City of Richmond

Report to Committee

To Public Works & Transportation May 16, 2007

To:	Public Works and Transportation Committee	**Date:**	May 8, 2007
From:	Robert Gonzalez, P.Eng. Director, Engineering	**File:**	03-1000-20-2856P

Re: **Funding for District Energy System Feasibility Study**

Staff Recommendation

1. That the General Manager of Engineering and Public Works (the "GM") be authorized on behalf of the City to enter into a Memorandum of Understanding generally per the terms attached hereto as Attachment 2 and a Joint Initiative Agreement with BC Hydro, on terms and conditions acceptable to the GM, to effect the goals set out in the "Funding for District Energy System Feasibility Study" report from the Director, Engineering.

2. That funding in the amount of $75,000 be approved from General Contingency for the City's contribution to the feasibility study and, if the feasibility study supports the financial viability of the district energy utility project, to the annual salary of the project engineer, as outlined in the "Funding for District Energy System Feasibility Study" report from the Director, Engineering.

Robert Gonzalez, P.Eng.
Director, Engineering
(4150)

Att. 2

FOR ORIGINATING DEPARTMENT USE ONLY					
ROUTED TO:	CONCURRENCE		CONCURRENCE OF GENERAL MANAGER		
Law	Y ☑ N ☐		for Jeff Day		
Budgets	Y ☑ N ☐				
REVIEWED BY TAG	YES ☑	NO ☐	REVIEWED BY CAO	YES ☑	NO ☐

Staff Report

Origin

In the spring of 2006, the City issued a request for proposal (RFP) for vendors interested in entering into an agreement for a proposed geothermal heating and cooling based district energy utility for the Oval Lands. Subsequent to the RFP, staff have been working with the vendor (Free Energy Solution), BC Hydro and consultants to further research the viability of the proposed municipal utility. Preliminary research and reports indicated that the district energy utility would not only be financially viable, but would also be a renewable source of energy that would present the City as a leading sustainable community.

On February 2, 2007, staff from Engineering, Finance and Law met with representatives from Free Energy Solutions, BC Hydro, ASPAC (the developer) as well as members of ASPAC's consulting team. The purpose of the meeting was to present the proposed district energy utility concept plan to the developer and to obtain feedback. Most of the questions and concerns were addressed at the meeting; however, ASPAC remained concerned over the perceived increased capital project costs that they may not recover.

Since the meeting, staff have been working with Free Energy to explore opportunities for the developer's concern regarding additional capital costs to the development as a result of connecting to the City of Richmond district energy utility.

The purpose of this report is to seek Council's approval for funding for a study into a joint agreement with BC Hydro, that would address the financial uncertainties relating to the capital cost associated with ASPAC's development connecting to the City owned district energy utility. If the study supports the financial viability of the utility, funding will be provided, jointly with BC Hydro for the annual salary of a City of Richmond project engineer who will work on this project.

Analysis

In order for this initiative to succeed, the City needs to obtain full commitment from ASPAC to connect to the City's district energy utility. To ensure maximum credibility and to gain developer confidence, staff, in consultation with BC Hydro, propose to employ consultants to develop a feasibility study. The expectation is that the feasibility study will substantiate financial viability for ASPAC. In addition, information developed from the study would provide the City with current market information that can be used for future development involving geothermal energy systems.

In moving forward, staff have been working with BC Hydro and their consultant on developing a District Heating Integrated Energy Master Plan as well as a Memorandum of Understanding (MOU).

Scope of Work, District Heating Integrated Energy Master Plan (Attachment 1)
The Scope of Work identifies elements and resources required to develop our comprehensive District Heating Integrated Master Plan.

General Terms of Memorandum of Understanding (MOU)

The MOU, a draft of which is included as Attachment 2, will outline the intentions of the parties with respect to the responsibility shared between BC Hydro and the City in terms of resources and funding for the feasibility assessment. While there may be minor revisions requested by BC Hydro to the draft MOU, the intent will remain the same. Once the final document has been completed it is recommended that the General Manager, Engineering & Public Works be authorized to sign the MOU. This will expedite the study, which is necessary given the schedule set forth by ASPAC.

BC Hydro has committed to funding up to 50% of the costs of a feasibility study (subject to BC Hydro approval) and the City will commit the remaining 50%. Subject to financial and technical feasibility, BC Hydro has also committed to funding up to $100,000 towards the salary of a project engineer to assist the City in moving forward with this project and the City will commit up to $50,000. The City, in turn, would agree to instruct staff to prepare policies, standards, draft by-laws and other draft regulatory measures for consideration by Council to encourage growth associated with re-development of the lands adjacent to the Richmond Oval utilize the district energy utility.

Hydro is also offering, subject to the technical and financial viability of the project, and BC Hydro Cost/Benefit Analysis, to provide eligible developers of new commercial buildings within the neighbourhood with tools, resources and financial incentives to assist with the design and construction of high performance buildings including reducing the incremental capital cost to the developer associated with connecting to the district energy system, through the Power Smart High Performance Building Program. Capital incentives will be calculated based on the total net electrical energy saving of the system and building as compared to conventional design.

Financial Impact

The cost of the feasibility study is estimated at $50,000, and the City's contribution would be $25,000. Additionally, the cost of retaining a project engineer for one year is estimated at $150,000, and the City would contribute $50,000. As a result, total cost to the City, in partnering with BC Hydro per the terms outlined in the MOU, is estimated at $75,000. Funding is available from General Contingency.

Conclusion

It is staff's intention that the feasibility study would provide the information required to gain acceptance from ASPAC and BC Hydro for our proposed district energy utility. In addition, information developed in the study would allow the City to make informed decisions in moving forward. We recommend that the City enter into the MOU and Joint Initiative Agreement and that funding of $75,000 be approved for the City's portion of the initiatives set out in this report.

Philip James Hogg
Manager, Facilities Operations and Maintenance
(1243)

Garforth International llc

Energy Productivity Solutions

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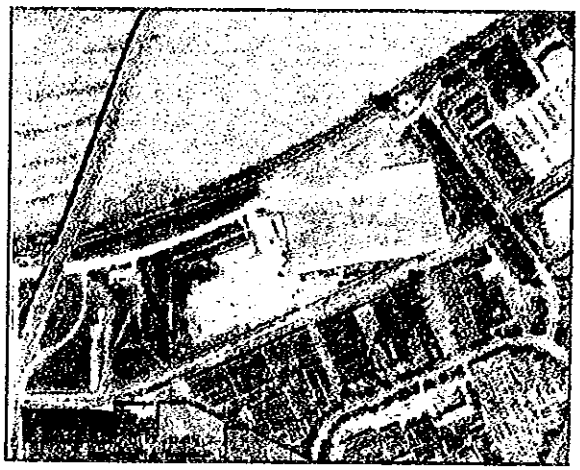
"Building Municipal Energy Systems for the Future"



District Heating Integrated Energy Master Plan
Feasibility Study for Oval Project

SCOPE OF WORK

CITY OF RICHMOND
DISTRICT HEATING INTEGRATED ENERGY MASTER PLAN
FEASIBILITY STUDY FOR OVAL PROJECT
SCOPE OF WORK

1. BACKGROUND AND PRE-EXISTING DOCUMENTS

The City of Richmond is evaluating the feasibility to implement an integrated energy solution for the site (Site) that will include the new skating oval and the surrounding residential and mixed use development (Development). This document describes the Scope of Work to complete a Feasibility Study (Study) encompassing the both energy efficiency and energy supply options for the entire site. The Study will be completed by a team (Team) that represents all the key interests of the Development. Prior evaluation of the site has been done and the following documents should be considered as part of the pre-work for this Study:

1. The Richmond Thermal Energy Network: Infrastructure
   Prepared by Thermal Network Energy Services dated 2nd November, 2006
2. Richmond Geothermal Energy Utility Proposal
   Prepared by Earth Source Energy & Innergex Consortium dated May 18th May 2006

The Team should not duplicate work already completed as a part of the above proposals, though some validation may be appropriate and necessary.

The Study will assess potential integrated energy solutions both in the context of the Development as a bounded project, and as a potential in a wider municipal energy services structure, at a minimum encompassing District Heating Services operated under some form City franchise.

The Oval Project is at a critical point to derive the greatest benefits from integrated energy planning, given that the bulk of the master planning is complete, and construction of initial developments could start shortly, necessitating a timely completion of the Study.

The Study will review the Development as an integrated energy supply and demand system and recommend scenarios that would give an attractive economic and efficiency blend between investments in energy supply and energy use strategies.

2. FEASIBILITY STUDY GOALS

The Study will recommend an integrated approach to providing energy services to the Development around the following overriding goals:

A. To minimize the primary fossil fuel needed to deliver competitive energy services to all users on the Site, irrespective of whether the primary fuel was used directly on the Site, or was used in remote facilities connected to public grids.
B. To minimize the incremental electricity demand that will be added to the BC Hydro distribution system
C. To be sufficiently flexible to economically grow with the anticipated build-out of the Site
D. To minimize incremental greenhouse gases created by the Development
E. To maximize the energy service reliability to all users on the Site
F. To be sufficiently flexible to incorporate new operating strategies and technologies as they emerge

G. To be compatible for future integration into a future wider municipal district energy utility run under the auspices of the City of Richmond

These goals should be clearly related to the context of British Columbia Provincial Energy Strategy and BC Hydro's overall targets to restrain the growth of the use of electricity with the Province.

3. Scope of Work and Deliverables

The Study will include the following:

1. Evolution over time of the energy service requirements for space heating, space cooling, domestic hot water, lighting, and electrical plug loads for all users on the Site, based on the anticipated build out schedule. Energy service requirements will be assessed on the end use requirements, not on the energy medium or technology used to deliver the services. Two efficiency scenarios will be evaluated:
    a. Base case: Construction to the energy efficiency requirements of British Columbia's current construction code
    b. Efficient Case: Construction to the energy efficiency requirements of the LEED Silver rating system of the Canadian Green Buildings Council

    The estimated construction costs differences between the two scenarios will be assessed as a part of the overall investment assessment.
2. Recommendation for an optimal multi-utility energy supply concept for the Site The energy supply aspects that will be considered for each of the efficiency scenarios will be:
    a. Networks delivering district energy, electricity and, maybe, natural gas energy services. Specifically, where district heating is recommended as a substitute for electric baseboard heating, the avoided electricity for each efficiency case should be clearly estimated. It is unlikely that district cooling will be a viable option on this Site, but it should be minimally assessed by the Team.
    b. Network metering and other distribution technology options, along with operating approaches that ensure investment, operating cost, reliability and environmental optimization
    c. Technical infrastructure within the buildings and other facilities to make optimum use of district heating, electricity and, maybe, natural gas
    d. Co-generation will be assessed as a potential option to provide heat and electricity to the Site.
    e. Non-traditional energy sources including geo-thermal (ground-effect) bio-mass and bio-gas, solar thermal, solar photovoltaic and wind will be evaluated for potential integration. Specifically, use of heat recovered from the cooling systems of the ice-skating oval will be considered in the energy supply mix. Bio-mass will include waste-to-energy as one fuel form. As a clarification, if there is clearly no strong case for a particular non-traditional energy source, there is no need to perform and in-depth option assessment as long as the reasons for rejection are clearly stated and can be independently validated.
3. Business and operating model for energy supply including organizational, tariff and incentives frameworks. Specifically the investment, ownership and operation of non-traditional in-building infrastructure such as would be necessary for district heating

services. The Study will include a Business Case in form of P&L Statements and Balance Sheets for both the energy supplier and the developer.

4. Regulatory, code and institutional recommendations for both energy system operators and energy service user will be included. If there are potential barriers to the recommended solution, the recommendations for adjusting these aspects will be included, along with alternative recommendations if modification is not feasible.
5. The Study will include an assessment of the 30 years' greenhouse impact of the recommended scenarios, and will recommend a business approach to tracking and monetizing greenhouse gas reductions or avoidance.
6. The Study will include a narrative on possible "over-the-fence" extensions of the energy system to neighbouring parts of Richmond, and include potential interoperability aspects, in the context of the City of Richmond being the holder of the operating franchise for district energy.
7. The time horizon of the Study will be a minimum of 20 years

The key deliverable will be the recommendations from the Feasibility Study in the form of a Preliminary Integrated Energy Master Plan. This will be sufficiently detailed to allow technical, investment, institutional and operating directional decisions to be made by all the key players concerned. It will, however, not formally be of investment grade and some subsequent detailed validation steps may be needed.

The Team will also be required to produce summaries of the Study in presentation format suitable for discussion with public interest groups, Richmond City Council and BC Hydro PowerSmart management.

4. Feasibility Study Team Structure

A successful Feasibility Study leading to the successful implementation of an Integrated Energy Master Plan will be the result of a team effort requiring close co-ordination between the following players:

- City of Richmond
- Master Developer – ASPAC
- BC Hydro as the incumbent electrical utility
- Terasen Gas as the incumbent gas utility

In addition the team should have the benefit of the following competencies:

- Multi-utility municipal technical, economic, institutional and operating expertise
- Building and community energy end-use modeling expertise
- Community energy master planning expertise

As a point of clarification, the multi-utility expertise should represent large-scale, global best-practices in implementing the energy source choices and the technical, business and institutional structures needed to deliver high quality municipal energy services including district energy in addition to electricity and natural gas. These best practices are widespread in Scandinavia, Germany, Austria, and a few countries in Central and Eastern Europe. They are very limited at city-scale levels in the USA and Canada. It is expected that the team would include expertise that brings this world-view to the project.

"Yoneda Free Utility Solutions" and "Yoneda & Associates" are requested to propose a team structure that represents the above players' interests and the necessary expertise to develop a Feasibility Study that meets the goals outlined in Section 2.

5. TIMING

The Study should be completed within 120-days of receipt of order

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at low cost,
for generations

Memorandum of Understanding

BC Hydro and The City of Richmond wish to enter into a joint initiative agreement to work toward the successful development of a new sustainable community in the City which is located at the "Oval Site", and includes Residential Parcels 1, 2, 3 and 7A, Non Residential parcels 5 and 6 and Mixed use Parcel 4, further detailed in Appendix A, and is called "The Oval Lands Neighborhood (The Neighborhood)".

This Memorandum of Understanding (MOU) dated March 22, 2007 outlines the understanding between BC Hydro and The City of Richmond (Richmond) relating to the design; financial, technical and institutional feasibility assessment: development and construction of The Neighborhood (The Project). The MOU has been prepared to describe the general understandings regarding certain concepts and undertakings to be included in future agreements that may be entered into between BC Hydro and Richmond.

Background

Richmond's vision to be the most appealing, livable and well- managed community in Canada. In pursuit of this vision, Richmond has developed and implemented a range of initiatives to accelerate the transition toward a more sustainable Richmond community – one where decisions made today leave a lasting positive legacy for future communities. Richmond adopted an enhanced sustainability initiative outlined in the Staff Report dated February 22, 2007 and attached to this MOU as Appendix B.

BC Hydro's purpose is to provide low cost, reliable power for generations. In support of this purpose, BC Hydro is working with municipalities and the design and development industry to develop and implement comprehensive integrated neighborhood energy plans that incorporate high performance buildings and district energy systems supplied by a variety of energy sources to result in a dramatic and permanent reduction in electricity intensity in British Columbia.

BC Hydro and Richmond wish to work together in The Project toward achieving the following goals for The Neighborhood:

- High Performance Building design and construction achieving a minimum LEED Silver rating with a target to exceed the minimum energy performance requirements for LEED Sliver
- Development of an integrated energy system for The Neighborhood that results in a significant net reduction in total energy, electrical energy intensity and greenhouse gas emissions by incorporating the following principles:
    - Maximize the viable use of waste heat
    - Elimination of electric baseboard heating
    - Utilize renewable energy supply options as economically viable
    - Incorporate smart, flexible distribution through a district energy system
- Develop the system to deliver low cost, reliable energy to customer
- Design the system to enable its integration into a future larger municipal utility
- The system will incorporate interconnectivity to accommodate for future growth adjacent to The Neighborhood

In working together toward achieving these goals, BC Hydro will provide the following:

To The City

1. Co-fund up to 50% of the cost of a feasibility study, subject to BC Hydro approval, to assess the technical, financial and institutional viability of the integrated energy system,

2. Subject to financial and technical feasibility and BC Hydro Cost/Benefit analysis based on the outcome of the feasibility study described in 1. above, BC Hydro will fund up to $100,000 toward the annual salary of a Project Manager, and renewable for 1 year. The Project Manager will be employed by The City of Richmond. The terms of reference and qualifications for the Project Manager will be mutually agreed to between the City of Richmond and BC Hydro.

3. Technical advice and assistance will be provided as needed and as resources are available.

To Developers

1. Subject to the technical and financial viability of The Project, and BC Hydro Cost/Benefit analysis, developers of new commercial buildings within The Neighborhood will be eligible to receive tools, resources and financial incentives to assist with the design and construction of high performance buildings including reducing the incremental capital cost to the developer associated with connecting to the district energy system, through the Power Smart High Performance Building Program. Capital incentives will be calculated based on the total net electrical energy savings of the system and buildings as compared with conventional design.

In working together, The City of Richmond will instruct staff to undertake the following:

2. Develop and adopt draft policy instruments, bylaws, standards and/or other regulatory mechanisms for consideration by Richmond City Council for new and redevelopment projects that will support BC Hydro's goal to achieve a dramatic and permanent reduction in electricity intensity by encouraging, incenting or requiring energy efficient community design, standards and practices.

Each party is executing this MOU to confirm its intention to proceed with the good faith negotiations referenced in this MOU in an effort to enter into the binding and enforceable agreements contemplated in this MOU.

BRIISH COLUMBIA HYDRO AND POWER AUTHORITY	CITY OF RICHMOND
Per: _____ (Authorized Signatory)	Per: _____ (Authorized Signatory)
Name: _____	Name: _____
Title: _____	Title: _____
Date: _____	Date: _____