed equations for the calculation of energy delivered based on flow and temperature inputs and that automatically compensates for temperature;
- ensure the energy calculator will not allow the local infield programming of coefficients for density and heat capacity;
- ensure the energy calculator will not involve the writing and field programming of energy calculations after the equipment has left the factory.

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The thermal energy supply from the Energy Centre to LEC is interruptible, as there is no redundancy on the BC Hydro electrical supply to the Energy Centre and the heat pumps are not redundant. Within the Energy Centre, duty and stand-by pumps are provided for secondary effluent circulation and hot water distribution, to allow for maintenance (GVS&DD's responsibility). In the event of an interruption of supply from effluent heat recovery, LEC is responsible for providing backup heat using natural gas boilers and other sources within LEC's system. (See also response to BCUC IR 2.1.2.)

GVS&DD is responsible for constructing, operating and maintaining buried hot water distribution piping from the Energy Centre to the tie-in point located approximately at the WWTP property line (the "Tie-In"). LEC is responsible for constructing, operating and maintaining buried hot water distribution piping from MP-7 to the Tie-In.

Both parties will provide communications conduits alongside the distribution piping. GVS&DD will provide a conduit path from the buried communications conduit to the Energy Centre control system. GVS&DD will provide a fibre optic communications interface at the Energy Centre control system for termination of a fibre optic communications cable to be installed by LEC. The interface between the Energy Centre control system and the LEC SCADA system will be provided by LEC. GVS&DD will provide the ability for LEC to interface with the Energy Centre control system via an overwire interface and wireless technology.

GVS&DD will provide a volumetric expansion tank to protect the water volume within the WWTP limits. LEC will provide one or more expansion tanks to manage LEC's system volumetric expansion and pressure transients. LEC will manage differential pressure in the LEC system so that differential pressure does not exceed 600kPa at the Tie-In. LEC will be responsible for pumping hot water within the LEC system and will coordinate such pumping with the Energy Centre distribution pumps. The Energy Centre distribution pumps will vary the flow in order to meet the heating demands of LEC by maintaining a constant heating capacity out of the heat pumps.

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2.5 Please discuss the ownership and operation models for the Energy Centre and downstream distribution pipework that GVS&SS has considered, including the relative merits of each model.

RESPONSE:

Chosen Ownership and Operations Model

As set out in the Thermal Energy Sale and Purchase Agreement, GVS&DD will own the GVS&DD works within, and forming part of, the North Shore WWTP that are necessary to generate thermal energy at the WWTP and to deliver thermal energy from the WWTP to the LEC district energy system. The LEC will own the LEC works forming part of the LEC district energy system, that are necessary to accept thermal energy from the WWTP at the Tie-In and to deliver thermal energy to the LEC district energy system. LEC will continue to own its existing facilities, and will construct and own the distribution piping from its MP-7 to the Tie-In.

The division of ownership of facilities is at the Tie-In, which is approximately at the property line of the North Shore WWTP site. Each party is responsible to design, construct, operate and maintain their own facilities, except that the parties will cooperate on the design, permitting, construction and connection between their respective facilities to facilitate connectivity and maximize the production and transfer of thermal energy.

Under this model, the Energy Centre is on the North Shore WWTP site directly adjacent to the effluent heat source, and GVS&DD appropriately manages safety and security risks by maintaining control of the entire North Shore WWTP site. A disadvantage of this model is that GVS&DD falls within the definition of public utility in the *Utilities Commission Act* as a result of owning and operating the Energy Centre, necessitating this application for an exemption order given that regulation would not be in the public interest and to ensure the parties have certainty of contract.

Alternative Ownership and Operations Model

An alternative ownership and operations model would be for LEC, in addition to owning and operating its existing district energy system and the distribution piping from MP-7 to the Tie-In, to also own and operate the Energy Centre on the North Shore WWTP site or at another site.

As Mr. Knee observed in his letter of comment (Exhibit E-1), this alternative structure would avoid the *Utilities Commission Act* entirely, negating the need for an exemption order because LEC (a municipal utility) would own and operate all the energy facilities. The disadvantage of this alternative model would be that GVS&DD would take more risk if it allowed LEC to own and operate the Energy Centre on GVS&DD's property. Instead of the parties' respective facilities interfacing at the Tie-In approximately at the property line, they would interface within

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LEC's Energy Centre within GVS&DD's North Shore WWTP site. This would add complexity in relation to safety and security, access for operating and maintaining facilities, compliance with environmental laws, insurance and similar matters. A model where LEC owns and operates the Energy Centre at another site would require additional land and facilities, adding costs unnecessarily.

The alternative ownership and operations model is sub-optimal for managing risks and/or minimising costs; however, if GVS&DD is not able to obtain a satisfactory form of exemption order from Part 3 of the *Utilities Commission Act*, GVS&DD would reconsider the alternative model as it avoids GVS&DD or LEC falling within the definition of public utility in the *Utilities Commission Act*.

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On page 4 of the Application, GVS&DD states:

LEC's existing Mini-Plant #7 ("MP-7") is less than 1km from the site of the new North Shore WWTP, and would be the location at which the LEC system would connect to hot water supply and return pipes connected to the North Shore WWTP Energy Centre.

2.6 Please elaborate on the criteria used to select LEC's MP-7 as the most suitable district energy system for connection to the North Shore WWTP Energy Centre.

RESPONSE:

Please refer to the responses to BCUC IRs 1.1 and 1.1.1.

2.6.1 How many customers does LEC's MP-7 currently serve? What is the anticipated increase in the number of customers over the course of the 20 year contract term?

RESPONSE:

LEC's MP-7 is one of several mini-plants LEC operates to generate thermal energy which LEC distributes through insulated piping to heat about 5.3 million square feet in 70 buildings in the City of North Vancouver. LEC is in the process of interconnecting its three services areas: Lower Lonsdale, Central Lonsdale and the Harbourside/Marine Drive areas of the City of North Vancouver. Once these systems are interconnected, LEC will be able to optimise all of its eight mini-plants to serve the thermal energy needs of all its customers across the City of North Vancouver.

GVS&DD requested an answer to the question about the anticipated increase in customers over the 20-year contract term and LEC responded as follows:

LEC started operation less than 15 years ago (in late 2003) and the above-mentioned 70 buildings (5.3 million square feet) have all been connected to its system since then. It is not unreasonable to estimate that the number and area of buildings could more than double in the next 20 years. However, the rate of building connection is greatly influenced by the rate of real estate development, which in turn can be impacted by economic factors as well as political and community support of projects.

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**3.0 Reference: PROPOSED EFFLUENT HEAT RECOVERY PROJECT
Exhibit B-1, Section 3, p. 5
Capital Costs and operational costs**

On page 5 of the Application, GVS&DD states:

- Thermal energy supplied to LEC to be metered
- GVS&DD does not intend to profit beyond cost recovery

3.1 Please provide the capital costs for the Project.

RESPONSE:

GVS&DD's capital costs are \$13,245,668 to build the effluent heat recovery system within the NSWWTP and a monthly cost of \$223,320 for up to 12 months during the performance period, for a total capital cost of \$15,925,511. This is a guaranteed cost since it is a Design-Build-Finance project.

GVS&DD has budgeted an additional \$2,000,000 for BC Hydro infrastructure to serve the Energy Centre. This is an estimate and remains to be finalized.

LEC has budgeted \$3,600,000 for distribution piping from MP-7 to the Tie-In at the North Shore WWTP property line.

All capital cost amounts above are provided in 2017 dollars.

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3.2 Please provide the estimated annual operating and maintenance costs for the Project.

RESPONSE:

The estimated annual operating and maintenance costs for the Project are dominated by the cost of electricity to run the heat pumps. Electricity costs are projected to increase over time as LEC's demand for heat grows and BC Hydro rates rise. Electricity costs are estimated at \$1.1M in 2021 (nominal dollars) and \$2.6M in 2040 (nominal dollars).

Non-electricity operating and maintenance costs are estimated at \$310,000 in 2021 (nominal dollars) and will escalate with inflation over time.

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3.3 Please provide a breakdown of the items included in the annual cost recovery.

RESPONSE:

The annual cost recovery from LEC includes the following items:

- electricity;
- major repair and replacement;
- heat pump preventative maintenance;
- balance of plant preventative maintenance;
- piping preventative maintenance (from the Energy Centre to the Tie-in);
- CDACS maintenance and repair;
- operating labour and supervision; and
- office and administration costs.

The annual cost recovery from LEC does not include GVS&DD's capital costs for the Energy Centre or debt financing on the capital.

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**4.0 Reference: PUBLIC INTEREST IN GRANTING THE EXEMPTION
Exhibit B-1, Section 5, p. 7
Public interest in granting the exemption**

On page 7 of the Application, GVS&DD states:

Although GVS&DD would fall within the UCA definition of "public utility", it should be exempt from public utility regulation because regulation would provide no public benefit.

4.1 Please explain in detail how GVS&DD will deal with customer complaints.

RESPONSE:

GVS&DD will not be providing thermal energy to the public. The LEC will be GVS&DD's only customer for the supply of thermal energy recovered from the effluent at the North Shore WWTP. The Thermal Energy Sale and Purchase Agreement (s. 3.1) between GVS&DD and LEC provides that GVS&DD will supply thermal energy recovered at the North Shore WWTP exclusively to LEC for the term of the agreement.

GVS&DD and LEC will interact in a cooperative manner, share information and notify each other of any proposed operational changes. Such cooperation is specifically provided for in section 2.6 of the Thermal Energy Sale and Purchase Agreement. In the unlikely event of a dispute or complaint by LEC, the Thermal Energy Sale and Purchase Agreement (s. 14) provides a dispute resolution process. The dispute resolution process requires the parties to use best efforts to settle the dispute by amicable negotiations based on frank and timely disclosure of all relevant facts and information to facilitate such discussions.

As discussed in the response to BCUC IR 2.2, other parties will be able to access the treated effluent in the off-site conveyance pipe to extract energy using their own heat recovery facilities.

4.1.1 If there is no process in place, please explain why.

RESPONSE:

The Thermal Energy Sale and Purchase Agreement between GVS&DD and LEC provides a process for resolving any disputes or complaints GVS&DD's only thermal energy customer, LEC, might have about GVS&DD's provision of thermal energy. Please refer to the response to BCUC IR 4.1.

4.1.2 If a process has been developed, please provide that policy. Please include details of how complaints would be managed at various stages and how disputes would be resolved. Also clarify who has the final decision making authority.

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RESPONSE:

Please refer to the response to BCUC IR 4.1.

In the extremely unlikely event the GVS&DD and LEC are not able to resolve a dispute or complaint by amicable negotiations, the dispute or complaint would amount to an alleged breach of contract which could be taken to and resolved by the courts of British Columbia.

4.1.3 Would GVS&DD consider it reasonable for the BCUC to include a provision to lift the exemption in response to a customer complaint against the utility?

RESPONSE:

GVS&DD will not be providing thermal energy service to the public. GVS&DD will be supplying thermal energy exclusively to LEC in accordance with the terms and conditions the parties have agreed to as documented in the Thermal Energy Sale and Purchase Agreement.

The specifications and performance obligations in the agreement represent what both GVS&DD and LEC agree is reasonable and appropriate for the Project. Refer to the responses to BCUC IRs 2.1.2 and 2.4 for details.

It would be problematic if the Commission grants GVS&DD an exemption from Part 3 of the *Utilities Commission Act* but retains the power to lift the exemption in response to a complaint by LEC about GVS&DD's provision of thermal energy. If the Commission was to lift the exemption on a complaint and exercise its powers with respect to the GVS&DD's provision of thermal energy to LEC, the Commission would be substituting its own terms of service for the achievable and appropriate specifications in the agreement.

The LEC supports the Commission granting the form of exemption GVS&DD has requested (Attachment 4). The requested exemption will provide the parties certainty of contract respecting the terms that they have agreed to and which are mutually acceptable to their elected governing bodies, and avoid unnecessary regulatory burden.

If GVS&DD is not able to obtain a satisfactory form of exemption order from Part 3 of the *Utilities Commission Act*, GVS&DD would need to reconsider the alternative ownership and operations model described in the response to BCUC IR 2.5.

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4.2 Please explain the extent to which ratepayers have recourse with GVS&DD and confirm in what ways GVS&DD is accountable to customers of the utility.

RESPONSE:

GVS&DD will be supplying thermal energy exclusively to LEC in accordance with the terms and conditions the parties have agreed to as documented in the Thermal Energy Sale and Purchase Agreement. GVS&DD is accountable to meet its commitments under the Thermal Energy Sale and Purchase Agreement, and in the unlikely event LEC is not satisfied with GVS&DD's performance, the agreement provides a process for resolution of any such disputes as described in the response to BCUC IRs 4.1 and 4.1.2.

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4.3 Please provide a detailed breakdown of the rate setting model, including the process by which rates will be changed and updated.

RESPONSE:

LEC will compensate GVS&DD for thermal energy supplied to LEC in accordance with section 3.2 and Schedule D of the Thermal Energy Sale and Purchase Agreement. Schedule D will apply for the term of the agreement, and the charges will not be changed or updated except as specifically provided for in the schedule.

The principle is that LEC is responsible for all reasonable costs and expenses, without any markup, associated with the operation and maintenance of the GVS&DD works within, and forming part of, the North Shore WWTP that are necessary to generate thermal energy at the WWTP and to deliver thermal energy from the WWTP to the LEC district energy system (defined as the GVS&DD Infrastructure in the agreement). To the extent that such reasonable operations and maintenance costs increase over time, the increases will flow through to LEC.

The largest cost recovered from LEC will be the cost of electricity to run the heat pumps. Increases in BC Hydro rates will flow through to LEC. In developing the Thermal Energy Sale and Purchase Agreement, LEC requested and GVS&DD agreed to guarantee a minimum efficiency for the performance of the heat pumps. This performance guarantee motivates GVS&DD to operate the heat pumps efficiently and effectively places a cap on the cost of electricity recovered from LEC through the sale of heat.

LEC will not contribute anything toward GVS&DD capital costs for the Energy Centre project.

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ATTACHMENTS

1. Request for Qualifications and Information (RFQ) No. 14-209: Effluent Heat Recovery Opportunities at the New Lions Gate Secondary WWTP
2. Thermal Energy Sale and Purchase Agreement between GVS&DD and LEC
3. Liquid Waste Heat Recovery Policy
4. Letter of support from LEC dated November 8, 2017

RFQ No. 14-209**Effluent Heat Recovery Opportunities at the New Lions Gate Secondary WWTP****Information for Respondents**

Advertised on the Metro Vancouver website (<http://www.metrovancouver.org/bids/Pages/default.aspx>) and BC Bid (www.bcbid.gov.bc.ca).

Information

Greater Vancouver Sewerage & Drainage District (the Corporation) invites Responses to this Request for Qualifications and Information (RFQ) for potential Effluent Heat Recovery Opportunities at the New Lions Gate Secondary WWTP. More specifically, the intent of this RFQ is to short-list up to three (3) Respondents to enter into discussions regarding potential opportunities for the development of energy recovery infrastructure and the purchase of heat recovered from effluent at the new Lions Gate Secondary Wastewater Treatment Plant (LGSWWTP).

RFQ documents may be viewed at or obtained from the Metro Vancouver Purchasing Department, 5th Floor, 4330 Kingsway, Burnaby, BC, Tel. (604) 432-6326. This RFQ may also be downloaded directly from the Metro Vancouver website at <http://www.metrovancouver.org/bids/Pages/default.aspx>.

The Corporation reserves the right to accept, but is under no obligation to accept late Responses.

The Corporation will endeavour to post the list of Respondents on the Metro Vancouver website by 10:00 a.m. the business day following the submission deadline. Only the Respondents' names will be disclosed. All inquiries regarding the Responses will be referred to that site. Only the short-listed Respondents will be contacted at the conclusion of the process. Unsuccessful Respondents wishing to be debriefed are encouraged to contact the Buyer of record within 30 days of the website posting. As only the successful Respondents will be contacted at the conclusion of this RFQ, the Corporation wishes to thank all Respondents for their effort in responding to this bidding opportunity.

Purchasing Department hours of business are 8:00 a.m. to 4:30 p.m., Monday through Friday.

For further information, please contact Gary Mui at gary.mui@metrovancouver.org.

GREATER VANCOUVER SEWERAGE & DRAINAGE DISTRICT

**REQUEST FOR QUALIFICATIONS AND INFORMATION (RFQ)
RFQ No. 14-209**

**EFFLUENT HEAT RECOVERY OPPORTUNITIES
AT THE NEW LIONS GATE SECONDARY WWTP**

OCTOBER 17, 2014

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Section 00010Instructions for Respondents

PART 1 INTENT

The intent of this Request for Qualifications and Information (RFQ) is to seek statements of qualifications (Responses) from parties (the Respondents) interested in potential Effluent Heat Recovery Opportunities at the New Lions Gate Secondary WWTP. More specifically, the intent of this RFQ is to short-list up to three (3) Respondents to enter into discussions regarding potential opportunities for the development of energy recovery infrastructure and the purchase of heat recovered from effluent at the new Lions Gate Secondary Wastewater Treatment Plant.

Only parties that have responded to this RFQ and are short-listed will be invited to participate in contemplated next steps. Please see Section 00010, Response Submission below.

The Corporation reserves the unfettered right to determine the next steps in the process which may include negotiation with the front-runner(s), issuing a Tender or Request for Proposal to the short-listed Respondents only, collapsing this process entirely or pursuing a different selection process altogether.

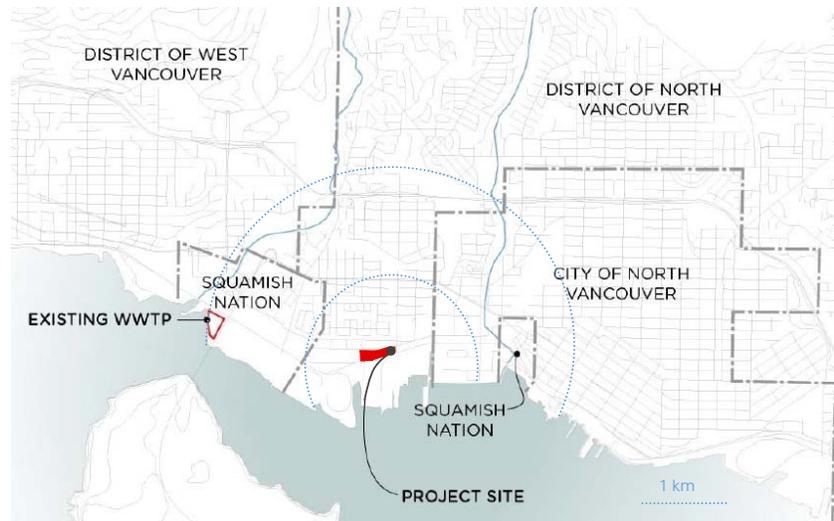
This is not an invitation to tender or request for proposal. By participating in the RFQ each Respondent expressly agrees that no contract of any kind is formed under, nor any legal obligations whatsoever arise out of, this RFQ.

PART 2 PROJECT DESCRIPTIONBackground

The Corporation is designing a new Lions Gate Secondary Wastewater Treatment Plant (LGSWWTP). The LGSWWTP will provide secondary treatment to the North Shore municipalities of the District of West Vancouver, the City of North Vancouver and the District of North Vancouver, as well as the Squamish Nation and the Tsleil-Waututh Nation, with a combined population of 200,000. Under federal regulations the LGSWWTP is to be fully commissioned and operational by December 31, 2020. Procurement for the design and construction phase will commence in early 2015. Construction and commissioning will take place between 2017 and the end of 2020. Once the LGSWWTP is in operation, the existing Lions Gate primary treatment plant will be decommissioned and deconstructed.

The LGSWWTP presents an opportunity to simultaneously provide a needed upgrade to an essential service, protect the local environment and contribute to development on the North Shore. As part of the treatment process, the Corporation is also finding innovative ways to use wastewater as a resource. The facility has the potential to be a net producer of energy. This includes the recovery of low-grade heat from the treated effluent using heat pumps. A small portion of this energy is to be used on-site for space heating, with the remainder potentially

available to users of heat such as district energy systems located near the LGSWWTP or near the effluent pipeline to the existing outfall at First Narrows.



The indicative design process for the LGSWWTP, completed in 2014, led to the allocation of space within the Operations and Maintenance Building for an Energy Centre. At the Energy Centre, green energy would be produced by extracting low grade heat from treated effluent and upgrading the heat to a higher temperature using heat pumps. The heat would then be distributed to third-party district energy system(s) using an underground piping system. Once delivered to a district energy system, heat would be transferred and used by residential and/or commercial customers for hydronic space heating and hot water heating. The indicative design for the Energy Centre includes sufficient space to accommodate a 5 MW heat pump – capable of providing heat to approximately 3,000 North Shore households. There may be the potential to expand the capacity of the Energy Centre. The Energy Centre would be located at the east end of the LGSWWTP near the main entrance and would be highly visible to the public to showcase the energy recovery system.

As part of the indicative design process, a conceptual design for the onsite Energy Centre was developed assuming a tie-in point to a district energy system located within one kilometer of the LGSWWTP. Economic analysis shows there may be a reasonable opportunity to recover energy from the effluent for district energy use. Providing heat to areas farther than one kilometer away may also be possible, although greater distances increase transmission pipeline costs. The final business case for energy recovery will depend on detailed construction and operation costs, the future market value of green energy, the cost of electricity, the availability of funding, and the allocation of risk in the development of the assets. For reference see Section 8.3 and Appendix 2P of the *Lions Gate Secondary Wastewater Treatment Plant Project Definition Report, Volume 2, Appendix 2 – Project Background Technical Brief*.

http://www.metrovancouver.org/services/wastewater/engagement/LionsGate/ConsulationDocs/2014-03-31_LGSWWTP_Project_Definition_Report_Volume2A_Appendix_2.pdf

Although the heat will not be available until the LGSWWTP is operational at the end of 2020, design decisions concerning the Energy Centre are needed earlier, in 2015. For this reason, the Corporation is currently identifying interested potential parties to enter into further discussions regarding potential development of energy recovery infrastructure and purchase of heat recovered from effluent at the LGSWWTP.

The Corporation has set the goal of using liquid waste as a resource, including recovering energy from the heat in sewage, in the Integrated Liquid Waste and Resource Management Plan. While the *Greater Vancouver Sewerage and Drainage District Act* (the "GVS&DD Act") does not currently include the production and supply of energy as one of the Corporation's objects, the Corporation might seek an amendment to the GVS&DD Act to expressly include this object at some point in the future.

Scope

While up to 30 MW of energy is estimated to be available in the effluent, the amount of energy that can be extracted onsite at LGSWWTP is limited by space constraints within the proposed Energy Centre. This RFQ concerns only the 5 MW of energy expected to be available for extraction onsite at the LGSWWTP. The remainder of the energy, which is expected to be available in the effluent pipeline from the plant to the outfall at First Narrows, is not in the scope of this RFQ. The remaining energy in the effluent pipeline may be made available for offsite heat extraction in the future under a separate procurement process.

Two options are currently under consideration:

1. High-grade heat recovery

- Heat pump located inside the onsite Energy Centre at LGSWWTP with a high-temperature transmission loop to a tie-in point located a short distance from the LGSWWTP.
- The building housing the Energy Centre would be provided by the Corporation.
- The heat pump within the Energy Centre could be owned and/or operated by the Corporation or by the Respondent.

2. Low-grade heat recovery

- Heat exchanger located inside the onsite Energy Centre at LGSWWTP with a low-temperature transmission loop to an offsite heat pump located a short distance from the LGSWWTP.
- The boundary between the components to be owned by the Corporation and those to be owned by the Respondent is expected to be located at the property line of the LGSWWTP.
- The offsite heat pump, along with the associated land and building to house the heat pump, would be provided by the Respondent.

The conceptual design and capital cost basis in the *Lions Gate Secondary Wastewater Treatment Plant Project Definition Report, Volume 2, Appendix 2 – Project Background Technical Brief* are intended to serve as a guide only. The final technical and financial details of any arrangement resulting from this RFQ will be developed through collaboration and negotiation between the Corporation and the successful Respondent(s).

The final design will need to consider:

- For high-grade heat recovery, if the onsite heat pump is owned and operated by the Respondent, access to the Energy Centre will need to be arranged.
- For low-grade heat recovery, the Respondent will require land and building for the offsite heat pump.
- Location of tie-in point(s), transmission pipeline route and rights of way.

The final business case will need to consider:

- A sale price of heat (\$/GJ) that is mutually acceptable to the Corporation, the Respondent, and the Respondent's customers and/or regulators if applicable.
 - The capital cost of heat recovery infrastructure constructed and/or owned by the Corporation is intended to be recovered through the sale of heat.
 - The future market value of green energy depends on price trends for other energy sources.
 - Based on other recent district energy projects in the province, the Corporation intends to charge a small premium for green energy relative to the price of fossil fuels, to contribute to cost recovery.
- Ownership of assets and financing of construction.
 - Options include ownership and financing by local government, ownership by local government with financing by a private entity, public-private partnership, etc. The capital structure, finance requirements, tax implications and other considerations of each approach will need to be assessed.
 - Ability of Respondent to access financing will be considered.
 - Respondent experience with generation, purchase and sale of heat will be considered.
- Operation and maintenance (O&M) of components.
 - O&M may be performed by the Corporation, the Respondent, or a third party contractor.
 - O&M costs borne by the Corporation are intended to be recovered through the sale of heat.
- Ownership of environmental attributes associated with green energy.
 - Greenhouse gas reductions could be allocated fully to the Corporation, or to the Respondent, or split between them. It is expected that the allocation between the Corporation and the Respondent will be aligned with ownership and financing of the project.

Process

The Corporation will select Respondent(s) to enter into discussions leading to potential contract(s) for the development of energy recovery infrastructure and the purchase of effluent heat by following these steps:

1. Respondents submit written responses to this RFQ.
2. The Corporation will invite up to three (3) top-ranked Respondents to participate in further discussions to evaluate the feasibility of providing heat to the Respondent's facility or district energy system. (Timeline: Nov. 2014 – Feb. 2015)
3. If discussions indicate that a project is feasible, the Corporation will enter into contract negotiations with selected Respondent(s) for the development of energy recovery infrastructure and the purchase of effluent heat. (Timeline: Mar. – Dec. 2015)

If responses to Steps 1 and 2 are satisfactory, the Corporation will proceed with the intent to allocate space for an onsite Energy Centre during preliminary design of the LGSWWTP during 2015, in good faith that a contract will be negotiated and signed with the Successful Respondent. The contract is expected to be signed in late 2015 pending approvals from the Corporation's Board and from local government(s) if applicable.

PART 3 FORMAT OF RESPONSE

A clear and concise presentation of information is encouraged. No assumption should be made that any information regarding a Respondent is known to the Corporation except as provided in Response to this RFQ. Responses to this RFQ should be no longer than eight (8) pages and should include the following:

1. Title Page – showing RFQ number, Respondent's name, address, telephone number, fax number, email address and contact person
2. Letter of Introduction – One page introducing the Respondent and signed by the person(s) authorized to sign on behalf of the Respondent
3. Table of Contents, including page numbers
4. Company Description
 - a. Describe the Respondent's corporate history and ownership structure, including partner companies and subsidiary relationships. If the Respondent is a joint venture, consortium, or association, clearly describe how it is organized including the expected role of each member in the context of the proposed opportunity.

- b. List number of employees in company, number and locations of offices, and the number of employees in the office who will support this project.
 - c. Describe existing district energy system(s), or other facilities that use low-grade heat, owned or operated by the Respondent. For each system provide location, capacity (MW), length of transmission piping, number of energy transfer stations, approximate number of customers and years of operation. For each system list the proponents involved in constructing, owning, operating and maintaining the system.
 - d. If available, provide audited financial statements in an appendix.
5. Technical Information
- a. List of heat loads expected to be served by the effluent heat. List all loads that could potentially be served even if the total load exceeds 5 MW. For each load, provide location, base load (MW), peak load (MW), type of use (e.g. residential/commercial), and approximate floor space area and/or number of residential units. For loads to be served by a district energy system (DES), specify whether each load consists of existing buildings already connected to an existing DES, existing buildings planning to connect to the DES in the future, or proposed buildings (under construction or not yet constructed) planning to connect to the DES in the future. For loads that are stand-alone facilities that will not connect to a DES, specify whether the load is already constructed or under construction. Provide anticipated date of connection for all new loads. Provide supply temperature and return temperature of district energy system or stand-alone facility that will be served by the effluent heat.
 - b. Statement of whether Respondent is more likely to select Option 1 (high-grade heat) or Option 2 (low-grade heat). If Option 2, state whether the Respondent already holds land or can procure a site for the offsite heat pumps, and its proposed location.
6. Any other items of particular relevance to the project.

Response Submission

If submitting your Response by post or courier, please return three (3) copies of your Response, including one unbound clearly-marked original, in a sealed package bearing the name of the firm responding, to the following specific physical location by **04:30pm on the 7th day of November, 2014:**

Purchasing & Mail Reception,
Metro Vancouver,
5th Floor, 4330 Kingsway,
Burnaby, BC V5H 4G8

Email responses will be accepted at the following email address:

gary.mui@metrovancover.org

The Corporation reserves the right to accept, but is under no obligation to accept, late Responses.

Information to Respondents

The Corporation's evaluation of the Responses and assessment of the qualifications shall be final.

The Corporation reserves the right to advance to the next phase of the process a Respondent that was not previously short-listed in the event that a short-listed Respondent notifies the Corporation they no longer intend to participate in the process.

By submitting a Response to this RFQ, each Respondent agrees to be solely responsible for any and all costs and expenses incurred by it in preparing the Response, including any costs incurred by the Respondent after the Response Closing.

Explanations, interpretations, or clarifications may be made in the form of Addenda. Addenda may be issued by the Corporation during the Response period and will be posted on the Metro Vancouver website.

All Addenda issued by the Corporation shall be incorporated into and become part of this RFQ. Addenda will be issued by the Corporation to all qualified persons of record receiving this RFQ.

PART 4 EVALUATION OF RESPONSES

The Corporation will evaluate the Responses received and will select up to three (3) Respondents who are deemed qualified at the sole discretion of the Corporation to participate in the next phase of the process.

Selection for advancement to the next stage does not constitute the formation of a contract between the Corporation and the Respondent.

With respect to this evaluation process, the Corporation, in its sole discretion, shall have the unfettered right to:

- accept any Response;
- reject any Response;
- reject all Responses;
- reject a Response even if it is the only one received.

The Corporation reserves the right to request additional information and/or seek clarification from any Respondent, but shall not be obligated under any circumstance to do so and may request this of one Respondent without any obligation to request the same of any other Respondent.

All Responses received will be evaluated based on:

Respondent's Experience (30 points)

- Respondent's corporate qualifications, relevant experience and financial stability. The Corporation reserves the right to obtain their own references and to take these references into consideration in the evaluation of Responses.
- Where the Respondent is a joint venture or consortium, the Corporation will take into account in its evaluation of Responses the qualifications, experience and references of each constituent member of the joint venture or consortium. Joint ventures and consortia comprised of key entities that have successfully worked together in the recent past may be regarded as more favourable than those of otherwise equal credentials that have had no previous experience working with one another,
- Whereas previous experience with the Corporation is not required and does not in any way confer an advantage, the Corporation's previous experience with the Respondent may also be taken into consideration in its evaluation of Responses. The Corporation reserves the right to rely upon its records, references and recollection in this regard. The Corporation may also obtain references other than those provided by the Respondent and may use these references in determining eligibility.
- With the exception of references as described above, Responses will be evaluated solely on information contained therein. As such, Respondents should ensure that any information they wish to be evaluated in the context of this RFQ should be clearly expressed in their submission.

Respondent's Technical Experience (30 points)

- Respondent's experience in constructing, owning, operating and maintaining district energy systems or other facilities that use and/or transfer heat.

Proposed Heat Load Suitability (40 points)

- Timing, magnitude, compatibility and certainty of heat loads planning to be served by effluent heat.

It is the Corporation's intent to evaluate Responses as promptly as possible. Metro Vancouver staff may contact a Respondent if a clarification is required; otherwise, they are unable to provide any details concerning the evaluation until after the process has concluded.

The Corporation will endeavour to post the list of Respondents on the Metro Vancouver website by 10:00 a.m. the business day following the Response Closing. Only the Respondents' names will be disclosed. All inquiries regarding the Responses will be referred to that site. Only the short-listed Respondents will be contacted at the conclusion of the process. Unsuccessful Respondents wishing to be debriefed are encouraged to contact the Buyer of record within 30 days of the website posting. As only the successful Respondents will be contacted at the conclusion of this RFQ, the Corporation wishes to thank all Respondents for their effort in responding to this bidding opportunity.

PART 5 ENQUIRIES

Any requests for explanations, interpretations or clarifications made by Respondents should be submitted in writing to the Corporation prior to the Response Closing. Any request for clarification or issues related to the RFQ must be transmitted to the Buyer of record identified below.

All queries shall be made in writing to the Corporation's Buyer of record as follows:

Gary Mui, SCMP, CRM
Metro Vancouver
Purchasing Department
5th floor, 4330 Kingsway
Burnaby, BC V5H 4G8
Telephone: 778-452-2660
Fax: 604-432-6295
Email: gary.mui@metrovancover.org

Please Note: The Buyer named above (or designate) is the only valid contact for enquiries. No explanation, interpretation or clarification of the RFQ by any other person whatsoever shall bind the Corporation in the interpretation of the RFQ.

PART 6 CONFLICT OF INTEREST

The Respondent declares that it has no pecuniary interest in the business of any third party that would cause a conflict of interest or be seen to cause a conflict of interest in carrying out the intent of this RFQ. Should such an interest be acquired during the term of any agreement resulting from this RFQ, the Respondent shall declare it immediately in writing to the Corporation. If the Respondent does declare a conflict of interest the Corporation may direct the Respondent to resolve the conflict of interest to the Corporation's satisfaction.

Responses will not be evaluated if the Respondent's current or past corporate or other interests may, in the Corporation's opinion, give rise to a conflict of interest in connection with this RFQ.

PART 7 SOLICITATION

The Respondent may not make any representations or solicitations to any director, officer or employee of the Corporation with respect to the RFQ either before or after submission of the Response except as provided herein. If any director, officer, employee, agent sub-contractor, supplier or other representative of the Respondent communicates with any director, officer or employee of the Corporation or any consultant engaged by the Corporation in connection with this RFQ about this RFQ, other than the person named under Part 5 –Enquiries, the Corporation shall have the unfettered right, regardless of the nature of the communication, to reject the Response submitted by the Respondent.

PART 8 CONFIDENTIALITY AND SECURITY

It is the Corporation's policy to maintain confidentiality with respect to all confidential information related to the Response, but the Corporation is subject to the *Freedom of Information and Protection of Privacy Act*. If the Respondent considers that any of its information is confidential, the Respondent shall identify that confidential information and advise the Corporation in its Response.

END OF SECTION.

THERMAL ENERGY SALE AND PURCHASE AGREEMENT

THIS AGREEMENT dated October 5, 2017 (the **"Effective Date"**)

BETWEEN:

GREATER VANCOUVER SEWERAGE AND DRAINAGE DISTRICT
4330 Kingsway
Burnaby, BC V5H 4G8

("GVS&DD")

AND:

LONSDALE ENERGY CORPORATION
141 West 14th Street
North Vancouver, BC V7M 1H9

("LEC")

WHEREAS:

- A. GVS&DD entered into an agreement dated April 5, 2017 (the **"Project Contract"**) with a contractor (**"Contractor"**) to design, construct and partially finance a new secondary wastewater treatment plant in the District of North Vancouver (the **"WWTP"**) on lands legally described as follows:

PID: 029-931-568
LOT 1 DISTRICT LOT 266 GROUP 1 NEW WESTMINSTER DISTRICT PLAN EPP65186

(the **"Project Site"**);

- B. GVS&DD intends to have the Contractor design and build infrastructure within the WWTP that GVS&DD may use to extract and upgrade heat from treated sewerage effluent for transfer to a third party energy utility through a piped, hot water distribution system;
- C. The proposed WWTP effluent heat recovery is:
- (a) consistent with GVS&DD's Integrated Liquid Waste and Resource Management Plan;
 - (b) consistent with the goals of developing and demonstrating the WWTP as a socially, ecologically and economically sustainable project and implementing integrated resource recovery strategies; and
 - (c) an important potential source of regional greenhouse gas reductions;

- D. The City of North Vancouver wholly owns LEC, which in turn owns and operates a district energy system through which LEC distributes energy to residential, institutional and commercial buildings in the City of North Vancouver;
- E. GVS&DD wishes to supply and sell thermal energy from the WWTP to LEC and LEC wishes to accept and purchase such thermal energy from GVS&DD on the terms and conditions set out in this Agreement; and
- F. GVS&DD and LEC wish to share greenhouse gas reductions and benefits that are achieved by supplying and selling thermal energy from the WWTP to LEC in proportion to their respective capital investments.

NOW THEREFORE the Parties agree as follows:

1. INTERPRETATION

1.1 Definitions

In this Agreement:

"Acceptance" is the date on which GVS&DD advises LEC that Acceptance has been achieved pursuant to Schedule 2, Section 10.13 of the Project Contract;

"Agreement" means this agreement, including any recitals and schedules, as it may from time to time be supplemented, amended or restated;

"Baseload Mode" means the operating mode for the GVS&DD Infrastructure during which heat is supplied at a constant heating capacity between 2MWt and 5MWt;

"BCUC" means the British Columbia Utilities Commission or a successor Governmental Authority;

"BCUC Application" means an application to the BCUC by or on behalf of the GVS&DD for the Public Utility Exemption;

"Business Day" means any day except Saturday, Sunday, statutory holiday in the Province of British Columbia or any other day on which banks are generally not open for business in Vancouver, British Columbia;

"Commissioning" means the commissioning activities and requirements necessary to ensure that the GVS&DD Infrastructure operates as necessary to comply with GVS&DD's obligations under this Agreement;

“complete”, in reference to Infrastructure, means that the construction of Infrastructure is substantially finished and the Infrastructure is ready to be operated for its intended purposes, but, with respect to the GVS&DD Infrastructure, has not yet been Commissioned;

“Contaminants” means collectively, any contaminant, toxic substances, dangerous goods, or pollutant or any other substance which when released to the natural environment is likely to cause, at some immediate or future time, material harm or degradation to the natural environment or material risk to human health, and includes any radioactive materials, asbestos materials, urea formaldehyde, underground or aboveground tanks, pollutants, contaminants, deleterious substances, dangerous substances or goods, hazardous, corrosive or toxic substances, hazardous waste or waste of any kind, pesticides, defoliant, or any other solid, liquid, gas, vapour, odour or any other substance the storage, manufacture, disposal, handling, treatment, generation, use, transport, remediation or release into the environment of which is now or hereafter prohibited, controlled or regulated by Environmental Law;

“Contaminated Site” has the meaning given to it in the *Environmental Management Act* (British Columbia);

“Environment” means the air (including all layers of the atmosphere), land (including soil, sediment deposited on land, fill, lands submerged under water, buildings, and improvements), water (including oceans, lakes, rivers, streams, groundwater, and surface water), and all other external conditions and influences under which humans, animals, and plants live or are developed and **“Environmental”** will have a corresponding meaning;

“Environmental Attributes” includes:

- (a) all attributes directly associated with, or that may be derived from, Thermal Energy that decrease environmental impacts relative to other energy facilities or technologies including any existing or future credit, allowance, “green” tag, ticket, certificate or other “green” marketing attribute or proprietary or contractual right, whether or not tradeable;
- (b) any credit, reduction right, offset, allowance, allocated pollution right, certificate or unit of any kind whatsoever, whether or not tradeable and any other regulatory, proprietary or contractual right, whether or not tradeable, resulting from, or otherwise related to the actual or assumed reduction, displacement or offset of emissions; and
- (c) any credit, reduction right, off-set, allowance, allocated pollution right, certificate or other unit of any kind whatsoever whether or not tradeable resulting from or otherwise related to the reduction, removal, or sequestration of emissions;

“Environmental Laws” means all applicable statutes, laws, regulations, orders, bylaws, standards, guidelines, protocols, permits, and other lawful requirements of any Governmental Authority relating to the Environment or its protection, environmental

assessment, health, occupational health and safety, protection of any form of plant or animal life, or transportation of dangerous goods, including the principles of common law and equity;

"First Delivery Date" means the first Business Day occurring after GVS&DD advises LEC that Acceptance is achieved under the Project Contract;

"Force Majeure" means any event or occurrence not within the control of the Party claiming it, and which by the exercise of reasonable diligence such Party is unable to prevent or overcome, including: (a) any acts of nature such as lightning, earthquakes, storms, washouts, landslides, avalanches, epidemics and floods, strikes, lockouts or other industrial disturbances, acts of the Queen's or public enemies, sabotage, wars, blockades, insurrections, riots or civil disturbances, fires, explosions, breakages of or accidents to machinery or lines of pipe; and (b) any delay due to actions or omissions of a Governmental Authority other than the Party claiming Force Majeure. For the purposes of this definition, a Party is deemed to have control over the actions or omissions of those Persons to which it, its agents, contractors or employees, have delegated, assigned or subcontracted its obligations and responsibilities;

"Governmental Authority" means any federal, provincial, regional, municipal, local or other government, governmental or public department, authority, court, tribunal, arbitral body, commission, council, board, bureau or agency;

"Greenhouse Gas" has the meaning set out in the *Greenhouse Gas Reduction Targets Act* (British Columbia);

"GVS&DD Infrastructure" means the GVS&DD works within, and forming part of, the WWTP that are necessary to generate Thermal Energy at the WWTP and to deliver Thermal Energy from the WWTP to the LEC DES, including heat pumps, distribution pumps, pipes, plant, the Tie-In, control system, communication infrastructure, thermal energy meter and all ancillary equipment and infrastructure;

"GVS&DD Infrastructure Specifications" means the standards, specifications, procedures, design criteria, design guidelines and other requirements applicable to all design, construction and installation activities agreed upon between GVS&DD and the Contractor in the Project Contract;

"Handover Date" means the date on which GVS&DD advises LEC that handover requirements are met in accordance with Appendix 5D of the Project Contract;

"hydraulically interconnected" refers to situations where water from one system flows into another system, or mixes with water from another system;

"industry standards" refer to industry standards acceptable in British Columbia for similar projects, or such other industry standards as the Parties may agree to in writing in advance;

"Infrastructure" means in the case of the GVS&DD, the GVS&DD Infrastructure, and in the case of the LEC, the LEC Infrastructure, or both, as the context demands;

"Initial Term" means period beginning on the Effective Date and expiring on first of the month following the twentieth (20th) anniversary of the First Delivery Date;

"Laws" means any law, statute, regulation, bylaw, Permit, order or lawful requirement of or issued by or under the direction or authority of any Governmental Authority having jurisdiction over the subject matter of this Agreement, the Parties, or the Project Lands;

"LEC DES" means the LEC owned and operated district energy system through which the LEC distributes energy to residential, institutional and commercial buildings in the City of North Vancouver, of which the LEC Infrastructure forms part;

"LEC Infrastructure" means the LEC works forming part of the LEC DES, that are necessary to accept Thermal Energy from the WWTP (at the Tie-In) and to deliver Thermal Energy to the LEC DES, including pipes, control system, communication infrastructure, and all ancillary equipment and infrastructure;

"LEC Infrastructure Specifications" means the standards, specifications, procedures, design criteria, design guidelines and other requirements applicable to all design, construction and installation activities required to complete the LEC Infrastructure, materially as set out in Schedule "B";

"Load Profile" means the following distribution of Thermal Energy per calendar month:

January	2,725,000 kWh
February	2,465,000 kWh
March	2,725,000 kWh
April	2,640,000 kWh
May	1,505,000 kWh
June	710,000 kWh
July	530,000 kWh
August	520,000 kWh
September	870,000 kWh
October	2,445,000 kWh
November	2,640,000 kWh
December	2,725,000 kWh

"Party" means either GVS&DD or LEC, as the context may require, and **"Parties"** means both of them;

"Peaking Mode" means the operating mode for the GVS&DD Infrastructure during which heat supply will vary relative to a differential pressure setpoint signalled from the LEC Infrastructure;

"Permits" means all permissions, consents, permits, rights of way, licences, certificates, approvals, authorizations, consents and the like required from any Governmental Authority, and all necessary consents and agreements from third parties;

"Person" means an individual or his or her legal personal representative, an unincorporated organization or association, or a corporation, partnership, trust, trustee, syndicate, joint venture, limited liability company, union, Governmental Authority or other entity or organization;

"Price Schedule" means Schedule "D";

"Project" means the design, construction and partial financing of the WWTP (including the GVS&DD Infrastructure) under the Project Contract;

"Project Warranty Period" means the period beginning on the date of Acceptance and continuing for two years following the date of Acceptance, subject to extension under the Project Contract;

"Property Line" means the northern lot line of the Project Site adjacent to West 1st Street;

"Public Utility Exemption" means an order from the BCUC pursuant to section 88(3) of the *Utilities Commission Act* exempting GVS&DD from regulation as a "public utility", as that term is defined in the *Utilities Commission Act*, in relation to the supply and sale of Thermal Energy pursuant to this Agreement;

"Renewal Term" means a period of the lesser of:

- (a) five (5) years; and
- (b) the Parties' reasonable estimate of the remaining asset life of the GVS&DD Infrastructure;

"SE" means secondary effluent produced and treated at the WWTP;

"setpoint" means the target amount of a parameter used to control heat delivery;

"signal" means a communication signal that LEC sends to GVS&DD through communication networks forming part of the LEC Infrastructure and GVS&DD Infrastructure;

"Term" means, collectively, the Initial Term and all Renewal Terms;

"Thermal Energy" means energy generated by extracting and upgrading heat from treated sewerage effluent;

"Thermal Energy Specifications" means the specifications set out in Schedule "C"; and

“Thermal Year” means twelve-month periods of time measured beginning on the first day of the first month after the First Delivery Date and ending on the day before the anniversary of the First Delivery Date, or such shorter period if the Agreement terminates before an anniversary of the First Delivery Date;

“Tie-In” means the tie-in, forming part of the GVS&DD Infrastructure, at which the LEC Infrastructure connects with the GVS&DD Infrastructure; and

“Water Quality Specifications” means the water quality requirements as may be specified by the GVS&DD, acting reasonably, on or before July 1, 2019 based on advice from the Contractor in coordination with LEC.

1.2 Schedules

The following are the Schedules to this Agreement:

Schedule “A”	[Internationally Deleted]
Schedule “B”	LEC Infrastructure Specifications
Schedule “C”	Thermal Energy Specifications
Schedule “D”	Price Schedule

1.3 Interpretation

Unless otherwise expressly provided, in this Agreement:

- (a) headings are for convenience only, do not form a part of this Agreement and are not intended to interpret, define or limit the scope, extent or intent of this Agreement or any provision hereof;
- (b) all grammatical variations of a defined term have corresponding meaning to the defined term;
- (c) the singular of any term includes the plural, and vice versa; the use of any term is equally applicable to any gender and, where applicable, a body corporate;
- (d) the word “including” is not limiting whether or not non-limiting language (such as “without limitation” or “but not limited to” or words of similar import) is used with reference thereto;
- (e) common engineering terms, such as “pressure transients” and “water hammer” are not defined and will be interpreted in accordance with industry practices generally acceptable in British Columbia;
- (f) except if expressly stated otherwise, all references in this Agreement to the Project Contract, or sections of the Project Contract mean the Project Contract in place as of

the date of this Agreement. GVS&DD warrants and represents to LEC that GVS&DD has provided to LEC relevant portions of the Project Contract. GVS&DD agrees that LEC is entering into this Agreement in reliance on this representation. At the request of LEC, GVS&DD will provide to LEC such additional portions of the Project Contract as LEC may determine to be relevant to this Agreement; and

- (g) nothing in this Agreement will be interpreted as imposing an obligation on LEC to review, assess or enforce any aspect of the Project Contract.

1.4 Statutory References

Unless otherwise specified, each reference to a statute is deemed to be a reference to that statute, and to the regulations made under that statute, as amended, re-enacted or replaced from time to time.

2. ROLES AND RESPONSIBILITIES

2.1 Supply and Sale of Thermal Energy

- (a) Subject to the terms and conditions set out in this Agreement, GVS&DD will sell to LEC Thermal Energy that meets the Thermal Energy Specifications, and LEC will purchase such Thermal Energy from GVS&DD during the Term.

2.2 GVS&DD Design, Engineering and Construction of Infrastructure

- (a) GVS&DD will:
 - (i) at its own cost, engineer, design, construct, install, and, subject to section 2.6, Commission the GVS&DD Infrastructure; and
 - (ii) operate and maintain the GVS&DD Infrastructure,

all in a good and workmanlike manner, consistent with industry standards, in compliance with all applicable Laws and as necessary to satisfy GVS&DD's obligations under this Agreement.
- (b) GVS&DD will, at its cost:
 - (i) make best efforts to complete the GVS&DD Infrastructure so that the LEC Infrastructure may be connected to the GVS&DD Infrastructure by June 29, 2020 and will notify LEC in writing when the GVS&DD Infrastructure is complete;
 - (ii) after the connection is complete to the satisfaction of the Parties, supply Thermal Energy to LEC, in accordance with the Thermal Energy Specifications; and

- (iii) enforce all warranties, and exercise all rights to correct defects, secured in respect of the GVS&DD Infrastructure under the Project Contract to the extent that failure to enforce such warranties or correct such defects may increase the cost of operation and maintenance of the GVS&DD Infrastructure borne by LEC under this Agreement.
- (c) GVS&DD will own the GVS&DD Infrastructure.
- (d) After receiving the following design submissions for the GVS&DD Infrastructure from the Contractor:
 - (i) the preliminary design (30%) phase;
 - (ii) the detailed design (60%) phase; and
 - (iii) the detailed design (90%) phase,

GVS&DD will deliver a complete set of the received design submittals for the GVS&DD Infrastructure to LEC and invite LEC to review each submittal. LEC may, at its discretion, review each submittal for compliance with the GVS&DD Infrastructure Specifications. If LEC undertakes to review the submittal for compliance with the GVS&DD Specifications, then LEC will endeavor to complete the review promptly and provide GVS&DD with any comments. The Project Contract requires GVS&DD to review and provide a response to the Contractor within 15 Business Days of the date the GVS&DD receives a design submittal from the Contractor following which the design submittal will be deemed to have been reviewed and the Contractor may proceed to implement the design and construction on the basis set forth in the submittal. The review of the design submissions by LEC will not limit GVS&DD's responsibility to construct and deliver the GVS&DD Infrastructure as necessary to satisfy GVS&DD's obligations under this Agreement.

- (e) LEC may request changes to the GVS&DD Infrastructure design and GVS&DD will review the change request and, subject to sub-section 2.2(f), forward the change request to the Contractor for consideration.
- (f) GVS&DD may reject any change request that may cause material delay in WWTP design and construction schedule, including any change that may delay the date Acceptance is achieved, provided that if LEC has identified the change request as essential for LEC to be able to comply with this Agreement, then the Parties will promptly discuss the change request and decide on an acceptable course of action.
- (g) For change requests that will not cause material delay in schedule, GVS&DD will provide LEC with a cost estimate for the Contractor to undertake the change and a deadline for LEC to agree to bear the costs of the change based on such estimate.

The cost estimate will comprise incremental costs for changes to the GVS&DD Infrastructure and to any components of the WWTP that are not part of the GVS&DD Infrastructure that are affected by the change request.

- (h) LEC will advise GVS&DD in writing whether the Contractor should proceed with the change request. If the change request proceeds, then GVS&DD will invoice LEC for the change request after the Contractor's final costs for the change are determined and LEC will pay within thirty (30) days of receiving the invoice. At the request of the LEC, GVS&DD will promptly provide to LEC all records and information in GVS&DD's possession that the LEC may reasonably need to evaluate the cost estimate, the final invoice or any aspect of this section 2.2(e) through (h).

2.3 LEC Design, Engineering and Construction of Infrastructure

- (a) GVS&DD will provide LEC with detailed design information for the distribution piping system (including conduits) that is part of the GVS&DD Infrastructure, no later than July 1, 2018.
- (b) LEC will, at its own cost and expense, engineer, design, construct, install, operate and maintain the LEC Infrastructure in a good and workmanlike manner, consistent with industry standards and in compliance with the LEC Infrastructure Specifications and all applicable Laws.
- (c) LEC will, at its cost:
 - (i) make best efforts to complete the LEC Infrastructure so that it is ready to be connected to the GVS&DD Infrastructure by May 29, 2020 and will notify GVS&DD in writing when the LEC Infrastructure is complete; and
 - (ii) after the connection is complete to the satisfaction of the Parties, signal demand for Thermal Energy, and accept Thermal Energy, all in accordance with the Thermal Energy Specifications.
- (d) LEC will own the LEC Infrastructure.

2.4 LEC Permits

- (a) LEC will work diligently to obtain and maintain at its own cost all Permits necessary for the ownership, installation, maintenance and operation of the LEC Infrastructure.
- (b) GVS&DD will provide reasonable support for LEC to obtain and maintain all such Permits, as requested by LEC.

2.5 GVS&DD Permits and Public Utility Exemption

- (a) GVS&DD will, at its own cost, prepare and submit the BCUC Application and LEC will provide reasonable support for the BCUC Application, as requested by GVS&DD, provided such application is consistent with this Agreement.
- (b) GVS&DD will, at its cost, work diligently to obtain and maintain all Permits necessary for the ownership, installation, maintenance and operation of the GVS&DD Infrastructure.
- (c) LEC will provide reasonable support for GVS&DD to obtain all such Permits, as requested by GVS&DD.

2.6 Commissioning and Cooperation

- (a) GVS&DD will advise LEC as soon as possible when the Acceptance and the Handover Date are achieved under the Project Contract and will enforce all provisions of the Project Contract as reasonably necessary to give effect to this Agreement.
- (b) To facilitate the connectivity between the GVS&DD Infrastructure and the LEC Infrastructure, maximize the production and transfer of Thermal Energy and maintain and avoid damage to the GVS&DD Infrastructure and the LEC Infrastructure, LEC and GVS&DD will:
 - (i) cooperate on the design, permitting, construction and connection between the LEC Infrastructure and GVS&DD Infrastructure, including any upgrades and modifications to such Infrastructure; provided that despite the exchange or review of, or comment on, any design drawings by the other Party, each Party will be solely responsible for the design and construction of their respective Infrastructure;
 - (ii) share relevant operating data and work together to optimize operation and prevent damage to the Infrastructure; and
 - (iii) notify each other in advance of any proposed operational changes, system modifications or upgrades to any portions of:
 - (A) their respective Infrastructures;
 - (B) the WWTP; or
 - (C) the LEC DESthat are hydraulically interconnected to ensure that such operational changes, system modifications or upgrades do not negatively impact either Party's works.

- (c) If LEC completes the LEC Infrastructure before the GVS&DD has completed the GVS&DD Infrastructure, then:
 - (i) GVS&DD will connect the LEC Infrastructure to the GVS&DD Infrastructure, at the Tie-In; and
 - (ii) LEC will signal demand for Thermal Energy, using varying temperature and flow rates in consultation with Contractor, so that the Contractor may complete the Commissioning.

- (d) If GVS&DD completes the GVS&DD Infrastructure before LEC has completed the LEC Infrastructure, then within 50 days of being notified under section 2.2(b)(i), LEC will:
 - (i) connect the LEC Infrastructure to the GVS&DD Infrastructure, at the Tie-In; and
 - (ii) signal demand for Thermal Energy, using varying temperature and flow rates in consultation with the Contractor, so that the Contractor may complete the Commissioning.

- (e) If LEC does not complete the LEC Infrastructure by May 29, 2020, then GVS&DD may instruct the Contractor to complete the Commissioning using temporary facilities, as necessary to allow the Contractor to demonstrate that the GVS&DD Infrastructure meets the GVS&DD Infrastructure Specification.

- (f) If, as a result of any action or omission by LEC, the Contractor is required to return to the Project Site after the Handover Date in order to connect the LEC Infrastructure to the GVS&DD Infrastructure or perform any deferred Commissioning, and if pursuant to the Project Contract the GVS&DD has to compensate the Contractor as a result, then LEC will indemnify the GVS&DD for such compensation and any other reasonably associated costs.

- (g) LEC acknowledges that if the connection between the LEC Infrastructure and the GVS&DD Infrastructure is not completed before the end of the Project Warranty Period, then the Contractor will be relieved of the obligation to perform the Commissioning. If, as a result of any action or omission by LEC, the Contractor is relieved of their obligation to perform Commissioning (in accordance with the Project Contract), then LEC will indemnify the GVS&DD for the reasonable costs of retaining another contractor for undertaking the Commissioning.

- (h) GVS&DD acknowledges that Commissioning may be impacted by LEC's seasonal, daily and hourly network capacity requirements.

- (i) If GVS&DD intends to amend the Project Contract in a manner that materially impacts the Parties' rights and obligations under this Agreement, or in a manner

that impacts the design or the Commissioning of the GVS&DD Infrastructure, then before entering into such amendment, GVS&DD will provide LEC with reasonable written notice and will consult with LEC on the impacts of the amendment.

- (j) If an amendment of the Project Contract frustrates this Agreement, materially impacts LEC's obligations, rights or liability under this Agreement, materially increases the cost of LEC to comply with this Agreement, or materially delays the First Delivery Date, then GVS&DD will not execute the amendment to the Project Contract until GVS&DD has addressed LEC's concerns to the reasonable satisfaction of LEC. In the event of an amendment contrary to this section 2.6(i), if there is any inconsistency between the Project Contract and this Agreement, this Agreement will govern the relationship between LEC and GVS&DD.
- (k) At the request of GVS&DD, LEC will allow GVS&DD to review and request reasonable changes to LEC's control sequences reasonably necessary to ensure that GVS&DD can fulfill the Thermal Energy Specifications.
- (l) At the request of LEC, GVS&DD will provide to LEC all information reasonably necessary to determine BC Hydro's billing periods.
- (m) Neither Party will take any action or omit to take any action that will, or could reasonably be expected to, have an adverse effect on the other Party's Infrastructure.

2.7 Operation and Maintenance

- (a) LEC will pay for the cost of operation and maintenance in accordance with the Price Schedule.
- (b) Subject to section 2.7(c), GVS&DD may procure various goods and services for operation and maintenance of all or some of the GVS&DD Infrastructure. Without being exhaustive, GVS&DD may procure goods and services for:
 - (i) maintenance;
 - (ii) operations; and
 - (iii) purchase of equipment, parts, chemicals and incidentals.
- (c) GVS&DD will consult with LEC before finalizing the procurement of goods and services for operation and maintenance. LEC may request that all or some maintenance activities, including the replacement and upgrade of equipment, be performed by equipment suppliers or specialized contractors. LEC may also specify contractors of its choice. If LEC makes such a request, GVS&DD will make best efforts to accommodate LEC's request, subject to GVS&DD procurement policies and practices.

- (d) GVS&DD may use GVS&DD staff to operate and maintain all or some of the GVS&DD Infrastructure.
- (e) GVS&DD has the discretion to decide whether to monitor the GVS&DD Infrastructure outside regular hours of the WWTP operation.
- (f) GVS&DD will make best efforts to schedule planned maintenance in order to minimize interruptions in Thermal Energy supply in relation to duration and seasonal demand.
- (g) GVS&DD will make best efforts to:
 - (i) manage pressure transients and prevent water hammer in the GVS&DD Infrastructure; and
 - (ii) prevent debris from being introduced into the LEC Infrastructure.

2.8 Thermal Energy Volume, Demand and Delivery

- (a) GVS&DD warrants and represents that the GVS&DD Infrastructure is designed to produce and supply hot water to the LEC Infrastructure with temperature and flow varying depending on Thermal Energy demands of the LEC DES as set out in the Thermal Energy Specifications; and
- (b) LEC warrants and represents that the LEC Infrastructure is designed to identify and communicate LEC's Thermal Energy requirements to the GVS&DD Infrastructure and to control and vary the flow of water from the LEC Infrastructure to the GVS&DD Infrastructure in accordance with the Thermal Energy Specifications;
- (c) GVS&DD will ensure that GVS&DD Infrastructure thermal energy meter will measure the quantity of Thermal Energy that is delivered from the GVS&DD Infrastructure to the LEC Infrastructure and GVS&DD will make such information available to LEC promptly upon written request.
- (d) GVS&DD will periodically test the GVS&DD Infrastructure thermal energy meter and will make the results of such testing available to LEC upon written request. If GVS&DD identifies any defect in a thermal energy meter, GVS&DD will promptly replace the meter and will promptly advise LEC in writing of the defect and the replacement.
- (e) LEC may request that GVS&DD carry out a test of the thermal energy meter from time to time. Promptly upon such request, GVS&DD will carry out the test and advise LEC of the results of such test, in writing. If the meter is found to be accurate, LEC will compensate GVS&DD for the test. If the meter is found to be defective, then GVS&DD will pay for the test and will promptly replace the meter at its own cost.

The Parties will work together to determine whether the defective meter resulted in inaccurate measurements of Thermal Energy that necessitate an adjustment to any issued or paid invoices from GVS&DD to LEC.

2.9 Water Quality, Pressure, Testing and Reporting

- (a) LEC owns and is responsible for the quality of the water that flows into the GVS&DD Infrastructure from the LEC Infrastructure and that carries the Thermal Energy to the LEC DES.
- (b) LEC will make best efforts to:
 - (i) manage pressure transients and prevent water hammer in the LEC Infrastructure;
 - (ii) manage volumetric expansion and static pressure control of the LEC Infrastructure and the LEC DES;
 - (iii) manage differential pressure in the LEC DES so that differential pressure does not exceed 600kPa at the Tie-In;
 - (iv) be responsible for pumping within the LEC DES and coordinate such pumping with the GVS&DD Infrastructure distribution pumps;
 - (v) manage the quality of water flowing into the GVS&DD Infrastructure so that it meets or exceeds the Water Quality Specifications;
 - (vi) prevent debris from being introduced into the GVS&DD Infrastructure;
 - (vii) prepare and provide GVS&DD with a water treatment plan by October 1, 2019 that sets out how LEC will maintain the quality of the water so that it meets or exceeds the Water Quality Specifications ("**Water Treatment Plan**");
 - (viii) implement the Water Treatment Plan before March 1, 2020 so that the water quality meets or exceeds the Water Quality Specifications before connecting the LEC Infrastructure to the GVS&DD Infrastructure; and
 - (ix) have an independent third party test the water that flows from the LEC Infrastructure to the GVS&DD Infrastructure on a monthly basis for all parameters in the Water Quality Specifications and provide GVS&DD with the results of such tests within 15 days of the results becoming available to LEC.

2.10 GVS&DD acknowledges that LEC has submitted to GVS&DD current water testing results ("**Baseline Water Testing Results**"). If the Water Quality Specifications are more stringent than the Baseline Water Testing Results, then:

- (a) LEC will determine the capital and annual operating costs to implement the Water Treatment Plan and provide the cost estimate to GVSⅅ
- (b) Subject to GVS&DD advising LEC in writing whether to implement the Water Treatment Plan, GVS&DD will reimburse LEC for:
 - (i) eighty per cent of capital costs in excess of \$20,000 incurred by LEC before March 1, 2020 to implement the Water Treatment Plan. LEC will invoice GVS&DD after LEC has paid the final capital costs for implementing the Water Treatment Plan and GVS&DD will pay LEC within thirty (30) days of receiving such invoice; and
 - (ii) incremental increase in annual operating costs to implement the Water Treatment Plan determined on an annual basis and paid in accordance with the Price Schedule.
- (c) At the request of GVS&DD, LEC will promptly provide to GVS&DD all records and information in LEC's possession that the GVS&DD may reasonably need to evaluate the capital costs to implement the Water Treatment Plan, including final invoices.
- (d) The actual operating costs for implementing the Water Treatment Plan will be determined by LEC on an annual basis. At the request of GVS&DD, LEC will promptly provide to GVS&DD all records and information in LEC's possession that the GVS&DD may reasonably need to evaluate the operating costs, including final invoices.

2.11 Suspension

- (a) If the water from the LEC Infrastructure does not meet the Water Quality Specifications, then GVS&DD may suspend providing Thermal Energy to LEC, on not less than five (5) Business Days written notice, until LEC satisfies GVS&DD, acting reasonably, that it has remedied the matter so that the water meets the Water Quality Specifications.
- (b) During suspension, LEC will make payments in accordance with the Price Schedule, provided that LEC will not pay for any quantity of Thermal Energy that LEC has not received.
- (c) Upon LEC remedying the water quality to meet the Water Quality Specifications, GVS&DD will promptly resume the supply of Thermal Energy.

2.12 Good Practices

- (a) The Parties will follow good construction, operation and maintenance practices and take reasonable precautionary measures to manage pressure transients and prevent water hammer in the Infrastructure.
- (b) The Parties will follow good construction, operation and maintenance practices and take reasonable precautionary measures to minimize the presence of debris that may add additional burden on the Infrastructure and may clog strainers that are part of such Infrastructure.
- (c) Without limiting sections 10 or 11, in the event a Party fails to comply with sections 2.12(a) or 2.12(b), then the defaulting Party will indemnify and save harmless the other Party from any losses, damages, costs and expenses arising from the default and the other Party's efforts to correct or mitigate the effects of the default, including, but not limited to, any reasonably related downtime or overtime wages. The Party seeking indemnity will provide the other Party with all information reasonably requested in support of its claims (including basis of calculating downtime and overtime wages).

3. PAYMENT FOR SUPPLY OF THERMAL ENERGY

3.1 Exclusivity and Exceptions

GVS&DD covenants and agrees that, during the Term, the supply and sale of the Thermal Energy derived from the operation of the GVS&DD Infrastructure will be exclusive to LEC. GVS&DD shall not deliver, supply or sell Thermal Energy derived from the operation of the GVS&DD Infrastructure to any other party without the prior written agreement of LEC.

3.2 Payment

- (a) Following the First Delivery Date, LEC will pay GVS&DD for Thermal Energy derived from the operation of the GVS&D Infrastructure and delivered to the LEC Infrastructure, that meets the Thermal Energy Specifications, in accordance with the Price Schedule and the following payment terms:
 - (i) commencing on the 15th day of the first month after the First Delivery Date, on or about the 15th day of each month, GVS&DD will generate and deliver to LEC an invoice for the preceding calendar month showing:
 - (A) the quantity of Thermal Energy delivered to LEC, as measured by GVS&DD using the GVS&DD Infrastructure thermal energy meter;

- (B) the applicable rates and adjustments, as set out in the Price Schedule;
- (C) the amount payable together with any other applicable charges, taxes or credits; and
- (D) the cumulative quantity of Thermal Energy delivered for the then current Thermal Year up to and including that month,

and LEC will pay the invoiced amount to GVS&DD within 30 days of delivery of the invoice to LEC;

- (ii) if the quantity of Thermal Energy delivered in the preceding calendar month is not known by the 15th of the month, then GVS&DD will issue the invoice based on a reasonable estimate of the quantity of Thermal Energy delivered to LEC, which is equal to the amount of Thermal Energy for that month listed in the Load Profile, and make the necessary adjustments as soon as practical and in any event by the next month;
 - (iii) LEC will promptly report to GVS&DD any errors in any statement or disputes as to amounts due to GVS&DD. The Parties will adjust any underpayments or overpayments, as necessary, with accrued interest at the rate of 0.29% per month (3.5% per annum); and
 - (iv) all charges that are calculated on a monthly or annual basis will be adjusted, as necessary, for any invoices or charges for partial months or partial years.
- (b) GVS&DD will inquire as to whether BC Hydro can bill LEC directly for the BC Hydro account for the GVS&DD Infrastructure so that LEC does not have to pay taxes to GVS&DD for electricity used by the GVS&DD Infrastructure. If BC Hydro can bill LEC directly, then prior to making such arrangements the Parties will review and revise this Agreement, including but not limited to subsection 3.2(a) and the Price Schedule, to reflect the proposed change in BC Hydro billing arrangements.

4. ENVIRONMENTAL ATTRIBUTES

- (a) Subject to subsections 4(b) and 4(c), GVS&DD will own or have the right to claim for its own use and benefit any Environmental Attributes arising from the Thermal Energy delivered pursuant to this Agreement.
- (b) During the Initial Term, GVS&DD will:
 - (i) transfer twelve (12) per cent of Environmental Attributes to LEC on an annual basis; and

- (ii) on LEC's behalf, transfer four (4) per cent of Environmental Attributes to the District of North Vancouver on an annual basis.
- (c) During any Renewal Term, GVS&DD will transfer sixteen (16) per cent of Environmental Attributes to LEC on an annual basis.
- (d) GVS&DD may engage third party entities to:
 - (i) validate the delivery or use of Thermal Energy under this Agreement as a Greenhouse Gas reduction project;
 - (ii) conduct annual quantification and verification of the Environmental Attributes

in accordance with the Provincial "Carbon Neutral Framework" for local governments, any similar program enacted from time to time, or to a higher standard or using an alternative methodology as GVS&DD and LEC may mutually agree upon.

- (e) Unless otherwise agreed by the Parties in writing in advance:
 - (i) LEC will, at its own cost, administer and manage Environmental Attributes that are delivered to it under this Agreement;
 - (ii) GVS&DD will, at its own cost, administer and manage Environmental Attributes that it has the right to retain under this Agreement; and
 - (iii) Neither LEC nor GVS&DD have any obligation to administer and manage Environmental Attributes that GVS&DD delivers to the District of North Vancouver under this Agreement.
- (f) Without limiting subsection 4(e), the Parties will cooperate in the administration of Environmental Attributes. LEC will share information and documentation with GVS&DD that concern the Environmental Attributes, including aggregate billing data and aggregate meter data, and GVS&DD will share information and documentation with LEC that concern the Environmental Attributes, including any validation reports and verification reports.
- (g) Nothing in this section 4 is intended to limit or restrict the Parties from:
 - (i) seeking or realizing any benefits or proceeds from programs or projects that are not based on the transfer of Environmental Attributes or on an emission offset project; or

- (ii) publishing information about the operation, benefits and effects of either Party's Infrastructure including actual Greenhouse Gas emission information of either or both the WWTP and LEC DES. In such cases, either Party may ask that the publishing Party include a footnote or other form of reference that describes the allocation of Environmental Attributes or emission offsets from the supply of Thermal Energy under this Agreement.
- (h) The Parties acknowledge that the Environmental Attributes under sections 4(b) and 4(c) are allocated in proportion to the Parties' respective contributions to project capital costs based on current GVS&DD Board policy. If at any time during the Term the GVS&DD Board adopts a new policy with respect to allocation of Environmental Attributes from heat recovery projects such that LEC would be entitled to a larger allocation of Environmental Attributes than under this Agreement, then the Parties will review such allocation and enter into good faith negotiations to determine a new allocation based on the new policy, with any new allocation commencing at the beginning of the calendar year of the adoption of the policy.
- (i) If GVS&DD acquires more Environmental Attributes than needed to achieve carbon neutrality for its liquid waste utility in a given year, then GVS&DD will refer to current GVS&DD Board policy to guide the allocation of excess Environmental Attributes.
- (j) LEC is free to pursue other projects that will allow LEC to acquire or claim Environmental Attributes independent of this Agreement. GVS&DD will have no claim to such independently acquired Environmental Attributes.

5. TERM AND RENEWAL

5.1 Term

This Agreement will be effective and in force for the Initial Term and any Renewal Terms.

5.2 Renewal

LEC may renew the Initial Term for up to a maximum four (4) Renewal Terms by providing GVS&DD with written notice at least one (1) year but not more than two (2) years prior to the expiry of the Initial Term or the preceding Renewal Term.

- 5.3** During the Term, the Parties may identify means to extend the asset life of the GVS&DD Infrastructure if they undertake repair or maintenance work other than typical maintenance expenditures, in which case the Parties may negotiate an agreement to fund such additional expenditures.

6. CONDITIONS PRECEDENT

6.1 LEC Conditions Precedent

- (a) The obligations of LEC to complete construction and installation of the LEC Infrastructure and to purchase Thermal Energy from GVS&DD are subject to fulfilment of the following conditions precedent:
 - (i) LEC advising GVS&DD that LEC has completed all due diligence and feasibility investigations that the LEC considers necessary, and is satisfied with the results thereof, in its absolute discretion;
 - (ii) LEC advising GVS&DD that LEC has secured financing for its obligations under this Agreement on such terms as it considers reasonable and necessary, in its absolute discretion;
 - (iii) LEC advising GVS&DD that LEC has obtained all the necessary Permits to commence construction of the LEC Infrastructure and to purchase the Thermal Energy from GVS&DD, on terms and conditions that are acceptable to LEC, acting reasonably;
 - (iv) without limiting the generality of subsection (iii), LEC advising GVS&DD that LEC has:
 - (A) obtained a licence or other form of permission or right from the District of North Vancouver, on terms and conditions that are acceptable to LEC, in order to install the LEC Infrastructure within District of North Vancouver roads and lands (including a bridge over McKay Creek), from the Property Line to the boundary between the District of North Vancouver and the City of North Vancouver;
 - (B) obtained a licence or other form of permission or right from the City of North Vancouver, on terms and conditions that are acceptable to LEC, in order to install the LEC Infrastructure within City of North Vancouver roads and lands from the boundary between the City of North Vancouver and the District of North Vancouver to a location that LEC determines to be necessary; and
 - (v) the representations and warranties of GVS&DD set out in section 7.1 continue to be true.
- (b) The conditions contained in section 6.1(a) are for the sole and exclusive benefit of LEC and may be waived by LEC in whole or in part at any time.
- (c) If the conditions precedent referred to in section 6.1(a) are not satisfied or waived in writing on or before ~~12:00~~ 6:00 p.m. on October 5, 2017, then this Agreement will

~~12:00~~ 6:00 p.m. LEC
GVS&DD

automatically terminate and neither Party will have any further obligations to the other under this Agreement except for those that the Agreement expressly provides are to survive termination of this Agreement.

- (d) GVS&DD will provide the LEC with all requisite written authorizations that LEC may reasonably require to carry out the due diligence and investigations contemplated under section 6.1(a)(i).
- (e) GVS&DD acknowledges that it has received \$10.00 from the LEC as consideration for agreeing not to revoke this Agreement while it remains subject to any of LEC's conditions precedent and the sufficiency of such consideration is hereby acknowledged.

6.2 GVS&DD Conditions Precedent

- (a) The obligation of GVS&DD to complete construction and installation of the GVS&DD Infrastructure and to sell Thermal Energy to LEC are subject to fulfilment of the following conditions precedent:
 - (i) GVS&DD advising LEC that it has executed the Project Contract;
 - (ii) GVS&DD advising LEC that it has exercised its option within the Project Contract to have Contractor design and construct the GVS&DD Infrastructure;
 - (iii) GVS&DD advising LEC that BCUC has issued the Public Utility Exemption on terms and conditions that are acceptable to GVS&DD, acting reasonably;
 - (iv) GVS&DD advising LEC that it has obtained the necessary Permits to commence construction of the GVS&DD Infrastructure and, without limiting subsection (iii), the necessary Permits to sell Thermal Energy to LEC, on terms and conditions acceptable to GVS&DD, acting reasonably; and
 - (v) the representations and warranties of LEC set out in Section 7.2 continue to be true.
- (b) The conditions contained in section 6.2(a) are for the sole and exclusive benefit of GVS&DD and may be waived by GVS&DD in whole or in part at any time.
- (c) If the conditions precedent referred to in section 6.2(a) are not satisfied or waived in writing on or before October 12, 2017, then this Agreement will automatically terminate and neither Party will have any further obligations to the other under this Agreement except for those that the Agreement expressly provides are to survive termination of this Agreement.

- (d) LEC acknowledges that it has received \$10.00 from the GVS&DD as consideration for agreeing not to revoke this Agreement while it remains subject to any of GVS&DD's conditions precedent and the sufficiency of such consideration is hereby acknowledged.

7. REPRESENTATIONS AND WARRANTIES

7.1 Representations and Warranties of GVS&DD

GVS&DD represents and warrants to LEC the following, and acknowledges that LEC is relying on such representations and warranties in entering into the transactions contemplated by this Agreement.

- (a) GVS&DD is a corporation incorporated and operated pursuant to the *Greater Vancouver Sewerage and Drainage District Act* and validly existing under the laws of British Columbia, with full power and authority to enter into and perform all of its obligations under this Agreement.
- (b) To the best of its knowledge, GVS&DD is not a party to any action, suit or legal proceeding, actual or threatened, and there are no circumstances, matters or things known to GVS&DD which might give rise to any such action, suit or legal proceeding, and there are no actions, suits or proceedings pending or threatened against GVS&DD before or by any Governmental Authority, which could affect GVS&DD's ability to perform its obligations under this Agreement.
- (c) This Agreement and the performance of the obligations of GVS&DD under this Agreement does not and will not breach any provisions of any other agreement or Law that is binding on or applicable to GVS&DD as of the date of this Agreement.
- (d) All necessary corporate action on the part of GVS&DD has been or will be taken to authorize and approve the execution and delivery of this Agreement and the performance by GVS&DD of its obligations hereunder.

7.2 LEC's Representations and Warranties

LEC represents and warrants to GVS&DD the following, and acknowledges that GVS&DD is relying on such representations and warranties in entering into the transactions contemplated by this Agreement.

- (a) LEC is a corporation duly incorporated and validly existing under the laws of British Columbia, with full power and authority to enter into and perform all of its obligations under this Agreement.
- (b) To the best of its knowledge, LEC is not a party to any action, suit or legal proceeding, actual or threatened, and there are no circumstances, matters or things known to LEC which might give rise to any such action, suit or legal proceeding, and

there are no actions, suits or proceedings pending or threatened against LEC before or by any Governmental Authority, which could affect LEC's ability to perform its obligations under this Agreement.

- (c) This Agreement and the performance of the obligations of LEC under this Agreement does not and will not breach any provisions of any other agreement or Law that is binding on or applicable to LEC as of the date of this Agreement.
- (d) All necessary corporate action on the part of LEC has been or will be taken to authorize and approve the execution and delivery of this Agreement and the performance by LEC of its obligations hereunder.

8. ENVIRONMENTAL PROVISIONS

8.1 GVS&DD Release and Indemnity

GVS&DD acknowledges and agrees that LEC is not and will not be responsible for any Contaminants now present, or present in the future, in, on or under the Project Site, or that may have migrated on or off the Project Site except to the extent that such release or the presence of such Contaminants was a result of LEC's activities on the Project Site or adjacent property, including the construction, operation and maintenance of the LEC Infrastructure.

GVS&DD hereby releases and will indemnify LEC and its shareholders, directors, officers, employees, agents, successors and permitted assigns, from any and all liabilities, actions, damages, claims (including remediation cost recovery claims), losses, costs, orders, fines, penalties and expenses whatsoever (including all consulting and legal fees and expenses on a solicitor-client basis) arising from or in connection with:

- (a) any release or alleged release of any Contaminants at or from the Project Site; or
- (b) the presence of any Contaminants on or off the Project Site before or after the Effective Date of this Agreement

except to the extent that such release or the presence of such Contaminants was a result of LEC's activities on the Project Site or adjacent property, including the construction, operation and maintenance of the LEC Infrastructure.

8.2 LEC Environmental Covenants

- (a) LEC will comply with Environmental Laws in its installation and operation of the LEC Infrastructure and, without limiting the generality of the foregoing, LEC will not, except in compliance with Environmental Laws:

- (i) install or use in the LEC Infrastructure or on, in or under any of the Project Site or any adjacent property any materials, equipment or apparatus, the installation, use or storage of which is likely to cause the generation, accumulation or migration of any Contaminant; or
 - (ii) dispose of, handle or treat any Contaminant in a manner in whole or in part that violates Environmental Laws or causes any of the Project Site or any adjacent property to become a Contaminated Site.
- (b) LEC will remediate, and will be responsible for the remediation of, in accordance with Environmental Laws, any and all Contaminants on or migrating from the Project Site to the extent that LEC, or any Person for whom LEC is at law responsible, has caused or contributed to the release, spill, leak, pumping, pouring, emission, emptying or discharge, injection, escape, leaching, migration, disposal, or dumping, of such Contaminants. Any remediation carried out under this section 8.2(b) will be to numerical or risk based industrial standards, using remediation method acceptable to LEC, acting reasonably.

9. INSURANCE REQUIREMENTS

9.1 GVS&DD Insurance

GVS&DD will obtain and maintain at its own expense throughout the Term the following insurance coverage:

- (a) commercial general liability insurance for at least \$5 million per occurrence; and
- (b) any other insurance the GVS&DD deems appropriate.

9.2 Evidence of GVS&DD Insurance

If requested by LEC, GVS&DD will deliver or cause to be delivered to LEC evidence, in the form of a Certificate of Insurance, of all insurance policies required to be obtained and maintained by GVS&DD under section 9.1 and any amendments, modifications or replacements thereof. All required insurance will be endorsed to provide LEC with thirty (30) days advance written notice of cancellation or material change.

9.3 LEC Insurance

LEC will obtain and maintain at its own expense throughout the term of this Agreement the following insurance coverage:

- (a) commercial general liability insurance for at least \$5 million per occurrence; and
- (b) any other insurance LEC deems appropriate.

9.4 Evidence of LEC Insurance

If requested by GVS&DD, LEC will deliver or cause to be delivered to GVS&DD evidence, in the form of a Certificate of Insurance, of all insurance policies required to be obtained and maintained by LEC under section 9.3 and any amendments, modifications or replacements thereof. All required insurance will be endorsed to provide GVS&DD with thirty (30) days advance written notice of cancellation or material change.

9.5 Additional Insured

For commercial general liability insurance, each Party will ensure that the other Party will be added as additional insured party as applicable and where permitted under the insurance to be obtained and maintained under this Agreement. In the event of a claim, the insurance of the Party found responsible for actions giving rise to the claim will be the primary insurance with respect to the claim.

10. INDEMNIFICATION AND LIMITATION OF LIABILITY

10.1 Indemnification

- (a) LEC will indemnify and save harmless GVS&DD and its directors, officers, employees, contractors, agents, successors and permitted assigns from and against all liabilities, claims, losses, suits, actions, judgments, demands, debts, accounts, damages, costs, penalties and expenses (including all legal fees and disbursements) arising from, related to or caused by:
 - (i) the negligence or wilful misconduct of LEC, its employees, directors, officers or contractors or any Person for whom LEC is responsible at law;
 - (ii) any claims against or in respect of Thermal Energy, or for personal injury or property damage caused by Thermal Energy, which arise after the Thermal Energy enters the LEC DES, at the Tie-In;
 - (iii) any claims against or in respect of the LEC Infrastructure, or for personal injury or property damage caused or contributed to by the LEC Infrastructure, including, but not limited to, that part of the LEC Infrastructure that is to be installed within the Project Site; or
 - (iv) the breach by LEC of any of the provisions contained in this Agreement.
- (b) GVS&DD will indemnify and save harmless LEC and its shareholders, directors, officers, employees, contractors, agents, successors and permitted assigns from and against any and all liabilities, claims, losses, suits, actions, judgments, demands, debts, accounts, damages, costs, penalties and expenses (including all legal fees and disbursements) arising from, related to or caused by:

- (i) the negligence or wilful misconduct of GVS&DD, its employees, directors, officers or contractors or any Person for whom in Law it is responsible;
- (ii) any claims against or in respect of the Thermal Energy, or for personal injury or property damage caused by the Thermal Energy, which arise before the Thermal Energy enters the LEC DES, at the Tie-In;
- (iii) any claims against or in respect of the GVS&DD Infrastructure, or for personal injury or property damage caused or contributed to by the GVS&DD Infrastructure, wherever located;
- (iv) any claim under or related to the Project Contract or work performed thereunder; or
- (v) the breach by GVS&DD of any of the provisions contained in this Agreement.

10.2 Limitation of Liability

Each Party's liability to the other Party under section 10.1 will be limited to the payment of direct damages. In no event will either Party be responsible or liable to the other Party for any indirect, consequential, punitive, exemplary or incidental damages of the other Party or any third party arising out of or related to this Agreement even if the loss is directly attributable to the gross negligence or wilful misconduct of such Party, its employees, or contractors.

10.3 Duty to Mitigate

Each Party has a duty to mitigate the damages that would otherwise be recoverable from the other Party pursuant to this Agreement by taking appropriate and commercially reasonable actions to reduce or limit the amount of such damages or amounts.

11. DEFAULT

11.1 Default

A Party will be in default of this Agreement if the Party is in breach of any term, covenant, agreement, condition or obligation imposed on it under this Agreement (the "**Defaulting Party**"), provided that:

- (a) the other Party (the "**Non-Defaulting Party**") provides the Defaulting Party with a written notice of such default and a 30-day period within which to cure such a default (the "**Cure Period**"); and
- (b) the Defaulting Party fails to cure such default during the Cure Period, or if such default is not capable of being cured within the Cure Period, fails in good faith to

commence the curing of such default upon receipt of notice of default and to continue to diligently pursue the curing of such default thereafter until cured.

11.2 Effect of Default

In addition to and without liability therefor or prejudice to any other right or remedy it may have at law or in equity, upon failure to cure a default under section 11.1, the Non-Defaulting Party may do one or more of the following:

- (a) cease performing its obligations under this Agreement, including suspending or refusing to make any payment due hereunder, until the default has been fully remedied, and no such action will relieve the Defaulting Party from any of its obligations under this Agreement;
- (b) undertake the necessary steps to remedy the default at the Defaulting Party's expense, provided that such action will not relieve the Defaulting Party from any of its obligations under this Agreement; or
- (c) terminate this Agreement immediately upon written notice to the other Party and disconnect the LEC Infrastructure from the GVS&DD Infrastructure, taking reasonable steps to coordinate such disconnection to ensure that it does not result in damage to the GVS&DD Infrastructure or the LEC Infrastructure.

11.3 Termination Payments

- (a) Without limiting the generality of sections 11.1 and 11.2, if GVS&DD terminates this Agreement pursuant to section 11.2, then GVS&DD will be entitled to immediate payment from LEC of the following:
 - (i) \$846,300 multiplied by the number of complete Thermal Years remaining in the Initial Term; and
 - (ii) Operations and Maintenance Basic Charge (as defined in the Price Schedule), calculated in accordance with the Price Schedule, that would have been payable during the Initial Term for a maximum of 12 months.
- (b) Without limiting the generality of sections 11.1 and 11.2, if LEC terminates this Agreement pursuant to section 11.2, then LEC will be entitled to immediate payment from GVS&DD of the following:
 - (i) \$162,750 multiplied by the number of complete Thermal Years remaining in the Initial Term.

12. TERMINATION OR EXPIRY

12.1 Automatic Termination

This Agreement will terminate automatically upon the expiry of the Term.

12.2 First Delivery Date Failure

Either Party may terminate this Agreement with 10 days' written notice to the other Party if the First Delivery Date does not occur on or before December 31, 2025.

12.3 Decommissioning and Removal of Encroaching LEC Infrastructure

As soon as practicable at the end of the Term, or upon earlier termination of this Agreement, LEC will, at its risk, cost and expense:

- (a) remove any part of the LEC Infrastructure that encroaches on the Project Site, make good any damage to the Project Site caused by the removal of the LEC Infrastructure, and leave the Project Site in good repair and condition and free from all debris to the reasonable satisfaction of the GVSⅅ or
- (b) with the prior written consent of GVS&DD, decommission any or all of the LEC Infrastructure that encroaches on the Project Site to the satisfaction of the GVS&DD and transfer ownership of such Infrastructure to the GVS&DD at no cost to the GVS&DD.

13. FORCE MAJEURE

13.1 Effect of Force Majeure

Neither Party will be in default of this Agreement by reason only of any failure in the performance of such Party's obligations pursuant to this Agreement if such failure is caused by any event of Force Majeure that makes it commercially impracticable or unreasonable for such Party to perform its obligations under this Agreement and, in such event, the obligations of the Parties will be suspended to the extent necessary for the period of the Force Majeure event, save and except neither Party will be relieved of or released from its obligations to make payments to the other Party as a result of an event of Force Majeure.

13.2 Exceptions

Neither Party will be entitled to the benefit of section 13.1 under any of the following circumstances:

- (a) to the extent that the inability or failure was caused by the negligence or contributory negligence of the Party claiming Force Majeure;

- (b) to the extent that the inability or failure was caused by the Party claiming Force Majeure having failed to diligently attempt to remedy the condition and to resume the performance of such covenants and obligations with reasonable dispatch; or
- (c) unless, as soon as possible after the happening of the event relied upon or as soon as possible after determining that the event was in the nature of Force Majeure and would affect the claiming Party's ability to observe or perform any of its covenants or obligations under this Agreement, the claiming Party will have given to the other Party notice to the effect that the claiming Party is unable by reason of Force Majeure (the nature whereof will be therein specified) to perform the particular covenants or obligations.

13.3 Resumption of Obligations

As soon as possible after the Force Majeure event is remedied or discontinued, the Party claiming Force Majeure will give notice to the other Party of such remedy, and that such Party has resumed, or is then in a position to resume, the performance of its suspended covenants and obligations hereunder either in whole or in part.

14. DISPUTE RESOLUTION

14.1 Informal Dispute Resolution

The Parties will use best efforts to settle all disputes that may arise under, out of, in connection with or in relation to this Agreement by amicable negotiations and will provide frank and timely disclosure to one another of all relevant facts and information to facilitate such discussions. Failing resolution, and except for those matters for which the BCUC has exclusive jurisdiction, the British Columbia courts will have jurisdiction to resolve all disputes between the Parties.

14.2 Performance of Obligations

The Parties will continue to fulfill their respective obligations pursuant to this Agreement during the resolution of any dispute in accordance with this section 14.

14.3 Injunctive Relief

Nothing in this section 14 will preclude either Party from applying to a court of competent jurisdiction for interlocutory or interim relief, including relief by way of a mandatory injunction.

15. CONFIDENTIALITY

15.1 Confidentiality

All information or documentation received by a Party (the "**Receiving Party**") which has been specifically marked by other Party (the "**Disclosing Party**") as confidential (**the "Information"**) will be deemed to be confidential and proprietary to the Disclosing Party. Except as otherwise provided herein, the Receiving Party will not directly or indirectly disclose the Information to any third party without the prior written consent of the Disclosing Party. Such consent is not required where the third party is another contractor or consultant retained by the Receiving Party for the purposes contemplated in this Agreement and to the extent that such disclosure is necessary for the proper performance of this Agreement or such disclosure is required by law, including the *Freedom of Information and Protection of Privacy Act*.

15.2 Exception for Regulatory Submission

Despite the foregoing, the Receiving Party may use the Information in the preparation of and submissions to regulatory agencies, including the BCUC, or a court.

15.3 Exclusions

The obligation of confidentiality set out above will not apply to material, data or information which is known to either Party prior to their receipt thereof, which is generally available to the public or which has been obtained from a third party which has the right to disclose the same.

16. GENERAL

16.1 Costs

Except as otherwise set out in this Agreement, each Party will be responsible for the payment of its own costs related to performing its obligations under this Agreement.

16.2 Publicity

Neither Party will initiate any media releases, interviews, or presentations to the media relating to this Agreement without the agreement and approval of the other Party, not to be unreasonably withheld or delayed.

16.3 Governing Law

This Agreement will be governed by and construed in accordance with the laws of the Province of British Columbia and the laws of Canada. The Parties hereby attorn to the

jurisdiction of the courts of British Columbia and all courts competent to hear appeals therefrom.

16.4 Notice

Any invoices, payments, notices or other communication required to be given or made pursuant to the Agreement will, unless otherwise expressly provided herein, be in writing and may be delivered in person or sent by email and will be deemed to have been received on the same Business Day as delivery or email at the following address:

(a) If to: **Lonsdale Energy Corporation**
141 West 14th Street
North Vancouver, BC V7M 1H9
e-mail: bthemens@LonsdaleEnergy.ca

Attention: Ben Themens
Executive Director

(b) If to: **Greater Vancouver Sewerage and Drainage District**
4330 Kingsway
Burnaby, BC V5H 4G8
e-mail: jeff.carmichael@metrovancover.org

Attention: Jeff Carmichael
Division Manager, Utility Research & Innovation

or to such other address as one Party may from time to time communicate in writing to the other.

16.5 Amendments to be in Writing

Except as set out in this Agreement, no amendment or variation of the Agreement will be effective or binding upon the Parties unless such amendment or variation is set forth in writing and duly executed by the Parties.

16.6 Waiver

No Party is bound by any waiver of any provision of this Agreement unless such waiver is consented to in writing by that Party. No waiver of any provisions of this Agreement constitutes a waiver of any other provision, nor does any waiver constitute a continuing waiver unless otherwise provided.

16.7 Enurement

This Agreement enures to the benefit of and is binding on the Parties and their respective successors and permitted assigns.

16.8 Remedies Cumulative

All rights and remedies of each Party under this Agreement are cumulative and may be exercised at any time and from time to time, independently and in combination.

16.9 Severability

If any provision of this Agreement is determined by a court of competent jurisdiction to be invalid, illegal or unenforceable in any respect, such determination will not impair or affect the validity, legality or enforceability of any other provision of this Agreement.

16.10 Further Assurances

The Parties will sign such further and other documents and do and perform and cause to be done and performed such further and other acts and things as may be necessary or desirable in order to give full effect to this Agreement.

16.11 Entire Agreement

This Agreement constitutes the entire agreement between the Parties with respect to the subject matter of this Agreement and supersedes all prior agreements, understandings, negotiations and discussions, whether oral or written. There are no conditions, covenants, representations, warranties or other provisions, whether express or implied, collateral, statutory or otherwise, relating to the subject matter of this Agreement except as provided in this Agreement.

16.12 Time is of the Essence

Time is of the essence.

16.13 Transfer, Subcontracting and Assignment

- (a) Either Party may assign this Agreement or any of its rights or obligations hereunder with the consent of the other Party, such consent not to be unreasonably withheld.
- (b) Either Party may subcontract to any Person any of its rights or obligations hereunder for its respective Infrastructure.
- (c) The Parties acknowledge that:
 - (i) LEC is wholly owned by the City of North Vancouver;
 - (ii) GVS&DD and the City of North Vancouver share common environmental and climate enhancement goals, including the reduction of Greenhouse Gas emissions;

- (iii) the Thermal Energy recovery contemplated in this Agreement costs more than conventional energy options; and
 - (iv) the Thermal Energy recovery contemplated in this Agreement is not meant to be profitable to either the GVS&DD, LEC or the City of North Vancouver.
- (d) If the City of North Vancouver elects to sell or otherwise transfer its legal or beneficial ownership in LEC in whole or in part to another Person, then LEC will pay GVS&DD the following amount prior to any such transfer:

\$423,150 multiplied by the number of complete Thermal Years remaining in the Initial Term and multiplied by the percentage of the City of North Vancouver's legal or beneficial share ownership that is being transferred.

16.14 Relationship

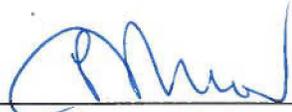
Nothing in this Agreement will create a partnership or joint venture, a franchise, a partnering agreement (as defined in the *Local Government Act*) or a relationship of landlord and tenant between GVS&DD and LEC.

16.15 Counterparts

This Agreement may be executed in counterparts and transmitted by electronic means with the same effect as if the Parties had signed the same original document. All counterparts will be construed together and will constitute one and the same agreement and, if transmitted by electronic means, each Party will promptly dispatch an original to the other Party.

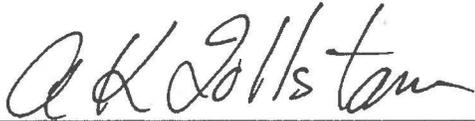
IN WITNESS WHEREOF the Parties hereto have executed this Agreement as of the day and year first above written.

GREATER VANCOUVER SEWERAGE AND DRAINAGE DISTRICT,
by its authorized signatory:

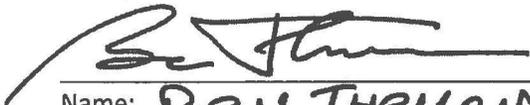


Carol Mason
Commissioner

LONSDALE ENERGY CORPORATION,
by its authorized signatory(ies):



Name: A.K. TOLLSTAM
Title: President



Name: BEN THEMENS
Title: EXECUTIVE DIRECTOR

LIQUID WASTE HEAT RECOVERY

Effective Date: May 25, 2018

Approved By: GVS&DD Board

PURPOSE

To enable beneficial use of waste heat and associated greenhouse gas emission reductions from Metro Vancouver's liquid waste system by external parties.

DEFINITIONS

"**Waste heat**" is excess heat that is available from GVS&DD operations, including but not limited to heat from untreated sewage, treated effluent, equipment or processes.

"**Heat user**" is a third party interested in accessing excess heat from GVS&DD's liquid waste system. A heat user may be a member municipality or other entity.

POLICY

Metro Vancouver is committed to pursuing strategies and actions that mitigate climate change. Waste heat recovery projects that displace the use of fossil fuels result in a reduction in regional greenhouse gas emissions. Recovering waste heat from the liquid waste system contributes to GVS&DD's *Integrated Liquid Waste and Resource Management Plan* goal of using waste as a resource.

This policy enables expedient access to waste heat where technically and financially feasible while ensuring that GVS&DD is able to convey and treat wastewater and meet all service objectives. This policy applies to situations where external parties request waste heat from GVS&DD's liquid waste system and to situations where GVS&DD offers waste heat to interested external parties.

COLLECTION SYSTEM PROJECTS**Allocation of Waste Heat**

GVS&DD will allocate access to untreated sewage for heat recovery on a first-come first-served basis in response to requests by interested heat users, provided the proposed heat recovery project will not adversely impact GVS&DD services or other established heat recovery projects, as determined by GVS&DD review. If an established heat recovery project that is already in place or approved for development by GVS&DD could be impacted by a proposed new heat recovery project, the established project's heating and/or cooling requirements will have priority. Private entities requesting access to waste heat must provide a letter of support from the host municipality demonstrating support and cooperation including allowance for works within municipal rights of way. Projects that access heat from municipal sewers do not require GVS&DD approval.

Ownership and Responsibilities

GVS&DD owns a sewerage system and is responsible for sewage in its liquid waste system, including any associated resources such as heat. The boundaries of responsibility for heat recovery equipment

and infrastructure are primarily tied to property ownership and will be defined in a contract between GVS&DD and the heat user. GVS&DD will own and be responsible for the portion of the tie-in up to and including a shut-off valve on both the diversion and return lines. GVS&DD will consider an in-line heat recovery system built directly in a GVS&DD sewer if the system will not impair GVS&DD operations.

Cost Recovery

GVS&DD will charge the heat user for all costs incurred to establish and maintain access to sewage. The value of sewage will be assessed using business case processes, including consideration of nominal value of sewage, and incorporated into sewage access contracts.

Environmental Attributes

Benefits associated with greenhouse gas reductions (such as carbon offset credits) and the costs of administering those benefits will be allocated on a case-by-case basis, in accordance with the costs and risks incurred by the parties involved in developing the heat recovery project.

TREATMENT PLANT AND OUTFALL PROJECTS

Allocation of Waste Heat

When GVS&DD identifies waste heat opportunities in wastewater treatment plants and effluent outfalls, GVS&DD will follow competitive processes in offering available waste heat to potential heat users, to ensure fairness and transparency.

Ownership and Responsibilities

The boundaries of responsibility for heat recovery equipment and infrastructure are primarily tied to property ownership and will be defined in a contract between GVS&DD and the heat user. GVS&DD will own and be responsible for waste heat recovery equipment and related infrastructure installed within its wastewater treatment plants and effluent outfalls, except in cases where ownership by an external party is deemed preferable to the GVS&DD.

Cost Recovery

Heat recovery projects within wastewater treatment plants and effluent outfalls will require capital investment by GVS&DD and will require ongoing operations and maintenance by GVS&DD. GVS&DD will recover the costs incurred in providing waste heat to external parties over the life of the project. GVS&DD does not seek to profit from the provision of heat. GVS&DD staff will evaluate heat recovery projects using established life cycle cost analysis and options analysis frameworks and will consider each project on a case-by-case basis. Benefits will include the value of avoided greenhouse gas emissions. A contract with the heat user will be established for each project that assigns the costs and benefits between GVS&DD, the heat user and other funding sources.

Environmental Attributes

Benefits associated with greenhouse gas reductions (such as carbon offset credits) and the costs of administering those benefits will be allocated on a case-by-case basis, in accordance with the costs and risks incurred by the parties involved in developing the heat recovery project.

Carbon credits will be allocated to the host jurisdiction as a project proponent for contributions to the project that can be financially valued (other than Tier 1 and 2 cost apportionments). In recognition

of the important role of the host and of impacts that cannot be valued financially, the host jurisdiction will receive 5% of the credits allocated to GVS&DD, for the initial term of the agreement for the sale of heat.

Carbon credits from GVS&DD emissions reduction projects that have been allocated to GVS&DD as a project proponent will be retained by GVS&DD, up to the amount needed for GVS&DD to be carbon neutral in a given year. If GVS&DD achieves carbon neutrality in a given year, excess carbon credits will be transferred to member jurisdictions. The distribution of excess carbon credits among member jurisdictions will be calculated based on capital contribution to the portfolio of GVS&DD liquid waste heat recovery emissions reduction projects. Calculated excess carbon credit distributions less than one tonne will not be transferred, but will instead be redistributed among the other member jurisdictions.



T. 604.983.7300

T. 604.983.7312

F. 604.985.9417

November 7, 2017

BC Utilities Commission
Suite 410, 900 Howe Street
Vancouver, BC
V6Z 2N3

RE: Proposed Heat Recovery Connection between North Shore Wastewater Treatment Plant and City of North Vancouver

Dear Sirs/Mesdames:

This letter is to confirm that Lonsdale Energy Corporation (LEC) has reviewed and supports the Greater Vancouver Sewerage and Drainage District (GVS&DD) "Application for an Order Pursuant to Section 88(3) of the Utilities Commission Act" dated June 14, 2017 requesting an exemption on sale of heat recovered from the new North Shore Wastewater Treatment Plant.

LEC is wholly-owned by the City of North Vancouver and only serves City of North Vancouver locations. As such, LEC is not considered a public utility under the Utilities Commission Act. LEC is regulated by the City and this project was reviewed and approved by the Council of the City of North Vancouver at its July 24th, 2017 meeting. A copy of the resolution and report is attached.

The proposed heat sale is one of several energy sources used by LEC. As mentioned in the report, LEC already uses solar energy, geexchange, heat recovery from cooling process as well as natural gas boilers. LEC owns 8 mini-plants that are inter-connected. Natural gas is purchased from different suppliers and under different contractual rates so that LEC may take advantage of available pricing opportunities. LEC's goal is to ensure that the most appropriate source of energy is used whenever available.

As per the attached report, LEC has chosen to enter into a heat sale/purchase agreement with GVS&DD as it has determined that the heat offered by GVS&DD is a good opportunity to decrease greenhouse gas emissions of the community and region.

Sincerely,

A handwritten signature in blue ink, appearing to read "Ben Themens", is written over a horizontal line.

Ben Themens, MBA, P.Eng., CPA, CGA
Executive Director

Enclosed: City of North Vancouver Council Resolution and report entitled "Heat Recovery from the New North Shore Wastewater Treatment Plant"

MINUTES OF THE REGULAR MEETING OF COUNCIL HELD IN THE COUNCIL CHAMBER, CITY HALL, 141 WEST 14th STREET, NORTH VANCOUVER, BC, ON MONDAY, JULY 24, 2017.

REPORTS OF COMMITTEES, COUNCIL REPRESENTATIVES AND STAFF

- 25. Heat Recovery from the New North Shore Wastewater Treatment Plant**
– File: 11-5500-06-0001/1

Report: Director, Lonsdale Energy Corp., July 19, 2017

Moved by Councillor Clark, seconded by Councillor Keating

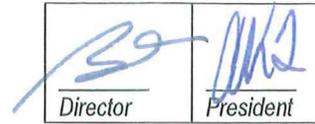
PURSUANT to the report of the Director, Lonsdale Energy Corp., dated July 19, 2017, entitled “Heat Recovery from the New North Shore Wastewater Treatment Plant”:

THAT pending successful negotiations with the Greater Vancouver Sewerage and Drainage District, Lonsdale Energy Corp. be authorized to enter into a Thermal Energy Sale and Purchase Agreement with the Greater Vancouver Sewerage and Drainage District;

THAT a provision of \$3,600,000 be included in a Lonsdale Energy Corp. future borrowing request to provide for the City portion of the cost of the heat recovery project;

AND THAT Lonsdale Energy Corp. submit a rate increase application in the Fall of 2017 that will provide a rate increase schedule to fund the heat recovery project and the reimbursement of City loans.

CARRIED UNANIMOUSLY



T 604.983.7305 F 604.985.1573 E info@env.org
141 West 14th Street, North Vancouver BC V7M 1H9

REPORT

To: Mayor Darrell Mussatto and Members of Council

From: Ben Themens, Director, LEC

SUBJECT: HEAT RECOVERY FROM THE NEW NORTH SHORE WASTEWATER TREATMENT PLANT

Date: July 19, 2017

RECOMMENDATION:

PURSUANT to the report of the Director of Lonsdale Energy Corp., dated July 19, 2017, entitled, "Heat Recovery from the new North Shore Wastewater Treatment Plant":

THAT pending successful negotiations with the Greater Vancouver Sewerage and Drainage District, Lonsdale Energy Corp. be authorized to enter into a Thermal Energy Sale and Purchase Agreement with the Greater Vancouver Sewerage and Drainage District;

THAT a provision of \$3,600,000 be included in Lonsdale Energy Corp. future borrowing request to provide for the City portion of the cost of the heat recovery project;

AND THAT Lonsdale Energy Corp. submit a rate increase application in Fall 2017 that will provide a rate increase schedule to fund the heat recovery project and the reimbursement of City loans.

ATTACHMENT:

1. Report to GVRD Utilities Committee entitled "Effluent Heat Recovery at North Shore Wastewater Treatment Plant", prepared by Jeff Carmichael, Division Manager, Utility Research and Innovation, Liquid Waste Services, dated July 6, 2017

PURPOSE:

Since 2014, the Greater Vancouver Sewerage and Drainage District (GVS&DD) and Lonsdale Energy Corp. (LEC) have been reviewing the opportunity to recover heat from the new North Shore Wastewater Treatment Plant (NSWWTP). This report provides an overview of the status of the project. Furthermore, since the Agreement has implications for debt and LEC rates, LEC seeks Council's authorization prior to entering into an Agreement with GVS&DD.

This authorization is sought while an Agreement has yet to have been finalized with GVS&DD. The Agreement is between GVS&DD and LEC and under this recommendation Council would confirm its support while deferring to the LEC Board the authority to finalize an Agreement that aligns with the conditions described in this report and with the interests of both the City and LEC. Early approval is being sought in recognition of the fact that the current project approval schedule requires LEC to finalize an Agreement with GVS&DD in late August, while Council is not scheduled to meet until September 11th, 2017.

BACKGROUND:

Since starting operations in 2003, Lonsdale Energy Corp. (LEC) has implemented several alternative energy sources. During the heating season, natural gas boiler technology still supplies a substantial amount of the energy consumed by LEC. However, the following sources provide an increasingly significant amount of energy for heating, particularly during the summer when space heating demand is low but domestic hot water consumption becomes relatively high:

- 120 solar thermal panels on the roof of the Library;
- geoexchange field owned and operated by LEC at the site of the School District 44 (SD44) at West 22nd Street and Lonsdale Avenue;
- provision of cooling service at the above-mentioned SD44 site through the use of heat pumps that allows the recovery of rejected heat for use in the Central Lonsdale LEC network;
- provision of cooling service at various Shipyards buildings through the use of heat pumps that allows the recovery of rejected heat for use in the Lower Lonsdale LEC network. Those heat pumps will also be used to recover heat during ice making of a planned skating rink at the waterfront and potentially in a similar way at the Harry Jerome once renovated.

DISCUSSION:

LEC has been working on the opportunity of recovering heat from NSWWTP. In 2014, Metro Vancouver issued a Request for Qualifications and Interest to determine potential heat purchasers in the surrounding area of the NSWWTP. LEC is considered the nearest large customer and was the only respondent to the request.

Since then, LEC has worked in collaboration with Metro Vancouver staff on establishing the requirements of a Heat Pump Energy Centre that is to be located at the NSWWTP site. Those requirements were included in an Appendix of a Design-Build-Finance agreement recently awarded by GVS&DD for the construction of the NSWWTP.

At its Regular Meeting of July 13, 2017, the GVRD Utilities Committee considered a report (Attachment 1) concerning effluent heat recovery.

The Utilities Committee unanimously adopted the following resolution:

That the GVS&DD Board:

- a) direct staff to enter into contract negotiations with Lonsdale Energy Corporation for the sale of effluent heat; and
- b) authorize ADaPT Consortium to proceed with the effluent heat recovery portion of the NSWWTP project, subject to award of a contract with Lonsdale Energy Corporation for effluent heat sale.

The resolution is expected to be included in the agenda of the July 28, 2017 GVS&DD Board meeting for further consideration.

For the past few months, staffs of both Metro Vancouver and LEC have been investigating technical and economic considerations of entering into a potential Agreement for sale of effluent heat. The target is to have a draft Agreement substantially completed in the coming weeks to allow GVS&DD approval by September. Metro Vancouver has until October 5, 2017 to exercise the option to proceed with effluent heat recovery as part of the NSWWTP design and construction contract already awarded to ADaPT Consortium.

Project Scope

The project aims to recover some of the heat contained in the NSWWTP effluent. GVS&DD is to install heat pumps inside the NSWWTP to capture the heat and deliver it at a temperature that meets LEC requirements. LEC is to design and build the distribution system from the NSWWTP property line to LEC's existing distribution system which includes a section within District of North Vancouver (DNV) with bridge access requirements over Mackay Creek. It is worth noting that DNV has yet to provide its approval, which must be obtained before ratifying an Agreement, to minimize project risks.

Greenhouse Gas Reduction

Without this project, the heat contained in the effluent will be discharged into Burrard Inlet and LEC will continue to use natural gas boilers to generate a substantial portion of the heat that it supplies, particularly during the winter.

GVS&DD has estimated that by displacing the use of natural gas in LEC's district energy system, the effluent heat recovery project will reduce GHG emissions by over 7,000 tonnes per year. GHG reductions are proposed to be allocated in proportion of respective contributions to capital project costs. As indicated in the table below, this would translate in annual GHG reductions of 1,200 tonnes being allocated to LEC.

Estimated Capital Cost Allocation and GHG Allocation

	Capital commitment	GHG allocation	Annual GHG reduction credits
GVS&DD	\$16,926,000	79%	5,700 tonnes CO2e/yr
LEC	\$3,543,000	16%	1,200 tonnes CO2e/yr
BC Hydro (Grant)	\$1,000,000	5%	300 tonnes CO2e/yr

While a significant portion of the GHG reduction credits will be allocated to GVS&DD, the fact remains that the total GHG reduction will allow LEC to supply substantially cleaner energy to its customers. To better understand the implications of this project, LEC delivered 37,800 MWh of heat to its customers in 2016. The effluent heat recovery project is anticipated to deliver between 20,000 and 30,000 MWh of energy to LEC by 2021. This translates into one-half to two-thirds of the energy supplied to LEC's customers would be considered green. Existing alternative energy sources and natural gas boiler plants would be generating the remaining energy.

FINANCIAL IMPLICATIONS:

From a capital cost perspective, LEC's Commitment estimated at \$3.6 million is principally to cover the cost of the distribution pipe from the existing LEC plant near the intersection of Fell Avenue and First Street to the location of the NSWWTP near the intersection of Pemberton Avenue and First Street.

In addition to this amount, while GVS&DD is to be responsible for the operation and maintenance of the heat recovery facility, LEC is to reimburse the cost incurred by GVS&DD for this work. The amount is currently under review by both organizations. LEC will also be responsible to compensate GVS&DD for the cost of electricity to run the heat pumps. While it is assumed that the variable cost of the electricity would be offset by natural gas savings, those savings would be insufficient to cover fixed electricity-related costs such as BC Hydro's Demand Charge.

Staff have reviewed the financial implications of the additional debt charge and ongoing fixed costs on LEC's rates. The fixed costs would significantly increase LEC's annual expenses, reducing liquidity and delaying City loans reimbursement. If LEC rates were to remain unchanged, LEC would incur significant losses starting in 2021, the year when the NSWWTP is expected to start delivering heat.

While some of the cost increase will be recovered from growth, rates will also need to be substantially increased. Fortunately, due to a combination of low natural gas prices and good cost controls, LEC's rates have been lower than BC Hydro rates as well as those of several other Lower Mainland district energy utilities. As a consequence, LEC considers that it has some latitude to increase rates in the coming years.

Fixed costs such as those described above have typically been recovered through LEC's Capacity Charge. The Capacity Charge approximately makes up between 50% and 60% of LEC's total revenue. Consequently, a 25% increase of the Capacity Charge would translate in an increase of approximately 15% of the total amount invoiced by LEC.

To allow for the recovery of heat from the NSWWTP, LEC is contemplating annual Capacity Charge increases of 5% above the rate of inflation from 2018 to 2022. This would increase the total cost of LEC's energy by approximately 15% above the rate of inflation over a period of 5 years. Assuming natural gas and electricity prices fluctuating with inflation, such an increase would still provide LEC's customers with energy below the price of electricity.

By smoothing the rate increase and pre-emptively increasing its rates, a basic modeling of the proposed rate increase and other financial implications indicates that LEC would suffer relatively modest losses in 2021 and 2022, when the NSWTPP would come online and fixed costs would increase significantly. Furthermore, the planned repayment of current City loans, which would need to provide an additional \$3.6 million for the project, would be delayed from 2032 (as per June 6th, 2017 report) to 2035.

Staff will review in greater details the cost implications of the project if/once an Agreement with GVS&DD has been finalized. LEC will submit to City Council a formal rate increase application including the details of the Agreement's financial implications in the fall of 2017.

OPTION:

As an alternative, if Council does not support this project, Council could receive and file the report or request that staff investigate other purchasing arrangements for the heat. This being said, LEC is facing a tight and firm deadline to satisfy GVS&DD approval requirements and enter into an agreement as well as to meet the contractually stated date of October 5, 2017 to exercise the option to proceed with effluent heat recovery as part of the NSWWTP design and construction contract.

The project is a cost-effective opportunity of substantial size. Staff has yet to identify an opportunity that would provide GHG emission savings of this magnitude. This opportunity is the result of a combination of convergent factors including the stated GVS&DD goal of reducing GHG emissions and the proximity of the LEC network to NSWWTP. Such circumstances are unlikely to be replicated in the near future. Both GVS&DD and LEC will benefit from the efficiencies of coordinating construction of the heat recovery facility with the plant.

In summary, staff is of the opinion that this provides an exceptional opportunity for both organizations.

RESPECTFULLY SUBMITTED BY:



Ben Themens
Director, LEC

To: Utilities Committee

From: Jeff Carmichael, Division Manager, Utility Research and Innovation, Liquid Waste Services

Date: July 6, 2017 Meeting Date: July 13, 2017

Subject: **Effluent Heat Recovery at North Shore Wastewater Treatment Plant**

RECOMMENDATION

That the GVS&DD Board:

- a) direct staff to enter into contract negotiations with Lonsdale Energy Corporation for the sale of effluent heat; and
 - b) authorize ADApT Consortium to proceed with the effluent heat recovery portion of the NSWWTP project, subject to award of a contract with Lonsdale Energy Corporation for effluent heat sale.
-

PURPOSE

The purpose of this report is to seek GVS&DD Board authorization to proceed with effluent heat recovery as part of the North Shore Wastewater Treatment Plant (NSWWTP) project and to seek authorization to negotiate a contract with Lonsdale Energy Corporation for the sale of effluent heat from the NSWWTP that acquires enough greenhouse gas (GHG) reduction credits to make the Liquid Waste utility carbon neutral.

BACKGROUND

In April 2017, the Design-Build-Finance contract for the NSWWTP was awarded to ADApT Consortium for \$525 million. Effluent heat recovery was included in the Design-Build-Finance contract as an optional item. GVS&DD has until October 5, 2017 to exercise the optional item and direct ADApT Consortium to design and construct the effluent heat recovery system. The NSWWTP has the potential to be a net producer of energy by implementing effluent heat recovery. The GVS&DD's Liquid Waste utility has the opportunity to reduce its carbon footprint to zero if GVS&DD commits to effluent heat recovery at NSWWTP.

This report brings forward for Board consideration approval of the NSWWTP optional project to design and build an effluent heat recovery system, which would proceed once a contract with the Lonsdale Energy Corporation has been approved by the Board.

BUSINESS CASE

Effluent heat recovery has the potential to contribute to the goals of *the Integrated Liquid Waste and Resource Management Plan*, which directs Metro Vancouver to use liquid waste as a resource and to evaluate opportunities for energy recovery from major wastewater treatment plant projects. Effluent heat recovery contributes to the goals of the NSWWTP project and has been highlighted in the descriptions of the plant that resulted in the federal and provincial governments committing significant funding towards the NSWWTP.

For effluent heat recovery to be financially viable, a nearby customer must be willing to purchase the energy. Lonsdale Energy Corporation (LEC), a district energy provider wholly owned by the City of North Vancouver, was the only respondent to a Request for Qualifications and Interest in 2014. Metro Vancouver staff and LEC staff have subsequently been investigating technical and commercial considerations of providing effluent heat from the NSWWTP to LEC’s district energy system.

Cost Estimates

ADApT Consortium provided a guaranteed cost of \$13,245,668 to build the effluent heat recovery system within the NSWWTP and a monthly cost of \$223,320 for up to 12 months during the performance period, for a total rounded cost of \$15,926,000. If the project proceeds, an additional \$2,000,000 will be required for BC Hydro infrastructure, for a total GVS&DD investment of \$17,926,000. LEC would be required to spend an estimated \$3,543,000 to install distribution piping from the NSWWTP to the LEC district energy system to be able to receive the effluent heat. In total, the cost for the project is \$21,469,000. Operating costs over the project life would be recovered from LEC.

Greenhouse Gas Emission Reductions

It is projected that the effluent heat recovery project will reduce GHG emissions by over 7,000 tonnes per year on average over the 25-year project life. These reductions will be achieved by displacing the use of natural gas in LEC’s district energy system.

Following the guidelines in the *Liquid Waste Heat Recovery Policy* (Attachment 1), GHG reductions are proposed to be allocated in proportion to respective contributions to project costs, as indicated in Table 1. An estimated 16 per cent of GHG reductions will be allocated to LEC based on their capital expenditure. BC Hydro has indicated intent to contribute up to \$1,000,000 to the effluent heat project in return for GHG emission reduction credits, which amounts to 5 per cent of the GHG reductions. Confirmation of BC Hydro funding is expected by September 2017. The remaining 79 per cent of GHG reductions, approximately 5,700 tonnes per year, will be allocated to GVS&DD based on its net capital contribution of \$16,926,000.

Table 1. Estimated GHG allocation based on contributions to project cost

	Capital commitment	GHG allocation	Average annual GHG reduction credits
GVS&DD	\$16,926,000	79%	5,700 tonnes CO ₂ e/yr
LEC	\$3,543,000	16%	1,200 tonnes CO ₂ e/yr
BC Hydro	\$1,000,000	5%	300 tonnes CO ₂ e/yr

Carbon Neutral Commitments

In the 2010 *Corporate Climate Action Plan*, Metro Vancouver committed to becoming carbon neutral by reducing corporate emissions, providing renewable energy to other parties to avoid emissions in the region, sequestering carbon, and as a last resort, purchasing or creating offset credits. The anticipated reduction in GHG emissions from Metro Vancouver’s existing portfolio of projects is not sufficient to achieve corporate carbon neutrality. New sources of GHG reductions are required.

Effluent heat recovery at NSWWTP is the first major GHG reduction project within Metro Vancouver’s operations that is ready to be implemented and is cost-effective due to efficiencies of coordination with the construction of the NSWWTP and its proximity to LEC’s district energy system.

Metro Vancouver's corporate carbon footprint for all energy and transportation related emissions is approximately 20,000 tonnes CO₂e per year, of which 5,000 tonnes are from the Liquid Waste utility. These emissions are projected to increase after the secondary upgrades of the North Shore and Iona Island Wastewater Treatment Plants.

GVS&DD would receive GHG reductions of over 5,000 tonnes per year as soon as the NSWWTWP is commissioned by investing in the effluent heat project. This would make the Liquid Waste utility carbon neutral starting in 2021. The cost of investing in these GHG reductions is \$120/tonne. This cost is lower than the price of \$150/tonne established in the *Carbon Price Policy* (Attachment 2), showing that this is a cost-effective GHG reduction project.

Based on the business case analysis, including opportunities to reduce overall GHG emissions in the region, the following alternatives are presented for consideration.

ALTERNATIVES

1. That the GVS&DD Board:
 - a) direct staff to enter into contract negotiations with Lonsdale Energy Corporation for the sale of effluent heat; and
 - b) authorize ADApT Consortium to proceed with the effluent heat recovery portion of the NSWWTWP project, subject to award of a contract with Lonsdale Energy Corporation for effluent heat sale.
2. That the GVS&DD Board authorize ADApT Consortium to proceed with the effluent heat recovery portion of the NSWWTWP project.
3. That the GVS&DD Board receive for information the report dated July 6, 2017, titled "Effluent Heat Recovery at North Shore Wastewater Treatment Plant" and provide alternate direction.

FINANCIAL IMPLICATIONS

If the Board approves Alternative 1, GVS&DD would commit \$17,926,000 for the effluent heat recovery project. Of that, \$15,926,000 would be to the ADApT Consortium to build and commission the effluent heat recovery facility, and \$2,000,000 for associated BC Hydro infrastructure. These costs would be partially offset by grant contributions from BC Hydro of up to \$1,000,000 toward the project. GVS&DD would also acquire associated GHG reduction credits. All operating costs for effluent heat recovery over the life of the project would be recovered from LEC.

The NSWWTWP project has a total budget of \$700 million including contingency and committed funding from the federal and provincial governments of \$405 million. The effluent heat recovery project is an optional item that will be added to the NSWWTWP project, in addition to the \$700 million. However, it is possible that some or all of the cost of the optional effluent heat recovery project may be accommodated within the \$700 million NSWWTWP budget depending on final outcome on expenditures from the project contingency. If required to support the project, additional funds of up to \$17,926,000 will be included within the 2018-2022 Financial Plan.

The capital expenditure will be contingent on successful negotiation of a contract with Lonsdale Energy Corporation for the sale of effluent heat. The contract would allocate the GHG reduction credits based on respective contributions to project costs. If the recommendation is supported by the Board, the proposed contract with LEC will be presented to the Board for approval at the September Board meeting. The contract must be executed before the October 5, 2017 deadline to exercise the

optional item for ADaPT Consortium to proceed with design and construction of the effluent heat recovery system.

If the Board approves Alternative 2, GVS&DD would make a commitment of \$17,926,000, less any grant contributions from BC Hydro, to build and commission the effluent heat recovery project without requiring a contract for sale of effluent heat to be in place. The risk exists that no effluent heat contract would be awarded, and consequently that the equipment would never be beneficially used and is not recommended.

SUMMARY / CONCLUSION

In April 2017, the Design-Build-Finance contract for the NSWWTP was awarded to ADaPT Consortium for \$525 million. Effluent heat recovery was included in the Design-Build-Finance contract as an optional item. GVS&DD has until October 5, 2017 to exercise the optional item and direct ADaPT Consortium to design and construct the effluent heat recovery system. The NSWWTP has the potential to be a net producer of energy by implementing effluent heat recovery. The GVS&DD's Liquid Waste utility has the opportunity to reduce its carbon footprint to zero if the GVS&DD invests in effluent heat recovery at NSWWTP.

Metro Vancouver's corporate carbon footprint is approximately 20,000 tonnes per year, of which 5,000 tonnes are from the Liquid Waste utility. Metro Vancouver has committed to becoming carbon neutral and needs new sources of GHG reductions to achieve this commitment. Implementing effluent heat recovery at NSWWTP would result in GHG emission reductions of more than 7,000 tonnes annually. GHG reduction credits from the project will be allocated in proportion to respective contributions to project costs.

GVS&DD can achieve carbon neutrality for the Liquid Waste utility starting in 2021 by investing in the NSWWTP effluent heat recovery project. The investment would acquire an annual average of 5,700 tonnes of GHG reductions. The cost of achieving the GHG reductions is \$120/tonne which is considered cost-effective. Staff recommend Alternative 1.

Attachments

1. Liquid Waste Heat Recovery Policy
2. Carbon Price Policy

21990261

BOARD POLICY

LIQUID WASTE HEAT RECOVERY

Effective Date: June 23, 2017

Approved By: GVS&DD Board

PURPOSE

To enable beneficial use of waste heat and associated greenhouse gas emission reductions from Metro Vancouver's liquid waste system by external parties.

DEFINITIONS

"Waste heat" is excess heat that is available from GVS&DD operations, including but not limited to heat from untreated sewage, treated effluent, equipment or processes.

"Heat user" is a third party interested in accessing excess heat from GVS&DD's liquid waste system. A heat user may be a member municipality or other entity.

POLICY

Metro Vancouver is committed to pursuing strategies and actions that mitigate climate change. Waste heat recovery projects that displace the use of fossil fuels result in a reduction in regional greenhouse gas emissions. Recovering waste heat from the liquid waste system contributes to GVS&DD's *Integrated Liquid Waste and Resource Management Plan* goal of using waste as a resource.

This policy enables expedient access to waste heat where technically and financially feasible while ensuring that GVS&DD is able to convey and treat wastewater and meet all service objectives. This policy applies to situations where external parties request waste heat from GVS&DD's liquid waste system and to situations where GVS&DD offers waste heat to interested external parties.

COLLECTION SYSTEM PROJECTS

Allocation of Waste Heat

GVS&DD will allocate access to untreated sewage for heat recovery on a first-come first-served basis in response to requests by interested heat users, provided the proposed heat recovery project will not adversely impact GVS&DD services or other established heat recovery projects, as determined by GVS&DD review. If an established heat recovery project that is already in place or approved for development by GVS&DD could be impacted by a proposed new heat recovery project, the established project's heating and/or cooling requirements will have priority. Private entities requesting access to waste heat must provide a letter of support from the host municipality demonstrating support and cooperation including allowance for works within municipal rights of way. Projects that access heat from municipal sewers do not require GVS&DD approval.

Ownership and Responsibilities

GVS&DD owns a sewerage system and is responsible for sewage in its liquid waste system, including any associated resources such as heat. The boundaries of responsibility for heat recovery equipment and infrastructure are primarily tied to property ownership and will be defined in a contract between

GVS&DD and the heat user. GVS&DD will own and be responsible for the portion of the tie-in up to and including a shut-off valve on both the diversion and return lines. GVS&DD will consider an in-line heat recovery system built directly in a GVS&DD sewer if the system will not impair GVS&DD operations.

Cost Recovery

GVS&DD will charge the heat user for all costs incurred to establish and maintain access to sewage. The value of sewage will be assessed using business case processes, including consideration of nominal value of sewage, and incorporated into sewage access contracts.

Environmental Attributes

Benefits associated with greenhouse gas reductions (such as carbon offset credits) and the costs of administering those benefits will be allocated on a case-by-case basis, in accordance with the costs and risks incurred by the parties involved in developing the heat recovery project.

TREATMENT PLANT AND OUTFALL PROJECTS

Allocation of Waste Heat

When GVS&DD identifies waste heat opportunities in wastewater treatment plants and effluent outfalls, GVS&DD will follow competitive processes in offering available waste heat to potential heat users, to ensure fairness and transparency.

Ownership and Responsibilities

The boundaries of responsibility for heat recovery equipment and infrastructure are primarily tied to property ownership and will be defined in a contract between GVS&DD and the heat user. GVS&DD will own and be responsible for waste heat recovery equipment and related infrastructure installed within its wastewater treatment plants and effluent outfalls, except in cases where ownership by an external party is deemed preferable to the GVS&DD.

Cost Recovery

Heat recovery projects within wastewater treatment plants and effluent outfalls will require capital investment by GVS&DD and will require ongoing operations and maintenance by GVS&DD. GVS&DD will recover the costs incurred in providing waste heat to external parties over the life of the project. GVS&DD does not seek to profit from the provision of heat. GVS&DD staff will evaluate heat recovery projects using established life cycle cost analysis and options analysis frameworks and will consider each project on a case by case basis. Benefits will include the value of avoided greenhouse gas emissions. A contract with the heat user will be established for each project that assigns the costs and benefits between GVS&DD, the heat user and other funding sources.

Environmental Attributes

Benefits associated with greenhouse gas reductions (such as carbon offset credits) and the costs of administering those benefits will be allocated on a case-by-case basis, in accordance with the costs and risks incurred by the parties involved in developing the heat recovery project.

CARBON PRICE

Effective Date: June 23, 2017

Approved By: MVRD Board

PURPOSE

To establish a price on Applicable Greenhouse Gas (GHG) Emissions, and to enable the value of those GHG emissions to be incorporated into Life Cycle Cost Analyses for Metro Vancouver projects or initiatives.

The objectives of the *Carbon Price Policy* are to:

- Incorporate consideration of climate change mitigation (i.e., GHG emissions reduction) into options analyses for all Metro Vancouver projects or initiatives; and
- Provide a mechanism to reduce financial risk of increased operating costs associated with rising external carbon taxes over the lifetime of a Metro Vancouver project or initiative.

DEFINITIONS

“Applicable Greenhouse Gas (GHG) Emissions” are GHG emissions associated with Metro Vancouver projects or initiatives, in particular GHG emissions related to energy use and utility processes, and GHG emissions reductions (or avoided GHG emissions) related to ecological carbon storage/sequestration.

“Carbon dioxide equivalent (CO₂e)” is the common metric used to quantify and compare different types of GHG emissions, and is expressed in tonnes.

“Carbon Price” is the total dollar value (including any provincial and federal carbon taxes) assigned by Metro Vancouver to one tonne of CO₂e.

“Life Cycle Cost Analysis” is the process to establish the net present value of all costs and revenues associated with a Metro Vancouver project or initiative over its expected life.

POLICY

When undertaking options analysis for a Metro Vancouver project or initiative, the Carbon Price will be used to calculate the value (expressed as a cost) of Applicable GHG Emissions associated with each option. This value will be included in the Life Cycle Cost Analysis for each option.

Carbon Price

Metro Vancouver will use a total Carbon Price (inclusive of any applicable external carbon taxes) of \$150 per tonne of CO₂e in Life Cycle Cost Analyses.

Financial Services, in coordination with the Air Quality and Climate Change Division, will develop and annually review a *Carbon Price Schedule*. This *Carbon Price Schedule* will provide the incremental cost per unit of purchased energy (e.g., litres of gasoline, GJ of natural gas), as well as the cost per unit of other Applicable GHGs (e.g., tonne of fugitive methane). The carbon price will be adjusted to account for any changes to provincial and federal carbon taxes, to ensure that the total carbon price per tonne of Applicable GHGs is constant at \$150 per tonne of CO₂e.

Application

This policy applies to all options analyses that use Life Cycle Cost Analysis for Metro Vancouver projects or initiatives, including (but not limited to):

- Planning, design, procurement, construction, operation, maintenance, and decommissioning (where applicable) of facilities, vehicles, and equipment owned or operated by Metro Vancouver or by third parties on Metro Vancouver's behalf;
- Acquisition of park land, where protection of the land by Metro Vancouver results in quantifiable GHG emissions reductions compared to business as usual; and
- Management of process emissions from Metro Vancouver facilities.

The Carbon Price will be used to calculate the value of Applicable GHG Emissions associated with:

- Energy purchased by Metro Vancouver or by third parties on Metro Vancouver's behalf for the operation of utilities, fleet, and facilities (including natural gas, liquid petroleum products, propane, and electricity);
- Fugitive methane and nitrous oxide emissions released from wastewater treatment processes and municipal solid waste management processes;
- Avoided GHG emissions due to the displacement of fossil fuels with energy recovered from Metro Vancouver facilities;
- Avoided GHG emissions attributable to the protection and/or restoration of park land such as forests and bogs; and
- Other sources related to Metro Vancouver's activities.

Related Document:

Carbon Price Schedule (22496514)