

STAFF REPORT: ENGINEERING AND PUBLIC WORKS DEPARTMENT

REPORT TO: Infrastructure and Recreation
Committee

MEETING DATE: October 16, 2012

REPORT NO.: EPW.12.070

SUBJECT: Energy Conservation and
Demand Management Plan
Development Strategy

PREPARED BY: Adam McMullin, Environmental
Initiatives Coordinator

A. Recommendations

THAT Council receive Report EPW.12.070 entitled “Energy Conservation and Demand Management Plan Development Strategy” and;

THAT Council consider the recommended approach as outlined by Staff to develop an Energy Conservation and Demand Management Plan as part of the 2013 budget process consisting in principle of:

- 2013 operating budget of \$75,000
- 2014 – 2017 capital budget totalling \$350,000 for energy efficiency and retrofit projects
- Initial funding from Gas Tax Revenues
- Creation of Energy Efficiency Reserve Fund

B. Background**Purpose**

The Town is mandated through regulation to annually summarize facility energy consumption, greenhouse gas emissions and to develop a conservation and demand management plan (Plan). This Report is requesting consideration from Council to implement Staff’s recommended approach during the 2013 budget deliberations.

Background

In 2009 the Province of Ontario enacted The Green Energy Act with the intention to expand renewable energy, encourage energy conservation and create green jobs. Under the Act, Ontario Regulation 397/11 includes a directive to the broader public sector (Municipalities, Universities, Schools and Hospitals) to:

- Complete annual energy consumption and greenhouse gas emissions audits;
and,
- Prepare energy conservation and demand management plans.

Reporting Requirements:

1) Energy Consumption and Greenhouse Gas Emissions Summary (Summary)

Municipalities must submit a summary of annual energy consumption and corresponding greenhouse gas emissions for all facilities including administrative buildings, libraries, fire stations, police stations and water and wastewater infrastructure.

All types of energy (electricity, natural gas, fuel oils) must be reported excluding fleet fuel consumption. Operational information such as floor space, operational hours, facility type and so forth is to be included in the reporting.

The summary must be submitted to the Ministry of Energy and published annually, commencing on or before **July 1, 2013**. The annual energy consumption and greenhouse gas emission summary reporting will be completed by Staff, lead by the Solid Waste and Environmental Initiatives Division.

2) Energy Conservation and Demand Management Plan (Plan)

The regulation stipulates that Municipalities must develop a 5 year plan that requires the Town to:

- Establish corporate goals and objectives for conserving energy consumption and managing energy demand;
- Identify conservation and demand management measures and associated costs and savings estimates; and,
- Identify any renewable energy infrastructure installed and quantity of energy produced.

The plan must be approved by the senior level of management. Every five years the plan must be updated and a progress report submitted that includes the following:

- A description of current and proposed measures for conserving and otherwise reducing energy consumption and managing its demand for energy;
- A revised forecast of the expected results of the current and proposed measures;
- A report of the actual results achieved; and,
- A description of any proposed changes to be made to assist the Town in reaching any targets it has established or forecasts it has made.

The plan must be submitted on or before **July 1, 2014**. The progress report is due every five years thereafter.

Plan Development Approach

The Regulation requires that the Plan include an energy conservation goal and identify the corresponding measures to be implemented to meet the target. To establish realistic, obtainable conservation goals a comprehensive energy audit is required to identify conservation and renewable energy deployment opportunities. Based on these

opportunities and other considerations such as cost and implementation timelines, an energy reduction goal will be developed.

Energy Auditing

Energy audits range in scope, scale and detail, from preliminary walk-through audits to investment grade engineering studies. Walk-through audits typically involve collecting and analyzing consumption data, costs and other information to create a general profile of a facility. These audits allow for a crude comparison or benchmarking of a facility's energy consumption to compare to an 'average' facility, to evaluate its overall energy performance. Simple energy conservation measures will be identified such as lighting upgrades with quick estimates on implementation cost, operational cost savings and payback. Walk-through audits are effective to prioritize potential energy efficiency projects and identify the need for additional, more intensive analysis.

Detailed and investment grade audits involve in-depth sophisticated analysis of potential energy conservation measures and opportunities. Facility energy profiles are developed and equipment, operational processes and controls are assessed. Based on this evaluation, opportunities are identified and prioritized with consideration for the following:

- Equipment upgrade cost
- Operational cost savings
- Life-cycle analysis and costing
- Return on investment

Investment grade audits include comprehensive recommendations that provide detailed quotations and estimates on equipment procurement and installation, predicted energy savings and process improvement impacts. These audits require a sophisticated knowledge of energy fundamentals, mechanical systems, building envelope, facility heating and cooling systems. The recommendations will require sufficient detail to solicit investment or financing to undertake the proposed energy efficiency improvement measures.

Investment grade audits vary in cost depending upon the facility and operation. It is estimated that these audits will cost between \$6,000 - \$10,000 per facility.

Auditing Options

As part of the annual energy consumption and greenhouse gas emission reporting, Staff will gather and establish baseline data for all of the facilities within the Municipality. This data will serve as a baseline for any energy auditing activities moving forward.

Three potential approaches to conduct energy auditing are as follows:

1) Preliminary 'Walk-through' Internal Auditing

Operational Staff have extensive knowledge and experience in the systems that they run on a day-to-day basis. Water, wastewater, recreational Staff operate the majority of

the facilities within the Town. There is opportunity for Staff to conduct preliminary level energy audits within their own facilities and provide recommendations for simple improvements.

2) Third Party Detailed Energy Audits

Through a competitive tendering process a consultant can be hired to conduct detailed energy audits for identified facilities. The consultant would be required to provide detailed energy conservation recommendations that serve as a basis for Staff (or a hired contractor) to implement any proposed equipment or process changes without further assessment.

3) Energy Performance Contracting (EPC)

Energy performance contracting provides a turnkey service to implement energy efficiency improvement measures within facilities. This approach requires that a contractor implement energy conservation projects that are guaranteed to save energy and therefore cost. Contractors conduct investment grade energy audits, implement identified energy retrofit measures and monitor energy savings. At this junction the investment grade audit costs are incurred, at an estimated expense of \$6,000 - \$10,000 per facility. The Town pays the contractor a set fee for services that include:

- All audit expenses
- All equipment purchases
- Engineering and design work
- Installation
- Staff training
- Monitoring implementation
- All other project management duties

Each project is financed and repaid utilizing the annual operational cost savings. A guaranteed energy savings performance contract obligates the contractor to pay the difference if the identified savings fall short. The upgrades and retrofits pay for themselves. Energy performance contracting is employed by public sector agencies as a low risk approach to reduce energy consumption, renew infrastructure and save costs.

The following table summarizes the benefits and drawbacks of each approach:

| Approach | Benefit | Drawback |
|---|--|---|
| Preliminary ‘Walk-through’ Internal Auditing | <ul style="list-style-type: none"> • This approach leverages Staff experience and could potential save the cost of hiring a third party consultant to complete the auditing. • Undertaking the auditing process can build capacity of Staff as they enhance their understanding of the systems they operate. | <ul style="list-style-type: none"> • Utilizing Staff will limit the sophistication and depth of the audit exercise. Energy conservation opportunities may be missed as Staff are not experts in energy management. There may be less confidence in the implementing recommended actions. • The auditing will require time and take Staff from the regular duties, potentially impacting operations. The auditing process will take longer than hiring a third party consultant. |
| Third Party Detailed Energy Audits | <ul style="list-style-type: none"> • A third party consultant will possess the necessary expertise to conduct detailed auditing and provide key recommendations. • The work will be completed in a timely fashion, quicker then conducting internal auditing with Staff. • Higher confidence in proposed recommendations then those recommended by Staff. | <ul style="list-style-type: none"> • More costly then conducting internal Staff audits. • Potential of receiving a ‘boiler-plate’ generic audit and recommendations. The consultant is not tied to the success of implementing the identified energy efficiency and conservation measures, which may limit the quality of the consultant work. |
| Energy Performance Contracting (EPC) | <ul style="list-style-type: none"> • Risk is placed on the contractor, ensuring guaranteed energy and cost savings. • Identifies sophisticated, large scale improvement projects with longer term payback period compared to other approaches. • Leverages expertise of the private sector | <ul style="list-style-type: none"> • Complex procurement and contracting process. • Requires long-term commitment to single contractor. • Individual project costs are typically higher (due to premium for project management and monitoring expenses). |

Developing an Energy Conservation and Demand Management Plan Approach

Staff propose the following approach for developing a Municipal energy conservation and demand management plan that involves the following actions;

- Conducting energy auditing activities
- Reviewing auditing recommendations and prioritizing projects
- Developing the Plan based on the priority project listing
- Implementation of the Plan

Staff recommend this approach because it provides flexibility for Staff and Council. Conducting the investment grade engineering audits will provide specification and costing data that can serve as a basis for all future procurement decisions. This approach ensures that the conservation goals outlined within the Plan are obtainable, while allowing Staff to properly understand the costs associated with the identified energy efficiency projects. The audit findings will allow Staff to prioritize projects and develop a Municipal energy conservation goal based on the identified potential energy savings. Simple projects can be completed in house utilizing Staff expertise at a reduced cost. Complex, longer-term projects can be implemented in a guaranteed contract format at a potentially higher cost but with a low financial risk to the Town. Projects will be implemented with consideration for return on investment and potential environmental and social benefits.

The recommended approach is described in further detail as follows:

Step #1 – Energy Auditing (February 2013 – July 2013)

- Staff tender for services to conduct investment grade audits for a prescribed number of facilities.
- Require that all recommendations include detailed costing relating to equipment procurement, installation, Staff training, monitoring, project management and auxiliary expenses. Individual energy improvement project timelines and schedules will be requested.
- Identify renewable energy deployment opportunities.
- Funded using tax gas at an expected cost of \$75,000.

Step #2 – Project Selection & Plan Development (August 2013 – January 2014)

- Staff review audit recommendations and prioritize the projects with consideration for total cost, ease of implementation, return on investment, potential energy savings and so forth.
- Develop the energy conservation plan. The potential energy savings from the identified priority project listing will serve as the basis to establish a Municipal energy conservation goal.
- Submit plan for adoption by Council.

Step #3 – Energy Conservation Plan Implementation (February 2014 – February 2019)

- Utilizing the audit findings and recommendations, Staff will choose to proceed with a particular project in one of followings ways:
 - 1) **In-house project management:** For simplistic, low risk, straightforward retrofit / improvement projects, Staff will take the project lead. The audit recommendations will lay out clear specifications and costing information for Staff to proceed forward.
 - 2) **Non-guaranteed open-market tender:** For low-risk projects that cannot be implemented in house, Staff will tender the work using the audit specifications and costing as guidance.
 - 3) **Guaranteed performance contracting:** For complex projects, Staff will consider employing the company that conducted the initial audit based on the specifications and costing outlined in the audit recommendation. These projects would include a guaranteed savings provision.

Energy Conservation Financing Mechanism

Generally, energy efficiency projects are funded using an up-front capital expenditure that is recovered through reduced operational costs. Establishing an appropriate financing mechanism is necessary to sustainably fund energy efficiency projects and to continuously improve energy conservation within the Town. Progressive governments have established self-sustaining energy reserve funds. These funds grow by accumulating operational cost savings realized by implementing energy efficiency projects. The reserve is used to fund future projects. Individual departments do not see a reduction in their operational costs as a result of a particular project.

Staff recommend that Council establish an energy reserve fund that is dedicated to financing energy efficiency initiatives in conjunction with the development of the Municipal energy conservation and demand management plan. The implemented projects undertaken within the plan timeframe can be funded using Gas Tax revenue. The Gas Tax will serve as seed money for the reserve fund and over the five year period, accumulated operational savings realized from the efficiency projects will grow the energy reserve. In the subsequent 5-year period and beyond, future efficiency projects will be funded using the energy reserve. The following outlines the benefits of utilizing Gas Tax to establish an energy reserve fund:

- Reduces the taxation burden for equipment and infrastructure renewal;
- Provides a sustainable funding source for future efficiency initiatives which ensures consistent implementation of projects year-over-year. Eliminates the impact of differing yearly budget constraints ;
- Reduces dependency on uncertain funding sources;

- Enhances the environmental performance of the Town through improved energy efficiency.

The energy reserve will be dedicated to fund energy efficiency projects that demonstrate a return on investment and/or positive environmental or social benefits. Potential projects include light retrofits, boiler and compressor upgrades, variable drive implementation, solar-hot water installations, heating and cooling systems upgrades, building envelope improvements and so forth.

Project Example: Beaver Valley Community Centre Light Retrofit

To further clarify the function of the energy reserve fund, the Beaver Valley Community Centre arena light retrofit project completed in 2011 serves as an excellent example.

Twenty-four metal halide light and fixtures were replaced with high-efficiency fluorescent T-5 lights and ballasts. A flexible operation management program was included in the installation to allow Staff to modify lighting levels based on the activity at hand. Based on equipment specification and operational data Staff calculated the following energy and cost savings:

| Beaver Valley Community Centre Arena Light Retrofit | | | |
|--|----------------------------|----------------------------|--------------------|
| | Old Lighting System | New Lighting System | Difference |
| Annual Energy Usage (kWh) | 94,296 | 22,680 | 71,616 |
| Annual Cost | \$8,958.12 | \$2,154.60 | -\$6,803.52 |

The new lighting system cost \$55,000 for equipment and installation. Based on an annual estimated operational cost savings of \$6,800, the retrofit has a simple payback of 8.1 years.

The energy reserve fund would function by accumulating \$6,803.52 annually over a period of 8.1 years, for a total of \$55,000. After the project payback period has been reached, future energy and cost savings are then realized in reduced operational budget expenses. This allows for participating departments to benefit from these retrofits through long-term reduced energy costs.

Based on this example, it is evident that once established the energy reserve fund could quickly grow ensuring a sustainable funding source moving forward.

Monitoring & Reserve Fund Operation

Where possible, energy efficiency projects will include monitoring programs that allow Staff to empirically quantify energy and cost reductions to verify pay-back calculations and properly transfer operational cost savings to the energy reserve. In some cases, where monitoring is too costly or impractical, conservative engineering calculations will serve to identify costs savings and corresponding reserve fund transfers (such as the light retrofit described above).

Moving forward, procedures for monitoring, quantifying and transferring operational cost savings to the reserve fund will be established to guide Staff in the operation of the reserve.

Next Steps

Subject to budget approval, Staff will proceed with the following:

- Completion of energy and greenhouse gas inventory (March 2013)
- Hire energy auditing consultant (March 2013)
- Receive completed audit and recommendations report (July 2013)
- Develop Energy Conservation and Demand Management Plan & establish energy reserve fund (August 2013 – December 2013)
- Submit Plan for adoption (January 2014)
- Plan implementation (February 2014 – 2019)

Any proposed energy conservation measures will be brought forth to Council on a case-by-case basis for consideration and approval.

Conclusion & Recommendations

Due to new regulatory requirements, the Town must develop an energy conservation and demand management plan by July 2014. Within this Plan the Town must establish an energy conservation goal and identify initiatives which improve energy efficiency.

Staff recommend conducting comprehensive facility energy audits and utilizing the audit recommendations as a basis of an energy conservation and demand management plan. As part of the 2013 budgeting process, Staff are proposing budgets for auditing and energy retrofit work from 2013 – 2017.

Moving forward and subject to budget approval of the energy auditing and retrofit activities, Staff will seek Council's authorization to establish an energy efficiency reserve fund to act as a long-term sustainable funding mechanism for energy efficiency and management action. This Reserve Fund will be funded from savings realized on the energy efficiency projects.

C. The Blue Mountains' Strategic Plan

Fulfilling the requirements outlined in Ontario Regulation 397/11 will achieve the Town's Strategic Goal #3 "Develop a municipal energy management plan".

D. Environmental Impacts

Developing and implementing an energy conservation and demand management plan will reduce energy consumption and deploy renewable energy infrastructure. Reducing electricity consumption decreases greenhouse gas emissions reducing the municipal impact on climate change.

E. Financial Impact

As of the 2011 year end, there is \$442,000 of unspent Gas Tax in reserve. From 2012 – 2014, the Town will receive \$627,000 in Gas tax funding, with one approved expenditure of \$220,000 in 2012 (Landfill expansion and mining project), leaving \$881,000 of un-allotted Gas Tax funding.

Staff propose utilizing the Gas Tax to fund auditing activities in 2013, in the amount of \$75,000 and to fund identified energy efficiency opportunities from 2014 – 2017 in the amount of \$350,000.

| Gas Tax Summary | |
|-----------------|----------------------------|
| Year | Funding Received / Reserve |
| 2009-2011 | \$442,431.51 |
| 2012 | \$209,356.88 |
| 2013 | \$209,356.88 |
| 2014 | \$209,356.88 |
| Subtotal: | \$1,070,502.15 |

| Allocated Funding | |
|---------------------------------|--|
| Landfill Mining (2012) | \$220,000 |
| Total unallocated Gas Tax: | \$850,502.15 |
| Proposed Energy Management Plan | \$425,000.00 |
| Development Funding | Auditing (\$75,000) Retrofits (\$350,000) |

F. In Consultation With

Jeffery Fletcher, Manager of Solid Waste & Environmental Initiatives
 Darcy Chapman, Capital Accountant

G. Attached

None.

Respectfully submitted,

Adam McMullin

Adam McMullin
Environmental Initiatives Coordinator

Engineering & Public Works
Office: 519-599-3131 Ext.264
Fax: 519-599-7723

amcmullin@thebluemountains.ca

Reg Russwurm

Reg Russwurm
Director, Engineering and Public
Works