SUBJECT: Lister Block District Energy System  
(PW09045/FCS09051) - (City Wide)

RECOMMENDATION:

(a) That the Acting General Manager of Public Works be authorized to formally notify LIUNA Local 837 Lister Property Corporation, of the City’s decision to proceed with the installation of a district energy system rather than a stand-alone system for the Lister Block, and adjust the purchase price, as per the terms of the Agreement of Purchase and Sale, dated June, 30, 2008;

(b) That the net capital costs for the Lister Block district energy system in the amount of up to $160,000 be funded from the Federal Gas Tax Reserve (Dept ID 112213).
EXECUTIVE SUMMARY:

On June 30, 2008, the City entered into an Agreement of Purchase and Sale (the “Agreement”), for the Lister Block with LIUNA Local 837 Lister Property Corporation (“LIUNA”), (refer to report FCS08060/PED08168/CM08018). A number of conditions were placed on both parties as per a prescribed timeline contained within the Agreement.

Report PW09045/FCS09051 is brought forward to seek approval of the recommended course of action to address one of the Agreement’s conditions. As per the Agreement, the City, in its’ sole discretion, is to decide whether a stand-alone HVAC system or a district energy system be installed for the Lister Block. Additionally, LIUNA and the City agreed to adjust the purchase price, to the extent that the cost of the materials and installation of a district energy system (heating and cooling) differs from the cost of the materials and installation of a stand-alone system.

The City engaged the services of a consultant to provide a preliminary evaluation on options for the heating and cooling systems for the Lister Block. The primary focus of the review was to determine whether it would be in the City’s overall best interests to connect the Lister Block to the downtown core district heating and district cooling systems or to proceed with stand-alone heating and cooling plants.

Based on the results of this analysis the recommended option is to connect the Lister Block to both the downtown core’s district heating and district cooling systems. This recommendation is based on a numbers of factors which include the district system having the lowest total life cycle costs, lowest energy usage and greenhouse gas (GHG) emissions. The district energy system also provides full system redundancy, whereas the stand-alone system as designed does not. Moving forward with the district energy solution could allow future expansion to clients in this area of the downtown core.

The district energy systems will require an initial combined capital investment estimate totalling $1.160 million. With the installation of the district energy systems, the stand-alone heating and cooling system at the Lister Block are no longer required. Therefore this would result in a reduction in the total Lister Block Agreement purchase price estimated in the range of $500,000 to $600,000. This is essentially a rebate on the City’s initial $25 million investment, resulting in reduction in the projects district energy capital costs of $550,000 to $660,000. Further the associated cost for Hamilton Community Energy (HCE) to expand their district heating piping to Lister is approximately $500,000, which would be recovered through capacity charges of about $45,000 annually. Therefore the resulting net capital requirement from the City directly is estimated between $60,000 and $160,000.

Capital Costs estimates and Breakdown

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Capital Cost Estimate for District Energy</td>
<td>$1,160,000</td>
</tr>
<tr>
<td>Less Recovery from Stand-Alone System</td>
<td>$500,000 to $600,000</td>
</tr>
<tr>
<td>Less Capital Costs Paid by HCE</td>
<td>$500,000</td>
</tr>
<tr>
<td>Estimated Net Capital Cost to the City</td>
<td>$60,000 to $160,000</td>
</tr>
</tbody>
</table>

The estimated cost of district cooling system is slightly higher at $560,000 to $660,000 verse HCE’s district heating option. This is for an addition of 300 to 400 tons of chilling
capacity to be installed at the central library. HCE already has enough existing capacity to supply the Lister building.

Existing government and utility energy efficiency programs may further offset district energy installation costs.

BACKGROUND:

The Agreement of Purchase and Sale for the Lister Block entered into by the City with LIUNA required the City, in its’ sole discretion, to decide whether a stand-alone HVAC system or a district energy system be installed for the Lister Block. Additionally, LIUNA and the City agreed to adjust the purchase price, to the extent that the cost of the materials and installation of a district energy system differs from the cost of the materials and installation of a stand-alone system.

The City of Hamilton retained Building Innovation Inc. (BII) to provide a conceptual comparison of a stand-alone HVAC system to a district energy system (heating and cooling) installation at the Lister Block. The comparison evaluates each option in terms of energy, utility and service costs (maintenance), life cycle costs and greenhouse gas emissions (GHG). Using the above criteria, BII was asked to conduct their analysis based on what was the best return for the City in terms of an overall impact, not just from the perspective of costs incurred at the building only.

This approach will require an initial investment of approximately $1,160,000. For analysis purposes the net costs of the stand-alone heating and cooling plants were estimated between $400,000 and $560,000. These estimates exclude additional costs that may be required for added system redundancy for the stand-alone system. Though the projects stand-alone system estimated costs are believed to be in the $500,000 to $600,000 range, staff asked BII to run an analysis using a lower recovery cost/ recovery rate of $400,000. This was used as a worst case scenario, to ensure the economics still provided favourable return for the district energy solution vs. the standard or stand-alone system.

Timelines

Based on the planned for redevelopment schedule of The Lister Block, the recommended district heating and cooling option can be implemented in time for The Lister Block’s completion. The following timeline is recommended:

- Summer 2009: Preliminary design and budgeting.
- Fall 2009: Final design and tender.
- Spring 2010: Install connections to district heating loop, separate from main tender.
- Spring 2010: Commissioning of heating loop.
- Spring 2010: Commissioning of cooling loop.

ANALYSIS/RATIONALE:

Tables 1 and 2 below provided annual comparisons of energy consumption, GHG emissions, utility and operating costs and total life cycle costs (TLCC) over 20-years.
Lister District Energy vs. Stand-Alone (Standard System)

Table 1 - Comparison of District Energy System vs. Stand-Alone (Costing $560,000)

<table>
<thead>
<tr>
<th></th>
<th>Electric (kWh)</th>
<th>Gas (m3)</th>
<th>GHG (t.CO2)</th>
<th>Utility ($)</th>
<th>Service ($)</th>
<th>Total ($)</th>
<th>Installed (Net $)</th>
<th>TLCC20 ('000 $)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stand-Alone (Standard)</td>
<td>159,700</td>
<td>84,400</td>
<td>212</td>
<td>$56,900</td>
<td>$14,000</td>
<td>$70,900</td>
<td>$560,000</td>
<td>$1,911</td>
</tr>
<tr>
<td>District Energy System</td>
<td>135,000</td>
<td>75,300</td>
<td>187</td>
<td>$45,300</td>
<td>$3,800</td>
<td>$49,100</td>
<td>$600,000</td>
<td>$1,379</td>
</tr>
</tbody>
</table>

Table 2 - Comparison of District Energy System vs. Stand-Alone (Costing $400,000)

<table>
<thead>
<tr>
<th></th>
<th>Electric (kWh)</th>
<th>Gas (m3)</th>
<th>GHG (t.CO2)</th>
<th>Utility ($)</th>
<th>Service ($)</th>
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<td>$14,000</td>
<td>$70,900</td>
<td>$400,000</td>
<td>$1,751</td>
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<tr>
<td>District Energy System</td>
<td>135,000</td>
<td>75,300</td>
<td>187</td>
<td>$45,300</td>
<td>$3,800</td>
<td>$49,100</td>
<td>$760,000</td>
<td>$1,539</td>
</tr>
</tbody>
</table>

Notes:
- **TLCC20** - Total Life Cycle Costs over 20-years.
- **Installed (Net $)** - net cost for the District Energy System after Credit from LIUNA

The proposed district energy solution offers the following benefits over a stand-alone HVAC system at Lister:
- Reductions in annual utility costs
- Reductions in annual maintenance costs
- Reductions in annual greenhouse gases
- Expansion of the district energy system in the downtown core for future system growth.

Existing government and utility energy efficiency incentive programs may further offset installation costs.

Total operating costs estimates (inclusive of utility and maintenance costs), installation budget, total life cycle costs, and total greenhouse gas emissions have been presented in Exhibit 1 below for the combined heating and cooling options. Cost figures for each approach are independent of each other.

**ALTERNATIVES FOR CONSIDERATION:**

**Stand-Alone System (Heating) - Standard**

This option is considered as the “base heating” scenario for the building’s heating needs. It is based on the equipment and systems identified in the planning documents provided by LIUNA. This stand-alone heating option includes for two standard heating boilers rated at 1.6mmBtu/hr input each, as well as 1 standard domestic heater rated at 0.150mmBtu/hr input. The equipment is located at the top of the building.

**Stand-Alone System (Cooling) - Standard**

This option is considered as the “base cooling” scenario for the building’s cooling needs, and is based on the equipment and systems identified in the planning documents provided by LIUNA. The planning documents identified the provision for one air cooled chiller rated at 250TR, with an identified building cooling load of 233TR.
For the purposes of this report, this option has not been modified for improved redundancy to match other City downtown buildings. This option may not meet redundancy requirements of the City.

The equipment is located at the top of the building.

**District Energy (Heating) - Supplied by HCE**

Cost figures presented in this option are based on the City’s perspective, with costs presented as they would be incurred by the City regardless of the specific department or entity incurring the costs. This would include for heating energy, heating utility costs and equipment maintenance costs as incurred by HCE.

**District Energy (Cooling) - Supplied by the City**

Cost figures presented in this option are based on the City’s perspective, with costs presented as they would be incurred by the City regardless of the specific department or entity incurring the costs. This would include for cooling energy, cooling utility costs and equipment maintenance costs as incurred by CUP.

**Economic Stimulus Package Funds**

If the option of using funds from the Federal Governments Economic Stimulus Package becomes available to fund the installation of both HCE and City district heating and cooling piping expansions and systems, this would reduce HCE’s annual capacity charges to the Lister Block from approximately $45,000 to zero.

**FINANCIAL/STAFFING/LEGAL IMPLICATIONS:**

**Financial:** The net life cycle costs for the district energy system versus the stand alone system are expected to range from $212,000 to $532,000

**Staffing:** The District Energy System will be operated by existing Central Utilities Plants staff (District Cooling) and existing Hamilton Community Energy staff (District Heating).

**Legal:** N/A

**POLICIES AFFECTING PROPOSAL:**

**Corporate Strategic Plan**

Vision: To be the best place in Canada to raise a child, promote innovation, engage citizens and provide diverse economic opportunities. The district cooling system impacts a number of focus areas of the City’s new Corporate Strategic Plan, including:

- Skilled, Innovative and Respectful Organization
- Financially Sustainable
- Growing Our Economy
- Environmental Stewardship

**The Public Works Strategic Plan, Innovate Now:**

A Compass for Public Works to 2017, addresses issues and opportunities identified in a department-wide Employee Survey and outlines specific activities that will direct Public Works in achieving our vision: To be recognized as the centre of environmental and innovative excellence in Canada. This district cooling project demonstrates both
innovation excellence and environmental leadership in ‘greening’ and stewardship in the City

Corporate Energy Policy

The key components of the district energy project expansion that will impact the City of Hamilton’s Corporate Energy Policy are:

- Facilitate the achievement of City-wide energy reduction targets
- Provide for ongoing Energy Monitoring and Targeting of utility usage
- Define policies re capital investment related to energy

VISION 2020

Hamilton’s Commitment to Sustainability describes what we want to see in Hamilton over the long-term. It is the commitment made by City Council, community groups, organizations, businesses and citizens to work towards our goal to build a sustainable community. First developed and adopted in 1992, VISION 2020 has been renewed by the community and re-adopted by Council in 2003 as the shared Vision for the City of Hamilton.

RELEVANT CONSULTATION:

Corporate Services - Budgets and Finance
Corporate Services - Legal
Public Works - Capital Planning & Implementation
Public Works - Energy, Fleet & Facilities, Corporate Buildings & Technical Services

CITY STRATEGIC COMMITMENT:

By evaluating the “Triple Bottom Line”, (community, environment, economic implications) we can make choices that create value across all three bottom lines, moving us closer to our vision for a sustainable community, and Provincial interests.

Community Well-Being is enhanced. ☑ Yes ☐ No
Environmental Well-Being is enhanced. ☑ Yes ☐ No
Economic Well-Being is enhanced. ☑ Yes ☐ No

Does the option you are recommending create value across all three bottom lines? ☑ Yes ☐ No

Do the options you are recommending make Hamilton a City of choice for high performance public servants? ☑ Yes ☐ No