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_2e/yr
LEC	$3,543,000	16%	1,200 tonnes CO_2e/yr
BC Hydro	$1,000,000	5%	300 tonnes CO_2e/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 CO_2e 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 NSWWTP 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 NSWWTP 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 NSWWTP 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 NSWWTP 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 NSWWTP 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 NSWWTP 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

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