TORONTO

# STAFF REPORT
# ACTION REQUIRED

# Enwave – Deep Lake Water Cooling System Expansion Proposal

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| **Date:** | April 23, 2013 |
| **To:** | Public Works and Infrastructure Committee |
| **From:** | General Manager, Toronto Water |
| **Wards:** | All |
| **Reference Number:** | P:\2013\Cluster B\TW\pw13009 |

## SUMMARY

This report requests authority for the General Manager of Toronto Water to enter into negotiations with Enwave Energy Corporation (Enwave) to amend the Energy Transfer Agreement (ETA) on the basis of a proposed expansion to the Deep Lake Water Cooling (DLWC) system. Enwave has approached the City with a proposal to increase the size of the DLWC system, based on a new raw water diversion system, originating at Toronto Water's Island Water Treatment Plant (WTP).

The proposal has sufficient technical merit and potential to provide benefits to the City including increasing revenues, rehabilitating existing equipment with minimal City investment, capitalizing on abandoned infrastructure and establishing environmental improvements. If mutually beneficial terms can be agreed upon, a DLWC expansion will be an opportunity to strengthen an existing strategic business partnership providing benefits to both parties.

## RECOMMENDATIONS

**The General Manager of Toronto Water recommends that:**

1. City Council authorize the General Manager of Toronto Water, in consultation with the Chief Corporate Officer and the City Solicitor, to:

    a. enter into without prejudice contract negotiations with Enwave Energy Corporation (Enwave) regarding Enwave's proposal to further amend the Energy Transfer Agreement (ETA) between the City and Enwave dated

January 18, 2002, as amended, to expand the Deep Lake Water Cooling (DLWC) Project's system capacity by increasing the flow of cool water from the City's Island Water Treatment Plant; and

b. to report back following the conclusion of negotiations to seek further Council direction.

### Financial Impact

As a result of revenues collected from Enwave under the terms of the ETA, Toronto Water has estimated 2013 revenue of $2.46 million. Any additional revenues that would be negotiated with Enwave would be dealt with through the budget process.

While strategic capital cost-sharing options may be considered during negotiations with Enwave, there are no immediate financial impacts arising from this report. Any capital financial impact arising from an agreement would be dealt with through the annual budget process.

The Deputy City Manager and Chief Financial Officer have reviewed this report and agree with the financial impact information.

## ISSUE BACKGROUND

In 2002, the City entered into a 50-year Energy Transfer Agreement with Enwave to provide cold treated drinking water to Enwave for their district cooling system which provides air conditioning to a number of downtown buildings. This initiative is known as the Deep Lake Water Cooling project. The ETA, as amended, defines the responsibilities, operational relationships, required infrastructure upgrades, and cost obligations as agreed upon between the parties.

Since commissioning, under the terms of the ETA, the DLWC project has yielded the City with annual operating income, supplemental cost recoveries, and a net gain of new or improved infrastructure.

In February 2013, Enwave presented a proposal to the City aimed at expanding the DLWC system by diverting a portion of raw water (untreated) at the Island WTP, thus creating a supplemental and independent DLWC cold water process stream. As a part of Enwave’s project works, the City could benefit from direct cost savings where existing City infrastructure improvements are required. Additionally, new operating revenues could be realized annually.

## COMMENTS

Enwave's DLWC expansion proposal involves constructing a new supplementary raw water system to utilize available capacity and inactive City infrastructure. Whereas the existing DLWC system relies on a heat exchange process linked to treated drinking

water, the expansion plan contemplates using cold raw water (untreated) before it undergoes the Plant's treatment process. To accomplish this, infrastructure changes at the Island WTP would be required to construct a raw water diversion and storage system.

Conceptually, unused pumping capacity associated with the Island WTP's raw water pumps would be used, subject to Ministry of Environment (MOE) approval, diverting a portion of the raw water into six large storage tanks. To convey the cold raw water to Enwave's heat transfer station located at the John Street Pumping Station (JSPS) on the mainland, a parallel – but separate and distinct – piping network would be either rehabilitated and/or constructed.

Specifically, through reconditioning efforts, Enwave envisions using six of the Island WTP's slow sand filter tanks for cold water storage and an abandoned 1800 mm pipeline from the Island WTP to Mugg's Island. For Enwave's final conveyance stretch, from Mugg's Island into JSPS, they would construct a new raw water tunnel.

To accomplish this project scope and achieve the desired raw water cooling capacity, Enwave is proposing to invest an estimated $50M to $60M in capital project costs.

A non-negotiable City condition would be that Enwave's expansion proposal would in no way hinder, adversely impact or interfere with the operation of the Island WTP or the security of the City's water supply system. The City's water system will always take priority and precedent over DLWC.

## Potential Benefits and Opportunities

The potential benefits and opportunities of the proposal, for the City, are as follows:

### 1. Financial Benefits

The pricing premise for energy transfer between the existing treated water cooling supply and the proposed raw water cooling supply would be one of neutrality. That is, the Energy Transfer Fee structure paid by Enwave to the City would remain constant with either cooling water source, thus maintaining consistent and efficient process operating strategies.

For activating the City's abandoned infrastructure, Enwave has proposed to pay nominal leasing fees. The value for the City would be two-fold: 1) in collecting additional on-going operating revenues for the increased DLWC flows, and 2) in capital cost savings associated with mounting water treatment process equipment rehabilitation needs.

<u>Net Operating Income</u>

Under the existing ETA with Enwave, the City collects an Energy Transfer Fee (ETF). It is based on the amount of heat Enwave shifts to the City’s treated drinking water, without impacting water quality, through an independent process known as an energy transfer

loop. In 2012, the ETF received by the City was $1,014.641. Based on the DLWC expansion proposal as submitted by Enwave, the ETF may increase annually by about 41% (or an estimated $416,000 based on 2012 revenues).

Operational Cost Recoveries

In terms of operational cost recoveries, the ETA stipulates that Enwave reimburse the City for an Incremental Operating Cost (IOC), defined as the net additional operating and maintenance costs directly incurred that are required to enable the City to fulfil its obligations over and above those costs that the City would have incurred had the DLWC project not been undertaken. Enwave's expansion proposal recommends that the City be reimbursed for all additional incremental variable costs associated with the raw water diversion project. This new and distinct fee would need to be defined and include, but not be limited to, increased costs for additional pumping, maintenance, staffing and system monitoring. Additionally, there may be nominal leasing revenues associated with using previously abandoned Toronto Water infrastructure.

Capital Costs

The project capital costs would be borne by Enwave. This includes upgrades to plant infrastructure which in some cases would provide cost savings for the City. In addition, there may be opportunities for improvement through specific cost sharing arrangements targeted at City infrastructure. The City could benefit from enhanced service delivery, operational efficiencies, system reliability and flexibility, or improved regulatory compliance on certain capital projects that could be constructed jointly with Enwave.

Enwave is committed to reimbursing the City for the cost of hiring an independent consulting engineering firm, reporting to the City, to scrutinize, perform due diligence, and seek design enhancements or innovation as Enwave's proposed capital project design impacts the City's water treatment and supply system.

## 2. Infrastructure Benefits

Under Enwave's expansion proposal, the City is to benefit from new, rehabilitated, or improved infrastructure assets. The project modifications are primarily focused at the Island Water Treatment Plant, the source of the cold water. Of the system changes proposed by Enwave, the following asset improvements would add direct value to the City (capital cost savings) at the Island WTP:

- upgrades to five raw water pumps, including reconditioning of the pump motors and impeller replacements;
- construction of residue management facility infrastructure, incorporating four slow sand filter tanks and appurtenances to meet regulatory requirements;
- removal and disposal of solids from two slow sand filter tanks; and
- replacement of five raw water pump discharge pipes and valves.

### 3. Additional Opportunities

Enwave would commit to assessing and developing an equipment redundancy and reliability plan, in conjunction with the City, as it pertains to an expanded use of the City's infrastructure capacity. Under the terms of negotiating an agreement, a technical review of redundancy and reliability issues would ensue as a cooperative effort between Enwave and City staff, with a view to reaching consensus on equipment vulnerabilities, mitigated measures, and cost allocations. Accordingly, an opportunity exists to strengthen the integrity and security of the City's water supply system.

A thorough review of the impact of expansion is anticipated to reveal possible opportunities for enhanced system supply security. A preliminary evaluation of the proposal suggests that certain improvements may be required, but are not limited to:

- adding a variable frequency raw water pump motor drive at the Island WTP;
- replacing the pre-chlorination solution lines at the Island WTP;
- modifying the supply piping on one treated water pump at John Street Pumping Station;
- improving reliability of the conveyance tunnel from the Island WTP across to Mugg's Island and/or into John Street Pumping Station; and
- adding pipes to transfer residue solids from the Island WTP in a batch manner to the mainland waste water treatment process

The cost of these potential improvements would be borne solely by Enwave, or shared with the City if deemed strategically beneficial as they pertain to Toronto Water's Strategic Plan.

## Anticipated Challenges

Enwave's proposal seeks to share the Island WTP's discharge point for the overflow on its proposed cold raw water storage tank. This could have environmental compliance implications and would require further investigation.

The proposal suggests that Enwave's warmed raw water outfall strategy would be to discharge into Toronto Harbour via a City storm sewer. With this approach there is a risk of potentially flooding the storm sewer during high flow rates. Alternate routings would need to be reviewed and likely established by Enwave.

Construction of the proposed project works could infringe upon property boundaries for construction staging and for the new infrastructure itself. Infrastructure easements from various government bodies, and construction coordination issues with in-service utilities, would prove to be challenging and require support resources.

Enwave would be held entirely responsible for securing any necessary environmental approvals.

In order to analyze these challenges, a Toronto Water review team would be formed to assess the issues and offer potential solutions. Engineering evaluations, supportive hydraulic modeling, and scrutiny of Enwave's detailed engineering designs would be required to support the project assumptions. This would be accomplished through both the internal review team and an independent consulting engineering assignment.

## Environmental Benefits

According to Enwave, by harnessing the coldness from the lake water, an alternative to conventional air-conditioning is achieved in the downtown commercial district. The Deep Lake Water Cooling partnership has already resulted in significant carbon reductions and improved air quality in Toronto's environment.

Enwave suggests that all environmental benefits associated with an expanded DLWC system would be extrapolated by an additional 41%, commensurate with the ratio of increased DLWC production. Table 1 summarizes the existing and predicted net environmental benefits to Toronto.

**Table 1: Summary of Enwave's Anticipated Net Environmental Benefits**

| **Environmental Benefit** (as per Enwave's proposal) | **Existing Improvement** | **Predicted Improvement Under DLWC Expansion Scenario** |
|---|---|---|
| **Electrical Reduction (over mechanical chillers)** | 90 % | 90 % |
| **Electricity Demand Reduction** | 61 MW | 86 MW |
| **CO2 Emission Reduction** | 79,000 tonnes per year | 111,390 tonnes per year |
| **CFC Elimination** | 1,391 kg per year | 1,961 kg per year |
| **SOx Reduction** | 145 tonnes per year | 204 tonnes per year |
| **NOx Reduction** | 318 tonnes per year | 448 tonnes per year |

A review of the potential environmental carbon offset credits to be retained by the City would need to be explored.

## CONCLUSION

A preliminary technical and financial review of Enwave's DLWC expansion proposal indicates that there is potential for a mutually beneficial agreement based on a raw water diversion system originating at the Island WTP. As such, approval is being sought to enter into without prejudice contract negotiations with Enwave to amend the ETA to expand the DLWC system capacity, by increasing the flow of cold water. Negotiations

would ensue in 2013 with an expected report to the Public Works and Infrastructure Committee and Council by the year-end.

Legal Services has been consulted in the preparation of this report.

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## SIGNATURE

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