TORONTO STAFF REPORT

February 16, 2006

To: Roundtable on the Environment

From: William G. Crowther, Executive Director, Technical Service

Subject: Port Lands Green Energy Plan

Purpose:

The purpose of the report is to provide information relative to the Port Lands Green Energy Plan

Financial Implications and Impact Statement:

There are no direct financial implications from this report.

Recommendations:

It is recommended that:

(1) the Port Lands Green Energy Plan be taken into account in on-going preparation and implementation of the City of Toronto Energy Plan including the Renewable Energy Plan, the City of Toronto Air Quality Action Plan and the Environmental Plan Update;

(2) the City of Toronto continue to document the megawatts of energy saved and economic and air quality benefits accrued due to the City's energy conservation programs and the related reductions in energy demand in City operations;

(3) a report to the Roundtable on the Environment by Deputy City Manager Fareed Amin in consultation with Deputy City Manager and Chief Financial Officer Joe Pennachetti on the potential for renewable energy generation and use in the City of Toronto, to be completed by September 2006;

(4) Council inform the Ontario Minister of Energy, the Ontario Minister of the Environment, the Ontario Minister of Health and the Ontario Minister of Economic Development and Trade about the on-going energy conservation measures at the City of Toronto as well as a summary of the City of Toronto's position relating to building a 550 megawatt gas-

powered generation facility on the Toronto waterfront given the economic, environmental and health benefits demonstrated by energy conservation and continued reductions in energy demand at the City of Toronto.

Background:

At the January 23rd, 2006 Policy and Finance Committee meeting of City Council, staff were directed to provide information relative to the Port Lands Green Energy Plan to the February 20th meeting of the Roundtable on the Environment.

As a result of the Province of Ontario's earlier proposal to site a 550 megawatt (MW) gas-fired power plant in the Port Lands district on the Toronto waterfront (the Portlands Energy Centre), Deputy Mayor Sandra Bussin and Councillor Paula Fletcher commissioned a four-person panel of energy experts to evaluate and develop alternatives to the proposal. The evaluation team was chaired by Peter Tabuns and included Keith Stewart, Melinda Zytaruk and Brent Kopperson. The expert panel released its report, entitled *Port Lands Green Energy Plan – More than 750 Mega Watts of Power*, on January 5th, 2006.

The Portlands Energy Centre (PEC) first attracted public attention in late 2002 when TransCanada Energy Incorporated and Ontario Power Generation began public consultation on a proposed 550 megawatt combined cycle co-generation facility on the Toronto waterfront near the mothballed Hearn Generating Station.

The initial 2003 PEC proposal indicated that the facility would produce electricity as well as steam heat for district heating. This co-generation aspect of the plant was subsequently dropped when three years of discussions with Enwave - the largest district heating entity in Toronto- failed to result in an agreement for the sale of steam.

In December, 2005 the Independent Electricity System Operator warned that the city core faced the risk of rolling blackouts as early as 2008 unless 250 megawatts of generating capacity could be built in central areas. This prediction brought a sense of urgency to discussions about the PEC and potential alternatives. The Province of Ontario has suggested that building and bringing PEC on-line as soon as possible would ensure peak load demand was met in the City of Toronto for the foreseeable future.

In the past, the City opposed the Portlands Energy Centre proceeding without co-generation (Works Committee February 1, 2005). In addition, Toronto Public Health indicated that emissions from PEC are "anticipated to increase existing ambient air pollutant levels in the local community" while pointing out that "current air pollutant levels in Toronto are responsible for significant excess illness and mortality" (Works Committee May 19, 2005).

Technical Services have noted (Works Committee May 19, 2005) that there would be potential water quality issues associated with the thermal plume from the plant and that reducing or eliminating co-generation capacity would result in more emissions per unit of energy produced. It was also estimated that since the wind turbine at Exhibition Place produces enough electricity

to light 250 homes, eight similar sized wind turbines could generate sufficient electricity to light 2,000 homes.

Comments:

The Port Lands Green Energy Plan (Attachment 1) is a 10-point plan that recommends reducing energy demand through conservation and more efficient use and delivery of energy. The plan also encourages increased use of energy from renewable sources. The 10 recommendations are consistent with recommendations in the City of Toronto Environmental Plan and with the City's energy planning, energy conservation and renewable energy initiatives.

Energy Planning:

The Province of Ontario's decision to proceed with the Portlands Energy Centre and the release of the Port Lands Green Energy Plan coincide with the development and eventual implementation of the City of Toronto's new Energy Plan, that will set out short-, medium- and long-term measures, including energy conservation and renewable energy use, to ensure a stable and reliable supply of energy. The Energy Plan will also provide a clear context for making immediate and long-range decisions relating to energy use and City of Toronto operations. The City of Toronto Energy Plan includes the City's Renewable Energy Action Plan and is linked to work on the Air Quality Action Plan and the 2006 Environmental Plan Update as well as the Green Economic Development Strategy.

Energy Conservation:

The City of Toronto and Toronto Hydro continue to demonstrate that significant energy savings are possible through conservation measures and that energy conservation brings with it financial savings as well as improved air quality and related health benefits.

As illustrated in Attachment 2, current energy efficiency initiatives at city-owned buildings, partnerships with the community through the Better Building Partnership and Better Building New Construction Program and the use of innovative technologies such as Enwave's Deep Lake Water Cooling will result in close to 200 MW of reduced energy demand by the end of this year. An additional energy savings of a minimum of 120 MW will occur by late 2007 based on the implementation of funded existing programs. Significant opportunities for reduction in energy demand exist over the longer term through initiatives such as the build out of the city's green roof potential, expanded customer base for Enwave's Deep Lake Water Cooling and funding for expansion of existing programs such as the Better Building New Construction Program and the transmission optimizer project of Toronto Water.

The City of Toronto has a number of programs under way that complement the recommendations in the Port Lands Green Energy Plan. For example, Recommendations 1 and 2 *(energy efficiency for new and existing buildings)* are addressed by programs such as the Better Buildings Partnership, the Better Buildings New Construction Program, the Energy Efficiency at Work program, the traffic signal LED replacement program; the Energy Retrofit Program that is retrofitting almost all City-owned community centres, fire halls and civic centres and the green

roofs program. These initiatives are reducing the City's emissions from the use of fossil fuels and saving significant megawatts of energy annually.

The City of Toronto has also proposed changes to the Ontario Building Code that would make the Code more compatible with energy efficiency measures and with the use and production of energy from renewable sources.

Recommendation 4, *Cool City Initiatives*, is consistent with the ongoing development and subsequent implementation of the City's Green Development Standards and with the green roofs policy and with accelerated implementation of its commitment to double the extent of Toronto's tree canopy.

An overview of City of Toronto and Toronto Hydro recent energy savings and economic benefits is presented in Attachment 2.

Increased Reliance on Renewables

Recommendation 5, *invest in renewable energy projects*, is supported by the work of the City of Toronto's Renewable Energy Action Planning Working Group, which has the task of reporting to the Roundtable on the Environment and the City's Executive Environment Team on a renewable energy action plan that includes targets and timelines for increasing the use and the potential production of renewable energy in the City of Toronto. The City does not know the extent of its potential and capacity to produce renewable energy but since there is currently relatively little action on renewable energy implementation, the expansion of use of renewable energy technologies in Toronto offers the promise of significant reduction in energy demand from fossil fuel and other conventional energy sources.

Use of Methane Gas

Recommendation 7 suggests using gas burned at Ashbridges Bay Treatment Plan to make electricity in addition to drying sludge and to use methane from sewage sludge to power the process. The City of Toronto currently uses the methane gas during winter to fire heating for plant buildings and related processes. The only surplus methane at this time is during certain periods throughout the summer. Toronto Water is investigating options for maximizing the use of methane gas generated at the plant on a year-round basis. This includes consideration of the potential to generate electricity or offset existing and planned natural gas use by wastewater treatment processes.

Toronto Waterfront Revitalization:

Toronto Waterfront Revitalization Corporation has committed to making the city's waterfront both a national and global model for sustainability. The TWRC's sustainability policy, as outlined in its Sustainability Framework, emphasizes the approach that the waterfront can and will set new standards for best practices not only in Canada but throughout the world and it will do so in a manner that improves the health of the natural environment and the strength of the local, regional, provincial and national economies.

Robert Fung, chairman of the Toronto Waterfront Revitalization Corporation, has said he accepts that "Toronto needs electricity, but a big new power plant is at odds with the corporation's efforts to make the waterfront an attractive place to live, visit and work" (Toronto Star, February 11, 2006). The TWRC has indicated that a smaller-scale plant with co-generation capacity located inside the Hearn generating station is more compatible with the Corporation's vision of vibrant, accessible, sustainable communities on Toronto's waterfront.

Conclusions:

The Port Lands Green Energy Plan is in-line with current and on-going City of Toronto environmental and economic objectives and identifies initiatives that, if implemented, could contribute to reducing the need for a 550 megawatt energy facility in the Port Lands. The Port Lands Green Energy Plan is also consistent with sustainable energy use and related sustainable community and economic development objectives for the Toronto waterfront.

The City of Toronto's current conservation measures will result in close to 200 MW of reduced energy demand by the end of this year. The continuation of existing programs will reduce energy demand by least a further 120 MW by the end of 2007. Additional untapped energy savings could be realized through the implementation of innovative new programs, greater use of renewable energy and the accelerated implementation of longer term programs that have energy conservation benefits.

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List of Attachments:

Attachment 1: Port Lands Green Energy Plan
Attachment 2: City of Toronto Conservation Measures and Related Benefits

Attachment 1: Port Lands Green Energy Plan

Port Lands Green Energy Plan — More than 750 Mega Watts of Power Report of the Expert Panel

January 5, 2006

In response to the Province's proposal to site a large scale, 500 to 650 mega watt (MW) power plant in Toronto's Port Lands, our panel was commissioned by Deputy Mayor Sandra Bussin, City Councillor for the Port Lands Paula Fletcher, former Toronto-Danforth MPP Marilyn Churley and Jack Layton, MP for Toronto-Danforth, to assess the Province's proposal and to develop alternatives to it.

We accept that Toronto does need some new generation and we believe that a number of practical steps can be taken to reduce the need for this specific proposal. At the same time, we also see potential in developing generating capacity through a substantially reduced plant or plants that will provide a district energy system in the Port Lands. This would allow the shut down of existing boilers in the port area and reduce pollution. We believe that in order to protect our community interests that the City, through Toronto Hydro, should have a direct interest in his project.

We propose the following 10 ideas to **produce new energy**, **create more jobs**, **reduce energy bills**, **cut energy waste** and **reduce pollution**. Our 10-point Port Lands Green Energy Plan **adds more than 750 mega watts of power produced or saved** through a combination of new energy production and energy efficiency, eliminating the need to site a single, oversized 500 to 650 mega watt power plant in the Port Lands.

The Province's persistence in trying to site a large, natural-gas fired energy plant in the Port Lands compels us to develop a new green energy plan for the city. This is an opportunity to make east end Toronto, Riverdale and the Beaches, a showcase for clean energy.

The 10 Point Port Lands Green Energy Plan outlined below should be the basis for the City and community response to this Provincial project. The plan includes reducing demand for electricity, providing electricity through renewable sources and where electricity is produced using transitional fuel sources such as gas, producing it as efficiently as possible.

10-Point Port Lands Green Energy Plan — More than 750 Mega Watts of Power

1) Cut energy use in existing government and non-government buildings in Toronto through energy efficiency programs delivered by governmental and non-governmental partnerships (170 MW).

2) Set much higher energy efficiency standards for new buildings to be built in Toronto and promote ground source heat pumps for new buildings (energy calculation unavailable).

3) Invest in cutting household energy use through large scale low income housing energy retrofits. Develop a Toronto Hydro loan program for renewable and high efficiency residential investments (energy calculation unavailable).

4) Utilize the "Cool Cities" program developed in the United States that cuts summer heat in the city through tree plantings, green roofs and light coloured paving (energy calculation unavailable).

5) Invest in renewable energy projects, including community based projects, to provide necessary power across the city including an appropriately-sited wind farm on Lake Ontario, solar hot water, solar heating and solar electricity (60 MW).

6) Expand use of the City's current district energy system to provide cogeneration, trigeneration and more cooling from Deep Lake Water Cooling (300 MW).

7) Use gas burned at Ashbridges Bay Treatment Plant for drying sludge to also make electricity. Use methane from the sewage sludge to power it (energy calculation unavailable).

8) Expand Toronto Hydro program to convert stand-by generators in large buildings across the city from diesel to natural gas to become suppliers of peak energy and start to develop cogeneration in those buildings (220 MW).

9) Set up a number of district energy grids in the city including the Port Lands to provide heat, cooling and power as efficiently as possible (energy calculation unavailable). The plant proposed by the Province of Ontario for the Port Lands must be restricted to a highly efficient, cogeneration plant no greater than 250 megawatts, half the size or less than the current proposal.

10) Provide substantial community investment in green energy and efficiency in the Beach and Riverdale to cut local emissions to balance out any impact from operation of the new plant (energy calculation unavailable). Provide other community benefits.

This document is meant to outline our thinking to date and to provoke debate about the direction we need to go in. We need to hear what people think of what we have proposed and to receive more suggestions.

BACKGROUND

The 10-point Port Lands Green Energy Plan plan above summarizes a number of initiatives that add up to more than 750 mega watts of power produced or saved through new energy production and energy efficiency measures. We have detailed the elements of the plan below.

1) Energy Efficiency for Existing Buildings — 170 MW

Cut energy use in existing government and non-government buildings in Toronto through energy efficiency programs delivered in partnership by Toronto Hydro, the Energy Efficiency Office, the Better Buildings Partnership, Enwave and the Toronto Atmospheric Fund. In addition build partnerships with non-governmental organizations, sectoral organizations and the private sector. The City of Toronto alone has 40 MW of power reductions it can implement. The calculation for non-government buildings immediate potential was recently reported at 130 MW in demand reductions.

2) Energy Efficiency for new buildings

Set much higher energy efficiency standards for new buildings to be built in Toronto and promote ground source heat pumps for new buildings outside areas served by district energy (energy calculation unavailable).

3) Existing Residential Housing Energy Efficiency Programs

Invest in cutting household energy use through large scale low income housing energy retrofits. Develop a Toronto Hydro residential loan program for solar panels, solar hot water and for high efficiency residential investments like upgrading air conditioning systems and purchasing appliances to Energy Star standards (energy calculation unavailable).

4) City Cooling Initiatives

Utilize the "Cool Cities" program developed in the United States that cuts summer heat in the city through tree plantings, green roofs and light coloured paving. Studies in Florida show heavily treed neighbourhoods have summer electric bills 8% or more lower than less green neighbourhoods (energy calculation unavailable).

5) Renewable Energy — 60 MW

Invest in renewable energy projects, including community based ones, to provide necessary power across the city including an appropriately-sited wind farm on Lake Ontario, solar hot water, solar heating and solar electricity. Recent assessments by Toronto Hydro envision potential for a 60 MW wind farm to serve Toronto.

6) Use the City's Existing District Energy Systems — 300 MW

Expand use of the City's current district energy systems. Convert Enwave's Walton Street steam plant in the downtown to make steam and electricity at the same time (cogeneration) and use summer steam to power air conditioning (trigeneration). Substantially expand existing Deep

Lake Water Cooling system capacity and provide new DLWC for new developments on the waterfront. DLWC potential in the range of 150 MW. Cogeneration and trigeneration for Enwave potential in the 150 MW range.

7) Cogeneration at Ashbridges Bay

Use gas burned at Ashbridges Bay Treatment Plant for drying sludge to also make electricity and use methane from the sludge to power it. The City of Ottawa ROP Environment Centre, a sewage treatment plant, installed a cogeneration system in 1996 for net annual savings of $750,000 annually on initial annual electricity bill of $2.6 million annually (energy calculation unavailable).

8) Invest in Peaking Generation and Cogeneration in Large Buildings — 220 MW

Expand Toronto Hydro program to convert stand-by generators in large buildings across the city from diesel to natural gas to become suppliers of peak energy and start to develop cogeneration in those buildings. Invest in demand control in these same buildings. Large office buildings and institutions like community colleges could have their boiler plants converted to cogeneration. Mohawk College in Hamilton has its own cogeneration system, as does University of Toronto and York University. Calculated initial reduction in demand from such measures approximately 220 MW.

9) Modular District Energy Systems utilizing smaller Cogeneration Power Plants

Set up a number of district energy grids in the city including the Port Lands to provide heat, cooling and power as efficiently as possible. One such plant proposed by the Province of Ontario for the Port Lands must be half the size or less of the current proposal. Thus it would be restricted to a highly efficient cogeneration plant no greater than 250 megawatts. Any such cogeneration plant built at the Hearn could provide heat and power to the existing and future industries in the port that are burning, or will burn gas. This would allow local industries to shut down their boilers and reduce local pollution. The West Don Lands and the Regent Park Redevelopment will benefit from having central district heating plants which could be operated on a cogeneration basis (energy calculation unavailable).

10) Community Benefits

Provide substantial community investment in green energy and efficiency in the communities around the port lands to cut local emissions to balance out any impact from operation of the new plant (For example –provide solar hot water heating for all city and school board swimming pools). Provide improvements to the Port Area itself (for example – board walk along the shipping channel or an Alternative Energy Research Centre). Assist in the development of an energy plan for the future of the east end (energy calculation unavailable).

SUMMARY

We believe that our approach will provide the community with environmental and economic benefits superior to those proposed by the Province. We were able to identify potential

alternatives to the Port Lands energy plant that exceeded 750 MW. While there may be challenges to bringing all of the suggested alternatives to fruition within the required time frame, we believe that there is enough potential to substantially reduce the size of the proposed plant and still provide energy security to the city and the community. A plant in the port that resulted in the closure of a number of existing boilers has the potential to avoid any net increase in emissions in our community. When we have heard back from the community we will provide a final report for consideration.

Expert Panel on Green Alternatives:

Peter Tabuns, Chair Keith Stewart Melinda Zytaruk Brent Kopperson

Attachment 2 **City of Toronto Energy Conservation Measures and Related Benefits**

Program or Project	**$ Spent**	**MW Saved (annually)**	**$ Saved (per year)**	**Future MW savings**
Arenas Retrofit	10,200,000	.614	1,350,000	See column 2
Better Building New Construction Program	650,000	4.3	n/a	4 (approximate- per 20 buildings)
Better Building Partnership	150,000,000	51	16,980,000	51 (plus any new retrofits)
Civic Centre Retrofit	4,200,000	.411	525,000	See column 2
Enwave Deep Lake Water Cooking	177,859,776	36 MW (generated)	n/a	25MW (additional capacity)
Exhibition Place Energy Retrofit	6,600,000	1.756	873,000	See column 2
Exhibition Place Photovoltaic	500,000	.1 (generated)	16000	1 (according to expansion plan)
Fire Halls Energy Efficiency Retrofit	2,700,000	.25	300,000	See column 2
Green Roofs	80,000	n/a	21,560,000 (potential at .75 build out)	114.6 (.75 build out)
LED conversion	3,500,000 (total for 2004 & 2005)	.959	1,800,000	7.3 (at full replacement)
Toronto Community Housing Corporation appliance renewal	6,400,000	n/a	500,000	n/a
Toronto Hydro Programs	21,440,000 since 2004	**134** since 2004	n/a	**116** by Sept 2007
Transmission optimizer project (water pump efficiency)	n/a	n/a	n/a	7 (requires investment of $5 million)