

<b>TO:</b>	<b>CHAIR AND MEMBERS CIVIC WORKS COMMITTEE MEETING ON WEDNESDAY, JUNE 7, 2017</b>
<b>FROM:</b>	<b>KELLY SCHERR, P.ENG., MBA, FEC MANAGING DIRECTOR, ENVIRONMENTAL &amp; ENGINEERING SERVICES &amp; CITY ENGINEER</b>
<b>SUBJECT:</b>	<b>CLEAN WATER AND WASTEWATER FUND PURCHASE OF MAJOR ORGANIC RANKINE CYCLE SYSTEM COMPONENTS FOR POWER GENERATION AT THE GREENWAY WASTEWATER TREATMENT PLANT</b>

<b>RECOMMENDATION</b>
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That, on the recommendation of the Managing Director, Environmental and Engineering Services and City Engineer, the following actions **BE TAKEN** with respect to purchase of an Organic Rankine Cycle (ORC) System Power Unit and Heat Exchanger:

**a) ORC System Power Unit**

- i) The proposal submitted by Turboden, S.r.l., for the purchase of an ORC Power Unit at a quoted price of \$2.8 M, including contingency (excluding H.S.T.) **BE APPROVED** in accordance with Section 12.2 b) and 12.4 of the City of London's Procurement of Goods and Services Policy;
- ii) The financing for this purchase **BE APPROVED** in accordance with the "Sources of Financing Report" attached as Appendix "A";
- iii) the approval given herein **BE CONDITIONAL** upon the Corporation negotiating prices, terms and conditions to the satisfaction of the Managing Director, Environmental and Engineering Services and City Engineer,
- iv) the Mayor and City Clerk **BE AUTHORIZED** to execute any contract or other documents, if required, to give effect to these recommendations.

**b) ORC System Heat Exchanger**

- i) the price submitted by Arvos Schmidtsche Schack LLC for the single source purchase of an ORC system Heat Exchanger and ancillary components at a total price of \$1.1M, including contingency (excluding H.S.T.) **BE APPROVED** in accordance with section 7.4 and 14.4 e) of the City of London's Procurement of Goods and Services Policy;
- ii) The financing for this purchase **BE APPROVED** in accordance with the "Sources of Financing Report" attached as Appendix "A";
- iii) the Civic Administration **BE AUTHORIZED** to undertake all administrative acts that are necessary in connection with this project;
- iv) the Mayor and City Clerk **BE AUTHORIZED** to execute any contract or other documents, if required, to give effect to these recommendations.

<b>PREVIOUS REPORTS PERTINENT TO THIS MATTER</b>
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CWC report 2106-11-29, Item 10, Appointment of Consultants-Clean Water and Wastewater Fund Projects

CWC report of 2016-10-04, item 8, Infrastructure Canada Phase 1-Project Requests- Clean Water and Wastewater Fund

CWC report of 2016-07-18, Item 5, Advancing a 760 kW Renewable Energy Project at the Greenway Wastewater treatment Plant

CWC report of 2016-02-02, Item 5, Electricity Generation from Waste Heat at the Greenway Wastewater Treatment Plant-Update

CWC Report of 2013-09-09, Item 11, Biosolids Disposal Assessment

CWC Report of 2012-05-14, Item 14, Renewable Energy Production from the Greenway Fluidized Bed Incinerator

CWC Report of 2013-02-25, Item 3, Timeline for Major Environmental and Engineering Reports

## **2015-19 STRATEGIC PLAN**

This project supports the Strategic Plan with respect to Building a Sustainable City- Robust Infrastructure, through investments in the Wastewater Business Plan and renewable energy production.

## **BACKGROUND**

### **Purpose**

This report requests Council approval for the purchase of an ORC power unit based on the results of an Expression of Interest (EOI) and Request for Proposal (RFP) process and the single source purchase of an ORC heat exchanger under section 7.4 and 14.4 e) of the Procurement of Goods and Services Policy.

### **Context**

The City is pursuing the installation of an ORC system capable of generating between 460 and 800 kW of electricity using waste heat from the Greenway biosolids incinerator. The two main system components, the power unit and heat exchanger, have delivery times of 12 and 10 months respectively; the system design will be completed around these two components once the suppliers are finalized.

## **DISCUSSION**

### **Clean Water and Wastewater Fund**

The first phase of funding for the Clean Water and Wastewater Fund (CWWF) is a 2 year - \$2 Billion Government of Canada investment to meet immediate priorities for clean water and wastewater to support a cleaner and healthier environment for communities. CWWF focuses on investing in projects that:

- Rehabilitate and optimize water, storm water and wastewater related infrastructure;
- Improve asset management approaches including pilots and studies;
- Plan for future upgrades to wastewater treatment and collection infrastructure;
- Include new construction projects like naturalized systems.

### **Project Description**

Recent reports to Municipal Council have outlined the potential to generate renewable electricity from biosolids incineration at the Greenway plant. An ORC system will

generate electricity worth between \$0.65 M and \$1.0 M annually dependent mainly on the biosolids generated within the City and the resultant loading rate to the incinerator; all electricity generated will be used within the Greenway plant. The overall system cost is estimated at \$7.7 M with \$5.7 M in funding applied for under Phase 1 of the CWWF, the City's portion of the \$5.7 M is \$1.42M. The remaining \$2.0 M is associated with the system installation and will be submitted for funding under Phase 2 of the CWWF provided it meets the funding criteria and timelines.

### **ORC Power Unit Pre-Purchase**

A formal EOI was issued for the ORC power unit in accordance with Section 12.2 b) and 12.4 of the City of London's Procurement of Goods and Services Policy. Three manufacturers responded and all three were carried forward to the RFP stage. Two of the suppliers were from Italy and one was from the United States. The RFP closed on January 31, 2017 with two suppliers submitting Proposals: Turboden S.r.l and Exergy, both based in Italy. Upon evaluation by staff in Wastewater Operations and Purchasing, as well as two Engineering Consulting firms with expertise in waste heat recovery systems, the proposal from Turboden S.r.l. was determined to offer the highest value to the City. Turboden has been carried forward as the recommended manufacturer.

### **Heat Exchanger**

The City recently installed a new preheater and reheater for the Greenway incinerator under a single source contract with Arvos Schmidtsche Schack LLC. The Arvos units were selected due to their proven reliability in municipal biosolids applications. A warranty inspection of the Arvos Units was undertaken in May 2017 and the inspection revealed no issues with either unit. Arvos has also installed a thermal fluid heat exchanger similar to that required by the proposed Greenway ORC unit which has run trouble free and without a loss of efficiency since 2003. Due to the proven performance of these units, it is recommended that the ORC system heat exchanger and ancillary components be purchased as a single source procurement in accordance with section 7.4 and 14.4 e) of the City of London's Procurement of Goods and Services Policy.

<b>CONCLUSIONS</b>
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The installation of an ORC system using waste heat from the Greenway Incinerator will generate from \$650,000 to \$1,000,000 in electricity annually over the 20 year life expectancy of the system. Purchasing the main equipment as described herein will enable the completion of the system design and the timely commissioning of the system. Installation is expected to occur in 2018.

### **Acknowledgements**

This report was prepared with the help of Kirby Oudekerk, P.Eng. Environmental Services Engineer and Mark Elliott CET. Senior Technologist, both of the Wastewater Treatment Operations Division.

<b>PREPARED BY:</b>	<b>REVIEWED AND CONCURRED BY:</b>
<b>GEORDIE GAULD, DIVISION MANAGER WASTEWATER TREATMENT OPERATIONS</b>	<b>JOHN LUCAS, P. ENG. DIRECTOR, WATER AND WASTEWATER</b>
<b>RECOMMENDED BY:</b>	
<b>KELLY SCHERR, P.ENG., MBA, FEC MANAGING DIRECTOR ENVIRONMENTAL &amp; ENGINEERING SERVICES AND CITY ENGINEER</b>	

Attach: Appendix "A"- Sources of Financing

cc:

- Turboden s.r.l., via Cernia, 10 25124 Brescia IT
- Arvos Schmidtsche Schack LLC; 6500 Brooktree Road, Ste 300  
Wexford Pennsylvania, 15090, USA