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October 27, 2008

To: The Board of Governors of Exhibition Place

ACTION REQUIRED

From: Dianne Young, CEO

Subject: Coliseum Complex – “Green” Technology Initiative

Summary:

Further to the Board approval of the steam boiler replacement as part of the 2008 Capital Works Program, Exhibition Place staff met with City Energy Efficiency staff to discuss the potential of City contributions to this boiler replacement project in the form of a loan. These discussions resulted in the boiler project expanding to lower the build out period from two to one year; expanded to include replacement of the General Services Building boiler and retrofit of the lights in the General Services Building. This expanded project and the loan were approved by City Council at its meeting in December 2007.

Even though the Coliseum Complex boiler project was a positive energy upgrade, Exhibition Place staff continued to investigate the possible use of an “innovative” technology as part of this project and began discussions with Direct Energy which proposed the Back Pressure Steam Turbine/Steam Source Absorption Chiller as a “green” technology project (the “Project”). Further investigation and completion of a feasibility study suggests this Project would have a very positive payback.

Simply stated, this Project involves the connection of a turbine generator to the new steam boilers to take the place of a back pressure reduction valve on a steam boiler in order to produce electricity. In addition, a new low pressure steam-sourced Absorption Chiller will utilize the low pressure steam produced through the boilers and the Back Pressure Turbine in the summer. The refrigeration produced by the Absorption Chiller will offset the chiller capacity produced by the electrically powered 1,250 tons centrifugal chillers in the Direct Energy Centre.

Overall, the Project will:

- reduce hydro consumption by 1,234,536 kWh annually
- reduce annual greenhouse gas emissions by 6.8%
- substantially increases the energy efficiency of the steam boiler plant by further utilizing unused steam energy.
- be a pilot project that would demonstrate the effectiveness of this application to any building Exhibition Place has established itself as a showcase for new energy efficient

and generation technology within this Back Pressure Turbine Generator would be another applicable showcase

- provide an invaluable opportunity to measure technical performance so that and lessons learned from this project can be utilized for other locations which can take advantage of the technology
- leverage work that will be completed on renewal of the steam boiler
- coordinate several energy efficiency measures and projects that interact with each other
- include substantial private sector investment and partnership

Recommendations:

It is recommended that the Board approve of and direct staff to enter into negotiations with Direct Energy on the terms and conditions of an agreement with Direct Energy to provide funding and act as the general contractor for the purchase and construction of a backpressure steam turbine/steam sourced absorption chiller (the "Project") within the Coliseum Complex and report back to the Board at its meeting in December 2008 on these terms and conditions.

Financial Impact:

The total cost of this Project is estimated at \$2,471,360. A funding application was made to the Better Building Partnership Sustainable Energy Funds and has now been approved for no-interest loan for 40% of the cost with 60% of the cost being provided by Direct Energy through a financing agreement to be negotiated. However, based on the existing Bank of Canada lending rates and the energy savings to be generated by this Project, simple payback would be in the range of 15 years.

Decision History:

At its meeting of September 2007, the Board approved of the replacement of the steam boiler system for the Coliseum Complex is over 30 years old. To achieve our corporate goal of self-sufficiency by 2010, a study was undertaken in 2007 to consider options such as direct replacement, co-generation, district heating and a solar heating system. In the end because of the expense of changing the entire distribution system the recommendation was to replace the existing boiler with a more energy efficient boiler has been recommended and \$0.500M was approved.

Issue Background:

The 2008 Coliseum Complex steam boiler replacement capital project as approved by the Board was scheduled to be constructed over two years. However, following approval, Exhibition Place staff met with the City Energy Efficiency Office to discuss the possibility of receiving a loan from the Energy Retrofit Program. These discussions led to a restructuring of the steam boiler replacement to a larger project involving replacement of the Coliseum Complex boiler in just one year; the replacement of the

General Services boiler in 2008; and retrofitting lights within the General Services Building. This total project is now at a value of \$1.4M (with a \$0.95M loan from the Energy Retrofit Fund) and will be completed in 2008 and will have a payback of 8 years.

Even though the Coliseum Complex boiler project was a positive energy upgrade, Exhibition Place staff continued to investigate the use of an "innovative" technology as part of this project and began discussions with Direct Energy which proposed the Back Pressure Steam Turbine. Further investigation/feasibility study suggests the turbine Project would have a very positive payback.

Comments:

This Project involves a turbine generator that takes the place of a back pressure reduction valve on a steam boiler in order to produce electricity. At Exhibition Place this would mean the connection of the Back Pressure Steam Turbine Generator to the new Coliseum steam boilers which provide all the heating for the Coliseum Complex including the Ricoh Coliseum. The new steam boilers will produce steam at 125 psig which is then directed through the Back Pressure Turbine blades, reducing the pressure of this steam before it goes on to service the low pressure steam heating loads for the Coliseum Complex. As this steam moves through the Back Pressure Turbine Generator it will be reduced to 15psig and the excess steam will then be used by the Back Pressure Turbine Generator to produce approximately 305,586 kwh of electricity during the heating season.

In order to fully utilize the Back Pressure Turbine, a summer steam load is required. The addition of a low pressure steam-sourced Absorption Chiller will utilize the low pressure steam produced through the boilers and the Back Pressure Turbine in the summer. The 554 tons of refrigeration produced by the Absorption Chiller will offset the chiller capacity produced by the electrically powered 1,250 tons centrifugal chillers in the Direct Energy Centre therefore reducing this building's demand for electricity. It is estimated that there could be a reduction of approximately 655,348 kwh of electricity annually during the summer cooling season.

This Project leverages the 2008 capital project which replaces the Coliseum Complex steam boilers. It also provides a coordinated electrical network between the Coliseum Complex heating system and the Direct Energy cooling system. Any electricity produced by this Project will also be able to be fed across the 192-acre campus to power other buildings on the grounds.

It is an innovative project that will contribute to the sustainability goal adopted by Exhibition Place and could be a demonstration project for the City as there may be potential to adding this type of mechanism by businesses which produce or use steam in either process (industrial) or in building heating (municipal, commercial, residential) including Enwave connected buildings where the distribution pressure is reduced for utilization, turning each building steam plant into an electricity generator. Finally,

financing for this project includes a substantial committed investment from the private sector.

Contact

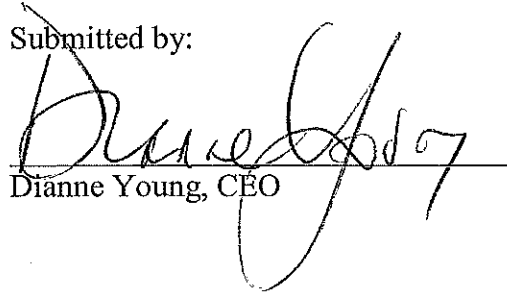
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Submitted by:

A handwritten signature in black ink, appearing to read "Dianne Young", is written over a horizontal line. The signature is stylized and cursive.

Dianne Young, CEO