



CITY OF HAMILTON
Public Works Department
Corporate Assets and Strategic Planning Division

TO:	Chair and Members Public Works Committee
COMMITTEE DATE:	May 22, 2014
SUBJECT/REPORT NO:	Corporate Energy Policy Corporate Energy and Energy Commodity Policies (PW14050) - (City Wide) - (Outstanding Business List)
WARD(S) AFFECTED:	City Wide
PREPARED BY:	Geoff Lupton, Director, Energy, Fleet & Traffic (905) 546-2424, Extension 7372 Tom Chessman, Manager, Office of Energy Initiatives (905) 546-2424, Extension 2494 Frank Gazzola, Superintendent, Office of Energy Initiatives (905) 546-2424, Extension 7518
SUBMITTED BY:	Gerry Davis, CMA General Manager Public Works Department
SIGNATURE:	

RECOMMENDATION

- (a) That the City of Hamilton adopt the revised Corporate Energy Policy and its recommendations attached as Appendix A to Report PW14050;
- (b) That all Boards and Agencies be encouraged to adopt the policy and actively participate towards the stated reporting, targets and goals;
- (c) That the Office of Energy Initiatives report on the progress and results of the Corporate Energy Policy annually;
- (d) That the item “Reduction in Green House Gas and Energy” be removed from the Outstanding Business List.

EXECUTIVE SUMMARY

The City of Hamilton’s (City) first Corporate Energy Policy (Report PW07127) was created and adopted by Council in 2007. This policy called for a review after five years. The City of Hamilton’s “New” Corporate Energy Policy calls for new corporate energy intensity reduction targets of 45% in 2030 and 60% in 2050. Achieving the proposed 2030 target alone is anticipated to deliver an additional \$50 million in revenue, direct energy savings and avoided costs. Meeting these targets along with the previously approved Board of Health (BOH) Climate Change Actions 2012 Report (BOH13024)

target of 80% Greenhouse Gas emission reduction, will put Hamilton on track to becoming a net zero carbon municipality.

In 2008, the City created and approved the City's first corporate Energy Commodity Policy (Report PW08144/FCS08114). The energy Commodity Policy has been combined with the Corporate Energy Policy into one cohesive policy document for ease of reference, as they are closely related, managed and reported on by the Office of Energy Initiatives. The focus of this policy continues to be on corporate energy, dealing with City owned assets. The new Corporate Energy Policy has a number of new targets and policy enhancements. Policy targets continue to be focused on energy intensity for corporate buildings. Also, new targets have been established for fuel consumption reductions in Fleet and Transit. Plus, a new key performance indicator for energy use as it relates to Hamilton Water - water and waste water operations.

Specifically, the following policy actions have been added or enhanced throughout the Corporate Energy Policy. These include:

- Base Building Standards;
- Project Approval Processes;
- Incentive/Funding Programs, Life Cycle Analysis;
- Sustainable Building Policy;
- Greenhouse Gas Emission (GHG) Emissions, Reporting And Protocol;
- Fleet & Transit Fuel Consumption;
- Energy Reserve;
- Energy Efficient Lighting;
- Building Automation Systems;
- Energy Efficient Equipment;
- Generation, Cogeneration, District Energy And Renewable Energy;
- Emergency Generators And Back-Up Power Systems;
- Monitoring And Verification;
- Building Labelling;
- Energy Procurement.

This report presents recommendations for a “new” City of Hamilton (City) Corporate Energy Policy along with recommendations for new corporate energy reductions targets in 2030 and 2050. The Corporate Energy Policy is integral to the success of meeting the environmental emission targets adopted by Council through the Board of Health (BOH) Climate Change Actions 2012 Report (BOH13024). Success in meeting the GHG and energy intensity targets can be achieved through a combination of energy conservation and demand management, renewable energy supply and through the purchase of environmental offsets e.g. carbon credits.

CITY OF HAMILTON - REVISED ENERGY REDUCTION TARGETS:

The Corporate Energy Policy is designed to facilitate achievement of City wide energy reduction targets, address legislated reporting requirements, define policies for capital investment related to energy conservation and demand management along with policies related to energy procurement and address regulations concerning greenhouse gases and other targeted emission reductions.

Corporate Energy Intensity and Emission Reduction Targets

Year	Energy Policy Reduction Targets	Emission Reduction and Offset Target
2020	Initial 20% <i>(using 2005 as base year)</i>	20%
2030	45%	50%
2050	60%	80%*

** Note: The Board of Health (BOH) Climate Change Actions 2012 Report (BOH13024) target a reduction of 80% Greenhouse Gas Emissions has been approved by council. It is recommended an interim target of 50% by 2030 be adopted as part of this report.*

The process for reporting and quantifying emissions generally follows an accepted or accredited protocol which has been developed by some form of acknowledged resource. Based on a review and consultation with industry experts, the City has chosen to comply with the Greenhouse Gas Protocol developed by the World Resource Institute and the World Business Council for Sustainable Development.

The intent of the Energy and Emission Reduction Target was that it be applied to each City Department or Division's overall energy usage on a proportional basis. This means larger energy users in the City must achieve the same reduction on a percentage basis in relation to their 2005 base year consumption, but their overall contribution to energy, cost and emission reductions will be much larger overall. Sites that have difficulty contributing for acceptable reasons can be duly noted on an exception basis.

This Energy Policy calls for targeted energy reductions in energy intensity of City owned facilities as well as reductions in energy intensity for Hamilton Water and reductions in energy intensity for City owned and operated Fleet vehicles and equipment. Reductions in GHG Emissions will occur through reducing energy use or from renewable energy production and may also be achieved by purchasing carbon offsets.

For the purposes of this Energy Policy, energy intensity for City owned facilities is defined as the total energy use per square foot of usable building area for a given period of time. Total energy is electrical energy and natural gas energy reported as equivalent kilowatt-hours - ekWhr. Similarly, energy intensity for Hamilton Water will be defined as total energy per Mega-liters per day (ekWhr/MLD). The metric for fleet energy intensity will be calculated based on the energy content of all liquid fuels that are

consumed by mobile activities and energy intensity for fleet will be defined as Diesel Litre Equivalent per 100 kilometres (DLE/100Km).

Among the various Departments and end uses for energy within the City, there are several where energy intensity (ekWhr/ft²) is not the appropriate metric for measurement of energy. Examples of this target are Hamilton Water, parks, yards as well as street lighting, traffic lights and fuel (diesel and gasoline) where using square footage as a measurement is not relevant. As the costs and GHG impacts from energy use are significant in the Hamilton Water, street lighting and fuel portfolios, tracking and reporting on these operations will be carried out going forward. Annual reporting will continue to be provided by the Office of Energy Initiatives which outlines Green Energy Act requirements that include site by site energy use, reduction plans and results.

The original Energy Policy recommends 2005 be used as the base year for measuring energy intensity. Currently, the Green Energy Act states 2011 will be the base year for all municipalities in Ontario. The notional target for energy intensity will be a 45% reduction by 2030 with 2005 as the base year. For purposes of complying with the Green Energy Act, the energy reduction target will be 25% using 2011 as a base year.

CITY'S ENERGY POLICY - RESULTS TO DATE:

The success of the Corporate Energy Policy to date has been tracked using key performance indicators for City buildings, namely the energy intensity target of 20% energy intensity reduction by 2020. As of year-end 2013 and seven years in advance of the target date, the City has achieved over 20% reduction in energy intensity and an estimated accumulated avoided cost and savings of over \$32 million (gross), using 2005 as the base year. This is ahead of the forecast savings target of 1.5% per annum and 20% overall by 2020. The City's commitment to the Corporate Energy Policy and Energy Commodity Policy has yielded an attractive return on investment as indicated in the tables below. These tables illustrate the year-over-year and cumulative direct energy savings and avoided costs for levy, rate and employee costs. The cumulative net savings as of the end of 2013 are calculated at over \$28 million since 2006. These results illustrated in the tables below are exclusive of the additional benefits to the City from its wholly owned subsidiary Hamilton Renewable Power Inc. (HRPI), which in itself has made Hamilton one of Ontario's largest municipal renewable energy producers. HRPI has created a cumulative net benefit of over \$10 million since the beginning of commercial operations in 2006. Energy staff performs key daily roles in operation, contracts and reporting on an ongoing basis of HRPI.

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Energy Policy Results to Date (Year by Year and Cumulative)

Year by Year								
	2006	2007	2008	2009	2010	2011	2012	2013
Corporate Total Levy	\$ 562,518	\$ 4,033,235	\$ 3,080,801	\$ 3,183,301	\$ 2,613,056	\$ 4,912,917	\$ 2,817,836	\$ 2,882,263
Corporate Total Rate	\$ 365,710	\$ 1,345,354	\$ 929,947	\$ 808,386	\$ 99,457	\$ 1,191,266	\$ 1,759,356	\$ 2,292,753
Corporate Total	\$ 928,229	\$ 5,378,589	\$ 4,010,747	\$ 3,991,687	\$ 2,712,514	\$ 6,104,183	\$ 4,577,192	\$ 5,175,016
Employee Related Costs	\$ -	\$ 216,070	\$ 376,150	\$ 475,200	\$ 494,360	\$ 728,390	\$ 967,030	\$ 880,570
Employee Cost Recovery -HRPI	\$ -	\$ -	\$ -	\$ (40,487)	\$ (33,738)	\$ (72,800)	\$ (77,650)	\$ (101,700)
Net Savings	\$ 928,229	\$ 5,162,519	\$ 3,634,597	\$ 3,476,000	\$ 2,184,416	\$ 5,302,993	\$ 3,532,512	\$ 4,192,746
Cumulative								
Corporate Total Levy	\$ 562,518	\$ 4,595,753	\$ 7,676,554	\$ 10,859,855	\$ 13,472,911	\$ 18,385,829	\$ 21,203,665	\$ 24,085,927
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Net Savings		\$ 6,090,748	\$ 9,725,345	\$ 13,201,345	\$ 15,385,760	\$ 20,688,753	\$ 24,221,265	\$ 28,414,011

Annual Benefit from Hamilton Renewable Power Inc.

2006	2007	2008	2009	2010	2011	2012	2013	Total
\$11,257	\$591,719	\$447,373	\$2,000,345	\$2,213,378	\$2,033,743	\$1,708,212	\$1,683,608	\$10,689,635

Looking forward, achieving the new 2030 targets alone are anticipated to deliver an additional \$50 million in energy savings and avoided costs. Meeting these targets will put Hamilton on track to become a net zero carbon community. This means that any emissions created to provide energy for corporate requirements in buildings, vehicles or water and waste water services will be offset by renewable energy generation, emission reduction activity through energy saving projects or purchasing carbon credits.

BOARDS AND AGENCIES:

As in the 2007 Energy Policy, all City Boards and Agencies are encouraged to adopt the revised policy and actively participate towards the stated reporting, targets and goals.

GREEN HOUSE GAS EMISSION REDUCTIONS:

Closely linked to energy reduction targets are the associated Greenhouse Gas Emission (GHG) reductions. Like many other cities in North America, Hamilton has adopted a 2050 target for GHG reduction of 80%, as per the Board of Health Climate Change Actions 2012 report (BOH13024). It should be noted that to achieve the 80% GHG reduction target, there may be a need for other efforts and activity such as purchasing carbon off-sets or significant and expanded local renewable energy production by the City. Another challenge to meeting these targets is the provincial generation mix, which has changed dramatically with the reduction of coal fired generation. This is a positive impact on provincial GHG emissions, but reduces the impact that electricity reduction has on lowering GHG emissions. In other words, more

electricity reduction is now required to achieve the same GHG reduction from previous years.

GREEN ENERGY ACT:

One of the single biggest impacts on the City's Corporate Energy Policy going forward is the Green Energy Act (GEA). This act stipulates a municipality's (plus other public institutions) annual reporting requirements. These requirements include using 2011 as a starting point for energy consumption data for end use locations. It also requires that municipalities develop annual energy management plans with stated projects and verify energy savings and GHG reductions from these measures which must be submitted to the Ministry of Energy in July of 2014. Prior to submission of the GEA report Council will be presented with additional information as required by the GEA. This information will be made available to the public just as the 2012 submission was also made available. The use of 2011 as a baseline also provides the City with an opportunity to track future savings against this baseline, plus also against our original baseline of 2005. The 2011 baseline will also provide a consistent benchmark against other municipalities that are also mandated to use the Green Energy Act as a baseline. Targets for 2030 represent an additional 25% reduction in energy intensity using the 2011 baseline.

Hamilton is prepared to meet these requirements through a rigorous data collection and verification process that links utility data and meter data with project implementation across City locations defined by the Green Energy Act.

ENERGY INTENSITY IN CORPORATE BUILDINGS:

The proposed new energy intensity target calls for a 60% reduction in energy intensity from 2005 levels. This is an additional 40% reduction from the current level of energy intensity reduction of 20%. An interim target of 45% energy intensity reduction by 2030 is identified as an initial target over the shorter term. This target also recognizes that efficiencies will be harder and harder to achieve over time, as indicated by the last 15% (from 45% to 60%) for the period 2030 to 2050. These reductions are dependent on a steadfast implementation of process and technology improvements like variable speed drives, lighting retrofits (light emitting diodes or other technology), monitoring energy use and targeting expected consumption. This can be achieved with improved monitoring and verification through the aid of our recently attained Energy Management Information System provided through the Association of Municipalities Ontario (AMO) and the use of Building Automation Systems (BAS) system controls.

In December of 2013 the Minister of Energy released the latest Long-Term Energy Plan (LTEP). The Province's LTEP balances five principles that will guide future decisions: cost-effectiveness, reliability, clean energy, community engagement, and an emphasis on conservation and demand management before building new generation.

ENERGY INTENSITY OF HAMILTON WATER:

The City's water and waste water operations consume approximately 35% of the energy use in the City in any given year. While it is critical (and mandated) to focus on providing safe drinking water and ensuring ample supply is available to residents,

tracking energy use to deliver and treat water is increasingly important. Going forward Hamilton Water will monitor energy use per volume of water delivered, measured as kilowatt hours per million litres of water per day (kWh per MLD). This key performance indicator will become a measure of how efficiently the City delivers safe drinking water using 2011 as a base year. Another focus is on the wastewater operations. Opportunities exist that include using methane from the waste water operations to produce energy. Currently this is already being done, but future projects will include additional analysis for additional renewable energy opportunities. These projects have the potential to create renewable energy that lower GHG and bring Hamilton closer to a net zero carbon municipality. These projects also have the potential to create revenue and keep that revenue inside the City.

FLEET AND TRANSIT FUEL CONSUMPTION:

Fuel purchasing and related alternatives are being assessed both to enhance operating budgets and have a positive impact on GHG emissions (diesel, gasoline and compressed natural gas). One significant opportunity lies with the fuel conversion from diesel to compressed natural gas (CNG) initially targeting Transit. With current market conditions, the lower operating costs of CNG are significant, along with the associated GHG emission reductions. Managing fuel usage in other areas will also lower operating costs and result in lower GHG emissions. This can come from the purchase of more efficient engines as vehicles are replaced. Ensuring fuel efficiency is incorporated into the procurement decision using a life cycle analysis will improve the City's overall fuel efficiency usage. In order to ensure success with the fuel efficiency a number of factors will need to be addressed, these include:

- CNG and other alternative fuels are recognized as part of the reduction strategy;
- New technology is embraced and available for fleet vehicles (i.e. hybrids);
- Horsepower requirement for the fleet can be reduced over time;
- Anti-idling is enforced among staff and new technology be acquired to reduce or eliminate idling;
- Driver training efforts continue with focus on fuel economy techniques;

DISTRICT ENERGY AND ENERGY PLANNING:

While the adoption of this policy is focused on Corporate Energy usage, the City will also continue to work through the Hamilton Utilities Corporation - Joint Advisory Committee (HUC-JAC) to investigate opportunities for growth of district energy in targeted areas of the City to enhance economic development, improved reliability, energy efficiency and foster further GHG emission reductions. District energy provides for local, clean, renewable and embedded energy systems which support energy efficiency solutions that are integrated with other City planning processes. District Energy systems are also an excellent solution to integrated community energy planning. District Energy offers a sustainable energy solution to address future Regional Energy Planning needs.

OFFICE OF ENERGY INITIATIVES:

The Office of Energy Initiatives (OEI) acts as a Centre of Excellence for all matters related to energy efficiency, renewable energy, utility rates, district energy, contracts, energy policy and operational efficiency. Core services provided by the OEI to maximize and leverage energy savings, revenue generation and associated services have expanded to now include:

ENERGY PROCUREMENT (COMMODITIES AND UTILITY RATES)

- Procurement (manage contracts; supplier agreements; balancing the daily, monthly and seasonal storage limits, unique lease and contract terms etc);
- Regulatory (mitigate utility increases through rate analysis, working with OEB and AMO Energy and Rate committees, supply strategies, utility agreements).

ENERGY AND ENVIRONMENTAL REPORTING

- Green Energy Act regulatory reporting requirements;
- Annual Energy report for Council;
- Annual Commodity report for Audit, Finance and Administration;
- Quarterly Fuel reports;
- Annual Green House Gas Emission reporting;
- Global Adjustment reports;
- Key Performance Indicator reporting for Corporate energy use;
- Monthly commodity strategy reporting (internal).

ENERGY CONSERVATION AND DEMAND MANAGEMENT (CDM)

- Energy Audits;
- Energy Management Information System (AMO/LAS and Utility Manager);
- Account Management (work directly with client groups on portfolios such as Hamilton Water, Library's, Fire Stations, Arena's, Pools, etc);
- Re-commissioning activity for targeted buildings;
- Life Cycle and Retrofit analysis of business cases;
- New technology assessment (Light Emitting Diodes, Variable frequency drive applications, compressed natural gas, control schemes, etc);
- Education;
- Maximizing incentives.

PROJECT MANAGEMENT

- Design, tender/procurement and construction activity for energy specific projects;
- Roster activity and management;
- Building Automation System upgrades;
- Capital planning and integration for special projects and client group projects.

RENEWABLE ENERGY SYSTEMS

- Hamilton Renewable Power Inc. operations and maintenance activity;
- Biogas purification unit operations and maintenance activity and daily gas nominations ;
- Hamilton Community Energy expansion plans and acquisition of Central Utility Plant (CUP);
- Metering, sub-metering and cost allocation;
- Solar Photovoltaic Projects;
- New cogeneration and combined heat and power projects assessments;
- Waste to energy assessments;
- Feed-In-Tariff (FIT) program management.

NEW BUSINESS VENTURES

- District energy;
- Renewable generation;
- Community planning (energy aspect of new developments).

ENERGY RESERVE

- Manage reserve to maximize cash inflow (incentives, billing errors, renewable energy revenues etc);
- Manage staffing costs that are paid from the Energy Reserve;
- Fund energy related studies and projects;
- Fund unplanned utility rate related volatile costs that dramatically impact budgets;

COMMITTEES AND POLICY ACTIVITIES

- Manage the implementation of the Corporate Energy Policy, and work closely with City staff that have impact on the Green Fleet Policy and Vision 2020 Policy.
- Energy staff sit on various industry and internal committees that include:
 - Ontario Power Authority Stakeholder Advisory Committee;
 - Ontario Energy Board;

- Independent Electricity System Operator;
- Association of Municipalities Ontario (AMO) Energy Task Force;
- AMO - Local Area Services (LAS) Committee
- Hamilton Renewable Power Inc. (HRPI);
- Building Owners and manager Association (BOMA);
- Mohawk Energy Program Advisory Committee;
- McMaster Energy Program Advisory Committee;
- Revving Up Municipalities - Hamilton Electric Vehicle Project;
- Sustainable Hamilton;
- Toronto Clean Air Committee;
- Downtown West Harbourfront Coordinating Committee;
- Horizon Advisory Committee for Electric Mobility Adoption and Prediction;
- Hamilton Utilities Corp. Joint Advisory Committee.

Alternatives for Consideration - See Page 17

FINANCIAL - STAFFING - LEGAL IMPLICATIONS

Financial:

Energy costs continue to rise and recent government announcements suggest a 45% increase in electricity costs alone over the next five years. Targets play a key role driving change towards greater energy efficiency through consistent management of energy consumption to control costs through efficiency gains from technology and operational changes. Projects are directed to be reviewed on a case by case basis for life cycle costing. This allows the City to best decide what project options will deliver the lowest ongoing costs - even though initial costs may be higher. Awareness of energy use key performance indicators like energy intensity ensures the City secures “better mileage” from its Corporate Buildings. Without these tools, policy and efforts by staff the City will end up paying higher operational costs.

Staffing: N/A

Legal:

Agreements and service contracts will continue to be vetted by legal services going forward. There are a number of suppliers and associated contracts that are managed under the Energy Commodity Policy that will continue to be managed in this manner.

HISTORICAL BACKGROUND

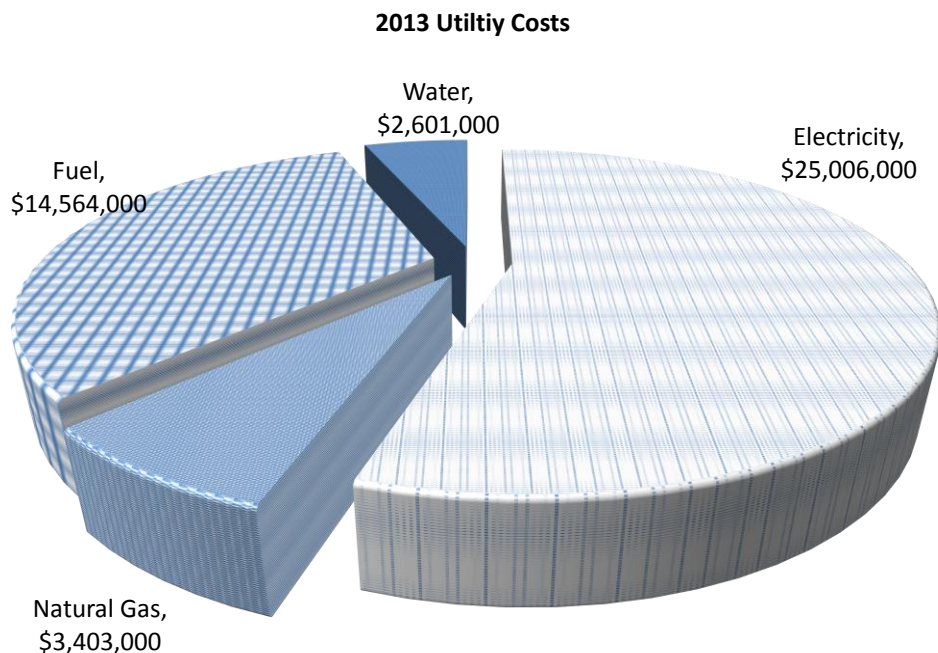
In 2005 Hamilton City Council approved the concept of an energy office (now the Public Works, Office of Energy Initiatives) to be created to formalize and centralize responsibility for energy management in the City by focusing on how and where the City of Hamilton is spending money on energy and to look for ways to save and reduce energy consumption.

The original Corporate Energy Policy from 2007 outlined many areas for energy efficiency and optimization. Using this policy plus the defined targets, the City has been

able to identify and bring various business cases that support the policy, reduce operating costs and achieve reduction in GHG's.

Duties established for the Office of Energy Initiatives (OEI) included focusing on how and where energy budgets are spent and to look at ways to reduce energy consumption. Overall responsibilities of the OEI include:

- Corporate Energy Policy (including commodity procurement);
 - Operations of renewable generation;
 - Utility rate management;
 - Utility billing errors and adjustments;
 - Energy monitoring, verification, benchmarking and analysis;
 - Metering, sub-metering and customer utility billing;
 - Energy conservation and demand management;
 - Regulatory Compliance and Reporting;
 - Environmental Emission Reductions;
 - Stewardship and Education.
- The Office of Energy Initiatives (OEI) retained its first staff member in May 2006 with the hiring of the Manager on a two year contract. In January and March of 2007, two Senior Project Managers joined, also on two year contracts. In November 2007, the City's Corporate Energy Policy was approved, along with approval for the three existing staff and two new Project Managers, hired in April 2008 to become permanent full time staff.
 - At the August 11, 2009, Committee of the Whole meeting an Information Report titled Corporate Energy Report - Year End 2008 was received by Council. This report (dated July 13) outlined the corporate energy savings and avoided cost savings as of the year end 2008 which had exceeded \$10 million dollars (\$9.2 net) and that overall, the City's corporate energy consumption or usage reductions was 3.3% during this time period. Further to this report, staff were asked by Council to present a rationale for additional staff for the Public Works - Office of Energy Initiatives as part of the 2010 budget process.
 - At the January 25, 2010 Public Works Committee a presentation regarding staff was delivered (Report PW10006). Staff is directed by the Committee to report back to Council on the cost and benefits realized with these positions. Council approved hiring of five new contract positions. The addition of this new staff was contingent on enhancing the City's bottom line by more than \$6 million. Since 2010 and the addition of these staff, we have seen City wide energy related avoided costs, incentives and savings grow to over \$32 million (from \$13.47 million in 2010). The actual savings since 2010 have exceeded \$15 million. Managing the City of Hamilton's current energy expenses is like running a business that spends ~\$45 million annually or \$123,000 per day.



As the City's energy program has evolved over the last few years, projects which have been assisted by the expertise of OEI brings the greatest return to the City in terms of energy efficiency, emission reductions, financial return on investment and incentive funding. When energy staff is not involved in the process, existing department staff in general (with some exceptions) may not have the expertise to take full advantage of energy reduction opportunities and the funding programs available in the market. What has been observed is that Consultants and Project Managers need to be educated and encouraged to evaluate energy efficient alternatives properly, so that diligent life cycle analysis is performed to make informed decisions and also to ensure that staff conform to policy while maximizing available incentives.

Staffing costs have been paid from the Energy reserve with no impact to the levy. Furthermore, staffing costs have been more than compensated by the energy savings, avoided costs, renewable energy revenue and incentives. This can be expressed as a favourable return on investment with \$4.1 million in employee costs being offset over seven times by over \$32.8 million in savings. This represents a return on investment of 8:1 for staffing costs vs savings.

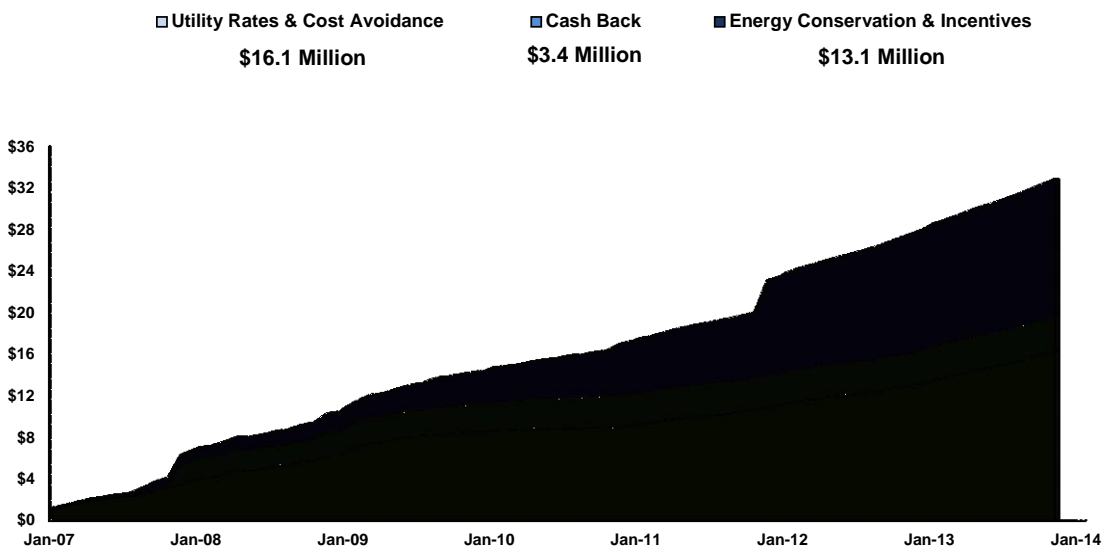
Adding to the value and minimizing employee costs are realized through the recovery of a portion of Energy staff salaries from Hamilton Renewable Power Inc. (HRPI). This covers off activities performed by Energy staff to manage HRPI, including daily operational oversight, ongoing analysis, cost control and optimization for revenue generation.

Staff had originally been focused on four primary areas:

1. Improved reporting on energy results and key performance indicators to Council and to individual Divisions so that informed decisions can be made and a climate of accountability for energy costs can be created. Reporting would also provide a focus on benchmarking both internally and with other municipalities, to gauge performance and evaluate successes as a leader in energy management.
2. Energy expertise to support major infrastructure projects and capital planning for the City's major energy users over the next several years. Support in this area ensures the City achieves the greatest return in terms of energy efficiency and financial performance of infrastructure projects.
3. Renewable energy technologies and opportunities under the Ontario Power Authorities (OPA's) FIT and MicroFIT programs. This function would also evaluate opportunities for participating in OPA's Demand Response programs which could generate millions in dollars.
4. Adding the skills and expertise required for metering, sub-metering and controls systems in the City. This skill set is presently lacking and is necessary for future cost and operational control. The City's current building automation systems are now over ten years old and need to be replaced. Expertise in this area will ensure the City makes the best decisions for future systems.

Results of these efforts are outlined in the following tables:

**City of Hamilton Cumulative Energy Savings & Avoided Costs
(2006- 2013)**



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RESULTS AS OF YEAR END 2013 (ANNUAL AND CUMULATIVE)

Year by Year								
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Significant milestones accomplished to date include efforts in the following:

- Maximizing incentives from utility programs (largest incentive in Ontario of \$2.3M in 2011);
- Promoting and operating renewable generation (Biogas, Solar, Hamilton renewable Power Inc., District Energy);
- Rate analysis and optimization (Over \$2.5M benefit from Class A Global adjustment rate in 2013 alone);
- Retrofit programs across City portfolio of buildings and operations;
- Energy advisory activity across City departments;
- Promote GHG reduction through measures in fuel management and fleet activity;
- Energy intensity reduction for Hamilton Water.

Incentive programs are leveraged to ensure no available funds are left on the table by ensuring compliance to program rules, meeting program deadlines and ensuring overall program details are provided and approved as required. One such significant project completed at Hamilton Water's high lift pump station secured \$2.3 million in incentives from Horizon Utilities, through an OPA program for electrical reduction. As of year-end 2012 the OEI has secure \$4 million in incentives for various projects.

Renewable generation has been promoted and implemented in a number of projects. Solar roof top photovoltaic systems were assessed for City owned roofs and a 250

kilowatt installation is complete at Wentworth Operation Centre. Additional sites are submitted for approvals and await Ontario power Authority program authorization before proceeding.

Hamilton Water also installed a biogas purification (BPU) unit at Woodward which captures excess methane from the wastewater process. The purification process allows the City to inject the resulting renewable natural gas into the Union Gas Distribution system, making the City a producer of renewable energy, in this case renewable natural gas. This BPU draws from the same source of methane as the existing Hamilton Renewable Power Inc.'s (HRPI) Cogeneration unit located at Woodward. In addition to the Woodward Cogeneration unit, there are another two units located at the Glanbrook Landfill site, for a total of 4.8MW (Woodward and Glanbrook) of electrical energy produced by the HRPI Cogeneration units. HRPI has provided the City a net benefit of \$10M since 2006. Renewable energy production at these sites is managed by the OEI, along with associated utility and maintenance contracts.

Rate analysis and optimization requires on going vigilance and expertise, but pays big dividends. In the past, street lighting accounts were switched to spot market billing and resulted in a big savings to the City. More recently the application of a new electrical rate category allowed certain sites to be charged a different rate for the Global Adjustment charge on the bill. The resulting savings from this change was \$2.5 million in 2013. Other rate changes on the natural gas accounts have had positive impact on charges and add to overall rate savings reported annually.

Retrofit programs have seen chiller installations evolve into the district cooling system in the downtown core, showing a better lifecycle cost than installing individual chillers across multiple buildings at City Hall, the Central Utilities Plant, Copp's (First Ontario Centre), Central Library, Hamilton Place, Hamilton Convention Centre, Lister Block and the Ellen Fairclough building. Other programs include lighting retrofits across Fire Stations, Arena's, Libraries, Hamilton Convention Centre and the Wentworth Operations Centre.

Advisory roles are taken during up front project designs. At the earliest possible stage energy plans are ideally developed so as to assess optimal energy supply options such as district energy, geo-exchange (ground source heat pumps), lighting, HVAC and other major energy consuming considerations. Attempting to make major energy system design changes, part way in to the design process leads to missed opportunities for energy efficiency, costly re-design fees or "same old design" applications. The OEI is committed to making strides to ensure design consultants are familiar with the requirements of life cycle analysis on all major building systems as well. Taking this a step further, Energy Plans for communities and developments should become part of the building permit process to ensure developers also consider energy supply solutions related to district energy or renewable energy. Often these options can reduce developer costs, create a higher quality product to sell and attract potential clients that value renewable energy and energy efficient buildings while providing more efficient designs which have a better environmental impact.

The Green Energy Act requires that municipalities submit 2011 data as a starting point and going forward Energy Plans be developed. Considering all municipalities are required to do the same we now propose to establish 2011 as the new baseline for the next 25% of energy intensity reduction by 2030 in order to align and meet the Green Energy Act requirements. The 2050 target of 60% energy intensity will also use the 2011 data as a baseline until regulations or conditions change.

POLICY IMPLICATIONS AND LEGISLATED REQUIREMENTS

Corporate Energy Policy revision will incorporate the Energy Commodity Policy as these are closely aligned and both managed closely by the Office of Energy Initiatives. Reporting requirements remain the same as originally approved.

Targets set out in the Corporate Energy Policy support and directly contribute to the greenhouse gas emission reduction targets set out previously in the Vision 2020 policy and the new Climate Change Actions Report (BOH13024). The new greenhouse gas emission reduction target is 80% by 2050.

Efforts to optimize the City's Fleet and Transit vehicles can have a positive impact on greenhouse gas emissions within our community. Decisions that include but are not limited to adopting new fuel sources (i.e. compressed natural gas or biofuels), enhancing driving habits, or modifying vehicles all impact and relate to the Fleet Policy and the Green Fleet Implementation Plan.

The Green Energy Act mandate municipalities report on energy use and resulting GHG impact of all energy using facilities. In addition there are ongoing reporting requirements that must be provided that document energy usage, GHG impact and energy efficiency project implementation. The OEI has met these requirements to date and will continue to do so in the future.

RELEVANT CONSULTATION

In order to obtain feedback from a diverse group of people, an Envisioning Session was held with invitations sent to senior staff across City departments plus a range of other municipalities, utilities and select experts from the energy consulting community. This session was well received as attendees provided their views and insights in envisioning what a sustainable Hamilton would look like in 2050. The resulting document was used as a guide to revise and enhance the Corporate Energy Policy.

Consultation about this policy was held with Facilities Management and Capital Programs, Central Fleet, Transportation, Hamilton Water, Hamilton Police Services, Finance and Administration plus external attendees whom attended the Envisioning event.

ANALYSIS AND RATIONAL FOR RECOMMENDATION

The revised Corporate Energy Policy builds on the past successful implementation of many measures that presented excellent business cases and were worthy of the investment based on prudent life cycle analysis. The City continues to be challenged with budget pressures and an aging infrastructure. Closely managing commodity

(operating) costs makes good business sense to ensure infrastructure investment and upgrades are completed with foresight since once the infrastructure is built, it is in place for many years. Incremental costs for energy efficient upgrades not only pay for themselves, they will also contribute to the emission reduction targets. This is proven through life cycle analysis on projects when comparing base designs and more efficient options.

Managing commodity costs through supply agreements and procurement strategies has been successful in the past. Hedging agreements offer price certainty by mitigating volatility which is paramount when managing budgets. Emphasis will first be on using less energy through efficiency. Operational and process improvements, energy and cost awareness plus supply management strategies also will deliver desired results with all remaining and unavoidable costs.

Establishing clearly defined energy targets along with a heightened focus on energy management is integral to the City meeting its goals of 80% emission reductions by 2050.

ALTERNATIVES FOR CONSIDERATION

The energy reduction targets recommended in this report assist the City in meeting its goals for emission reductions and new reporting requirements under the Green Energy Act. Internal policy changes are reflected to enhance the revised Corporate Energy Policy primarily by setting new targets for energy intensity that directly relate to the City's greenhouse gas emission reduction targets of 80% by 2050. As this greenhouse gas emission reduction target is already Council approved (Board of Health Climate Change Actions 2012 report (BOH13024)).

If the City chooses to not endorse the revised Corporate Energy Policy there would be challenges in overall corporate guidance, expertise and focus on meeting Green Energy Act requirements and managing energy related costs and consumption. The benefits of having a Corporate Energy Policy and associated staff designated to implement the policy have been demonstrated with over \$32 million in savings, avoided costs and incentives. Energy expertise is also leveraged for projects, rate options, supply contracts, renewable energy recommendations and operations (Hamilton Renewable Power Inc., biogas, solar projects, lighting and building automation systems).

Financial impacts include addressing how energy costs continue to rise. Recent government announcements suggest a 45% increase in electricity costs alone over the next five years. Without targets, which play a key role in managing consumption and drive down costs through efficiency gains from technology and operational changes, savings may not materialize. Projects would not be directed to be reviewed on a case by case basis for life cycle costing. The City may then only decide what projects will be delivered using only the lowest initial cost, even though operational costs may be lower with other options. Less awareness of energy use key performance indicators like energy intensity would lead to less efficient Corporate buildings that only take action on a reactive basis (instead of proactive basis). Without these tools, policy and efforts by staff, the City will end up paying higher operational costs. Fewer and lower incentives,

revenue from specified renewable energy projects and billing recoveries wouldn't be secured.

ALIGNMENT TO THE 2012 - 2015 STRATEGIC PLAN

Strategic Priority #1

A Prosperous & Healthy Community

WE enhance our image, economy and well-being by demonstrating that Hamilton is a great place to live, work, play and learn.

Strategic Objective

- 1.2 Continue to prioritize capital infrastructure projects to support managed growth and optimize community benefit.
- 1.3 Promote economic opportunities with a focus on Hamilton's downtown core, all downtown areas and waterfronts.
- 1.4 Improve the City's transportation system to support multi-modal mobility and encourage inter-regional connections.
- 1.5 Support the development and implementation of neighbourhood and City wide strategies that will improve the health and well-being of residents.
- 1.6 Enhance Overall Sustainability (financial, economic, social and environmental).

Strategic Priority #2

Valued & Sustainable Services

WE deliver high quality services that meet citizen needs and expectations, in a cost effective and responsible manner.

Strategic Objective

- 2.1 Implement processes to improve services, leverage technology and validate cost effectiveness and efficiencies across the Corporation.

APPENDICES AND SCHEDULES ATTACHED

Appendix "A" Corporate Energy Policy

Appendix "B" Envisioning Sustainable Energy for Hamilton