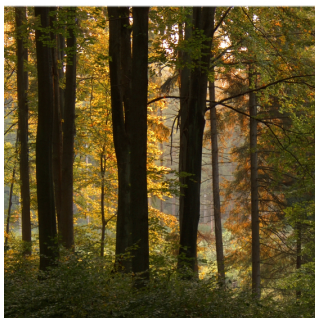


Town of Halton Hills Corporate Energy Plan



Corporate Energy Plan

Town of Halton Hills



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This document was prepared for the Town of Halton Hills by IndEco Strategic Consulting Inc.

Additional information on the Corporate Energy Plan as well as the Town's many other sustainability initiatives is available via:

Sustainability Website: www.haltonhills.ca/sustainability

Project Webpage: www.haltonhills.ca/initiatives/CommunityEnergyPlan.php

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Executive summary

Context

North American municipalities are increasingly focusing on energy as a strategic priority – to reduce operating costs, prepare for rising utility costs, and to demonstrate their commitment to long-term sustainability. In Ontario, the provincial government is allocating millions of dollars to energy conservation and demand management (CDM) programs, providing energy consumers with significant incentives to upgrade their facilities and equipment. The Government of Ontario has also expressed a commitment to greening public sector buildings, and developed *Regulation 397/11* under the *Green Energy and Green Economy Act (2009)* to advance this goal. Under the regulation, all public agencies – including the Town of Halton Hills – are required to report their energy consumption and greenhouse gas (GHG) emissions on an annual basis starting in 2013, and are required to submit 5-year energy conservation and demand management plans in 2014.

For the Town of Halton Hills, energy has strategic importance. A goal for the Town as indicated in the Integrated Community Sustainability Strategy is to “foster a culture of conservation by preparing energy plans focusing on efficiency and renewable power generation”. The strategy puts in place sustainable environmental, social and economic goals that establish a long-term vision for the Town to the year 2060. The Green Plan also demonstrates the commitment and interest of Halton Hills residents, businesses, and the municipality to “think globally and act locally”. Further to this, the Town has developed a Corporate Sustainability Building Policy (CSBP) to elevate the performance of its own facilities, as well as approved Green Development Standards to increase the performance of private-sector development.

The *Corporate Energy Plan (CEP)* provides a 5-year roadmap for energy management in the corporate Town of Halton Hills, and is part one of two components that will make up the *Mayor’s Community Energy Plan (MCEP)*. The second part of the CEMP is the *Local Action Plan*, which was developed to meet the requirements of Milestones 1, 2 and 3 of the Federation of Canadian Municipalities (FCM), Partners for Climate Protection (PCP) program.

The CEP focuses on the use of electricity and natural gas in Town facilities, as well as fuel usage by fleet vehicles. It covers the period from July 2014 to July 2019, and is designed to help the Town comply with the energy conservation and demand management planning requirements of *Regulation 397/11*.

Objectives and targets

Energy efficiency is a valuable opportunity to reduce or avoid future costs. Investing in energy management and implementing the actions

identified in the CEP will provide valuable opportunities for the Town of Halton Hills. Not only will it result in energy intensity and GHG savings, but it will also provide opportunities for staff engagement, lower risk exposure, and demonstrated leadership by the Town.

The three main objectives of the CEP are to achieve the following:

1. The Town of Halton Hills is a national leader in the efficient management of energy in its operations.
2. The efficient use of energy is part of the day-to-day activities of Town staff.
3. The Town's environmental and financial sustainability are improved through energy management initiatives that are Practical, Affordable, Reasonable, Educational, and Enforceable.

In 2011, electricity consumption by the Town was 5,625,077 kWh and natural gas consumption was 679,065 m³, resulting in an estimated annual cost of \$892,000¹. This translates into an average energy intensity of 31.30 ekWh/sqft. Additionally, the Town as a corporation produced 1,733,865 kg of GHG emissions in 2011. As identified throughout this CEP, the Town has significant opportunity to reduce its energy intensity and its GHG emissions. Based on the results of audits conducted on Town facilities, the CEP establishes the following quantitative targets to guide the Town's efforts on energy management from 2014 to 2019:

- 13% to 17% improvement in energy intensity; and
- 16% to 20% reduction in greenhouse gas emissions.

Scope and method

The CEP addresses Town buildings, technologies, and fleets – as well as people, processes, and information. The plan draws on information from three key sources: interviews, surveys, and meetings with Town staff, specifically the Technical Advisory Committee and the Steering Committee established for the plan; a review of Town policies, plans and programs; and a review of best practices in other jurisdictions.

The first step in the process was to identify and define the preferred state / vision of energy management for the Town. This was accomplished through interviews with key Town staff and through two strategic planning sessions held with members of the Technical Advisory Committee and the Steering Committee.

The second step involved defining the present state of energy use in the Town by reviewing the Town's energy management practices.

¹ This number only includes Town facilities and does not include the cost of streetlights. It is also important to emphasize that the cost of the Town's 2011 energy consumption is an estimate. This estimate is based on the actual amount of energy used (commodity costs only) at those Town facilities that are part of the *Green Energy Act* reporting. This estimate was derived by multiplying the electricity and natural gas amounts by the estimated average natural gas and electricity prices, rather than including the actual cost. The purpose of this estimate is to illustrate the magnitude of the opportunity offered by energy management.

Information was obtained through interviews with key Town staff and the review of the Town's key policies, plans, programs, and reports related to energy.

The third step involved developing technical and organizational actions to assist the Town in moving from its present to its preferred state of energy management. Technical actions were identified through ASHRAE Level 2 audits conducted on seven Town facilities of a variety of archetypes so that measures could be extrapolated across all Town buildings. The organizational actions, which relate to corporate processes, were identified through interviews, two strategic planning sessions, a corporate-wide survey, and a jurisdictional review of best practices. The actions are grouped in the CEP according to the following categories:

- **Organizational commitment** – measures related to policies, targets, and resources required to enable energy management and the other actions;
- **Existing buildings and equipment** – measures, both technical and policy based, that impact existing buildings and equipment;
- **New buildings and equipment** – measures, both technical and policy based, that impact new buildings and equipment;
- **Monitoring and tracking** – measures related to evaluating, monitoring, and verifying energy data;
- **Communication and engagement** – measures related to encouraging behavioural modifications to save energy;
- **Fleets** – measures related to Town fleet vehicles that reduce energy consumption; and
- **Procurement and renewables** – measures related to the procurement of energy and renewable technologies.

These actions are categorized into three time periods for implementation:

1. Priority actions – Year 1 (July 2014 – July 2015)
2. Medium-term actions – Years 2 and 3 (July 2015 – July 2017)
3. Longer-term actions – Years 4 and 5 (July 2017 – July 2019)

Many of the priority actions are foundational and put in place the structures and practices that will facilitate on-going energy efficiency within the Town. The technical actions identified through the facility audit reports are grouped according to facility type and are allocated across the five years of the plan in order to facilitate an annual net capital cost of approximately \$50,100 in each year for budgeting purposes.

Priority actions

The table below presents all the priority actions that should be implemented in Year 1 of the CEP (July 2014 – July 2015). These

actions are grouped by category and are numbered for ease of identification. The numbering is not an indication of importance; all priority actions should be implemented within the first year.

Organizational commitment

1. Formally adopt 5-year corporate targets for energy intensity and GHG emissions.
2. Formally adopt long-term corporate GHG emissions targets to align with the community-wide targets.
3. Formally adopt interim targets to assist in tracking progress towards 5-year goals.
4. Continue to apply to community awards (e.g. OPA Community Conservation Award, QUEST Community Energy Builder award).
5. Develop a process for updating the CEP in the interim and after 5 years.
6. Continue to foster an excellent relationship with Halton Hills Hydro and Union Gas.
7. Assign a dedicated staff person to implement the CEP and track energy initiatives.
8. Develop a centralized energy facilities management role within the Town to act as a resource for implementing energy initiatives.

Existing buildings and equipment

9. Implement plumbing – DHW optimization measures in all applicable buildings.
- 10-11. Implement general and specialized HVAC optimization measures in all applicable buildings.
12. Implement IT plug load measure in all applicable buildings.
- 13-14. Implement general and specialized construction air sealing measures in all applicable buildings.
15. Consistently set ice temperatures in arenas to 23°F.
16. Develop a formal process for soliciting ideas from O&M staff.
17. Formalize the criteria and metrics for prioritizing energy efficiency projects. Criteria should include: life-cycle costing of the project, available incentives, occupant comfort and regulatory requirements, ease of implementation, achievable energy savings, and contribution to demonstrating leadership. Appropriate weighting for these criteria should be developed.
18. Develop consistent guidelines and policies for energy management to be followed at all Town facilities.
19. Develop a corporate re-commissioning plan.

New buildings and equipment

20. Implement the comprehensive Corporate Sustainable Building Policy (CSBP).
 21. Develop energy efficiency processes for new construction to be incorporated into the CSBP.
 22. Include siting of Town buildings (e.g. close together) as part of the CSBP.
-

Monitoring and tracking

23. Formalize key performance indicators (KPIs) and tracking mechanisms to monitor and report on progress towards interim and 5-year targets.
 24. Investigate options for an energy management system (EMS) to be used to track and analyze energy use at the building level.
 25. Develop a process for evaluating the savings achieved from energy efficiency projects.
-

Communication and engagement

26. Make energy management related information available on the Town's Internet and Intranet websites so that staff and the community are aware of Town's energy initiatives.
 27. Investigate / develop general training on energy efficiency for all O&M staff.
 28. Ensure that all staff responsible for operation and maintenance of Town buildings are appropriately trained.
 29. Develop a single brand for communicating about energy, greening and sustainability (consider using the new sustainability logo).
 30. O&M staff across departments meet quarterly to discuss energy efficiency activities conducted in that quarter.
-

Medium-term actions

The table below presents the medium-term actions that should be implemented in Years 2-3 of the CEP (July 2015 – July 2017). These actions are grouped by category and are numbered for ease of identification. The numbering is not an indication of importance.

Organizational commitment

31. Re-affirm commitment to targets.
 32. Track and assess progress on interim targets and Year 1 actions.
 33. Include energy management as an important objective for the Town corporation.
 34. Develop a process for continually monitoring available incentives and applying for incentives.
 35. Expand the scope of the Staff Sustainability Team to help champion the CEP's implementation and behaviour change programs, and to provide resources and assistance to the dedicated staff person.
 36. Develop a mechanism (e.g. a revolving fund) through which savings from energy projects are re-invested in new energy projects.
-

Existing buildings and equipment

37. Implement plumbing – DHW insulation measure in all applicable buildings.
 38. Implement specialized plumbing – VFD measures in both arenas.
-

-
39. Implement general plumbing – VDF measures in all applicable buildings.
 40. Implement lighting control measures in all applicable buildings.
 41. Implement specialized HVAC measure in all community centres.
 42. Implement utility analysis measure in all applicable buildings.
 43. Develop a standard requiring that energy efficiency be considered in all building renovations.
 44. Implement guidelines and policies that were developed in Year 1 for energy management to be followed at all facilities.
 45. Develop and implement a corporate O&M preventative maintenance program in remaining buildings.
 46. Implement the corporate re-commissioning plan that was developed in Year 1.
-

New buildings and equipment

47. Identify and adopt energy efficient equipment standards to be followed when replacing equipment (e.g. Energy Star).
 48. Develop formal guidelines for considering energy at all stages of new building development (e.g. budgeting, procurement, design, construction / change management).
 49. Develop a formal commissioning policy based on current practices for new buildings to verify energy performance after construction. Embed policy in the existing CSBP.
-

Monitoring and tracking

50. Conduct an assessment of the metering needs of each building.
 51. Ensure each building is appropriately metered for each utility (e.g. interval and sub-meters).
 52. Implement the EMS chosen in Year 1 to track and analyze energy use at the building level.
 53. Develop a plan for the analysis and use of energy data.
 54. Allocate sufficient and appropriate staff resources to collect and manage energy data.
 55. Develop / purchase an energy dashboard that provides operators, management, and the community with appropriate information on energy use utilizing existing resources (e.g. Halton Hills Hydro and Union Gas).
 56. Develop a process for rolling out successful energy efficiency projects.
 57. Develop building level KPIs and produce a quarterly evaluation report for each building that is made public and identifies the status of the KPIs (e.g. number of energy efficiency initiatives implemented, energy saved).
-

Communication and engagement

58. Develop standardized education and communication tools (e.g. poster boards, brochures) for retrofit projects (e.g. lighting retrofit) and/or changes in building comfort levels for staff and the public.
-

-
59. Develop an employee engagement process for all staff based on the O&M pilot program implemented in Year 1.
 60. Implement general training on energy and energy efficiency for O&M staff identified in Year 1.
 61. Implement project specific training for O&M staff as needed (e.g. new technology, new piece of equipment).
 62. Develop and implement a corporate Town-wide energy, greening and sustainability behaviour change program for all staff with the assistance of the Staff Sustainability Team.
 63. Set up regular site visits and meetings with O&M staff from other municipalities to share information and tour facilities.
 64. Continue to send O&M staff to conferences for information sharing.
-

Fleets

65. Develop guidelines to operate vehicles in the most energy efficient manner (e.g. anti-idling).
 66. Implement a driver-training program (e.g. Shuttle Challenge).
 67. Develop a policy for purchasing the right-sized vehicles.
-

Renewables and procurement

68. Ask contracted procurement advisors how to consider environmental impacts in electricity and natural gas purchasing decisions (e.g. from renewable sources).
 69. Develop procurement standards for vehicles to encourage vehicles that include energy efficiency and alternative fuel purchases.
-

Longer-term actions

The table below presents the longer-term actions that should be implemented in Years 4-5 of the CEP (July 2017 – July 2019). These actions are grouped by category and are numbered for ease of identification. The numbering is not an indication of importance.

Organizational commitment

70. Re-affirm commitment to targets.
 71. Prepare plan update.
 72. Track and assess progress on interim targets and Years 2-3 actions.
-

Existing buildings and equipment

73. Implement lighting retrofits in all applicable buildings.
 74. Continue to implement and update guidelines and policies for energy management to be followed at all facilities.
 75. Continue to implement the corporate O&M preventative maintenance program.
-

76. Continue to implement the corporate re-commissioning plan.

Monitoring and tracking

77. Continue to use the EMS chosen in Year 1 to track and analyze energy use at the building level.

78. Conduct an assessment to ensure that energy data needs are being met, and that staff resources are adequate to manage and collect the data.

79. Identify an appropriate benchmarking system to monitor the energy performance of buildings (e.g. Energy Star) or join an existing benchmarking group (e.g. Mayor’s Megawatt Challenge).

Communication and engagement

80. Continue to set up regular site visits and meetings with O&M staff from other municipalities to share information and tour facilities.

81. Continue to send O&M staff to conferences for information sharing.

Fleets

82. Continue to implement the driver-training program.

Renewables and procurement

83. Examine the feasibility of installing renewables or other alternative generation technologies (e.g. district energy, combined heat and power).

84. Develop a process for identifying, evaluating, and developing renewable energy projects.

85. Produce guidelines for selecting the most energy efficient travel option for work related travel.

Capital costs and savings

To implement the CEP, the Town will need to make significant capital investments in energy efficiency over the five-year period. However, these investments will yield significant returns.

It will cost approximately \$250,639 to implement all measures in the seven buildings that were audited as part of the planning process, as well as measures that were extrapolated to other buildings. If implemented according to the schedule, it will cost the Town approximately \$50,100 each year over the next five years. The net present value (NPV) of implementing all the measures is \$1,156,545.

The estimated energy intensity and GHG savings from the seven audited facilities are outlined below.

Facility	Energy intensity (ekWh/sqft)	GHG emissions (kg)
Mold-Masters Arena ²	6.0%	6.5%

² Audit only included the old section of the arena, as the new section was not complete at the time of the audit.

Facility	Energy intensity (ekWh/sqft)	GHG emissions (kg)
Acton Arena	9.7%	9.2%
Gellert Community Centre	30.6%	36.5%
Cedarvale Community Centre	9.3%	9.6%
Civic Centre	25.6%	35.6%
Acton Library ³	28.8%	37.9%
Acton Firehall	12.1%	12.6%

³ Audit was conducted on the new Acton Library constructed in 2011.

Acknowledgments

This project was completed jointly with the *Local Action Plan* led by Sustainability Solutions Group, as well as the ASHRAE Level II audits conducted by Mindscape Innovations. We would like to thank the following people for their guidance:

- Yuill Herbert, Sustainability Solutions Group
- Rebecca Foon, Sustainability Solutions Group
- Micah Jarvis, Mindscape Innovations Ltd.
- Philip Drader, Mindscape Innovations Ltd.

We would also like to give a special thank you to the Town of Halton Hills Steering Committee and Technical Advisory Committee for their time, dedication, and valuable input into the development of the *Corporate Energy Plan*.

Members of the Steering Committee included:

- Mayor Rick Bonnette
- Jane Fogal, Regional Councillor, Ward 3 and 4
- David Smith, CAO
- John Linhardt, Director of Planning, Development and Sustainability
- Terry Alyman, Director of Recreation and Parks
- Stephen Hamilton, Manager of Facilities (Recreation & Parks)
- Simone Gourlay, Manager of Purchasing
- Damian Szybalski, Manager of Sustainability

Members of the Technical Advisory Committee included:

- Art Skidmore, President & CEO, Halton Hills Community Energy Corporation
- Linda Boyer, Conservation and Demand Management Officer, Halton Hills Hydro
- Gena Ali, Manager, Office of Sustainable Planning, Halton Region
- Arjun Rattan, Sustainability Analyst, Halton Region
- Suzanne Burwell, Environmental Sustainability Coordinator, Halton District School Board
- Bryan Boyce, Town Environmental Advisory Committee
- Ed Seaward, Manager, Market Opportunity Development, Union Gas

1 Introduction

The Town of Halton Hills *Corporate Energy Plan* (CEP) provides a roadmap for energy management in the corporate Town of Halton Hills and is part one of two components that will make up the *Mayor's Community Energy Plan* (MCEP). The second part of the CEMP is the *Local Action Plan*, which was developed to meet the requirements of Milestones 1, 2 and 3 of the Federation of Canadian Municipalities (FCM), Partners for Climate Protection (PCP) program.

The CEP describes the energy management activities that the Town as a corporation can take over the next 5 years to increase its energy efficiency, reduce its energy costs, and minimize its environmental footprint. The CEP aligns with the Town's commitments to environmental sustainability and energy efficiency that are described in the Town's *Strategic Plan*. It is also designed to help the Town comply with the energy conservation and demand management planning requirements of Ontario *Regulation 397/11* under the *Green Energy Act* (2009).

The CEP is organized as follows:

- Section 2 Objectives and targets
- Section 3 Priority actions (Year 1, July 2014 – July 2015)
- Section 4 Medium-term actions (Years 2-3, July 2015 – July 2017)
- Section 5 Long-term actions (Years 4-5, July 2017 – July 2019)
- Section 6 Capital costs and net present values
- Section 7 Renewables and alternative energy
- Section 8 Implementation of the plan
- Section 9 Energy management systems
- Section 10 Communication and engagement
- Section 11 Conclusion

The CEP also has appendices that contain the following:

- Appendix A Present state
- Appendix B Criteria for prioritizing actions
- Appendix C Utility incentive programs
- Appendix D List of acronyms

1.1 Planning horizon and scope

The CEP for the Town of Halton Hills is a 5-year plan covering the period from July 2014 to July 2019.

The CEP provides a roadmap for energy management at all of the Town's facilities. As can be seen in Figure 1, it addresses the use of

electricity and natural gas in Town facilities, as well as fleet vehicle fuel.

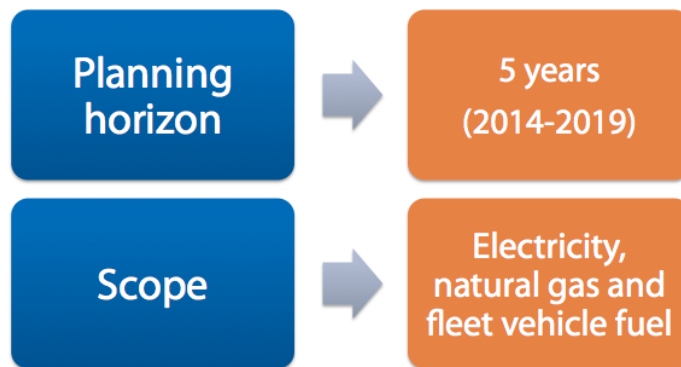


Figure 1 Planning horizon and scope

1.2 Planning process

Figure 2 depicts the major steps in the planning process that were used to develop the Town's *Corporate Energy Plan*. Key staff and stakeholders from the Town Technical Advisory Committee and Steering Committee were consulted throughout the planning process and provided valuable input. Inputs to the planning process included:

- Analysis of the Town's energy use data;
- Review of the Town's existing policies, plans, and past energy efficiency projects;
- ASHRAE Level 2 audits of seven Town facilities;
- Benchmarking of Town facilities against comparable facilities;
- Interviews with Town staff (including department directors, the CAO, and O&M staff);
- Two strategic planning sessions with the Town Technical Advisory Committee and the Steering Committee;
- Survey of Town staff regarding energy management and efficiency; and
- Review of energy management best practices in other jurisdictions.

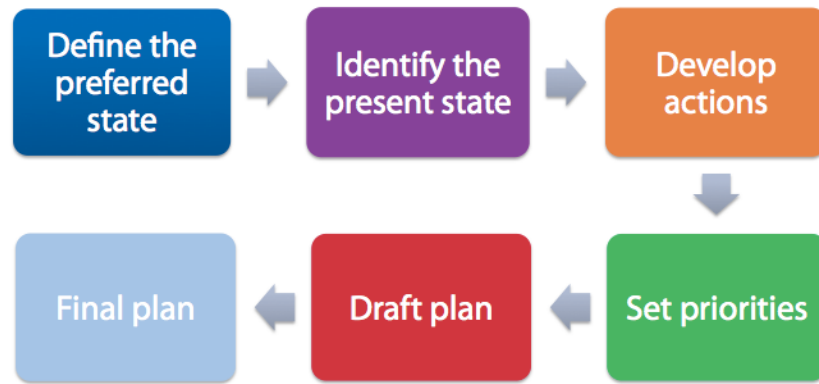


Figure 2 Overview of the planning process

Defining the preferred state involved exploring where the corporate Town of Halton Hills would like to be with respect to energy management. The elements of the preferred state were identified through interviews, a review of jurisdictional best practices, and through two strategic planning sessions. The preferred state informed the CEP’s objectives, targets, and actions.

Identifying the present state involved exploring where the Town is now with respect to energy management. Energy data analysis; interviews; seven AHSRAE Level 2 audits; a review of the Town’s existing policies, plans, and past energy efficiency projects; and benchmarking were among the inputs that were used to identify the present state. The audited buildings were chosen based on largest consumption, archetype, and above average energy intensity to increase the likelihood of identifying a significant number of cost-effective energy efficiency measures. Separate audit reports were produced for each of the buildings.

Developing actions involved identifying technical measures (i.e. measures identified from the facility audits) and organizational measures (i.e. measures related to corporate processes that also produce real energy savings and help to enable the technical measures) to help the Town move towards the preferred state. Actions were identified through audits, interviews, strategic planning sessions, and the jurisdictional review of best practices. They were grouped according to the following categories:

- **Organizational commitment** – measures related to policies, targets, and resources required to enable energy management and the other actions;
- **Existing buildings and equipment** – measures, both technical and policy based, that impact existing buildings and equipment;
- **New buildings and equipment** – measures, both technical and policy based, that impact new buildings and equipment;
- **Monitoring and tracking** – measures related to evaluating, monitoring, and verifying energy data;

- **Communication and engagement** – measures related to encouraging behavioural modifications to save energy;
- **Fleets** – measures related to Town fleet vehicles that reduce energy consumption; and
- **Procurement and renewables** – measures related to the procurement of energy and renewable technologies.

Setting priorities involved determining the timeframe for implementation of each action in the CEP. Organizational measures were prioritized based on their importance and ease of implementation. Technological measures were prioritized based on their internal rate of return (IRR) with adjustments to group similar measures together for more efficient implementation.

Preparing the Draft and Final Plan involved documenting the results of the planning process. As described in the section, *Updating and reporting on the plan*, the CEP will be reviewed annually and updated at the end of the five years.

1.3 Framework for planning

The Town’s *Corporate Energy Plan* addresses buildings, fleets and technologies – as well as people, processes, and information. As illustrated in Figure 3, the CEP centers on the Town’s facilities. It aims to ensure that new and existing facilities are built and operated as efficiently and sustainably as possible. The Town’s supporting organizational policies and processes, monitoring and tracking systems, and communication and engagement tools allow this to happen.

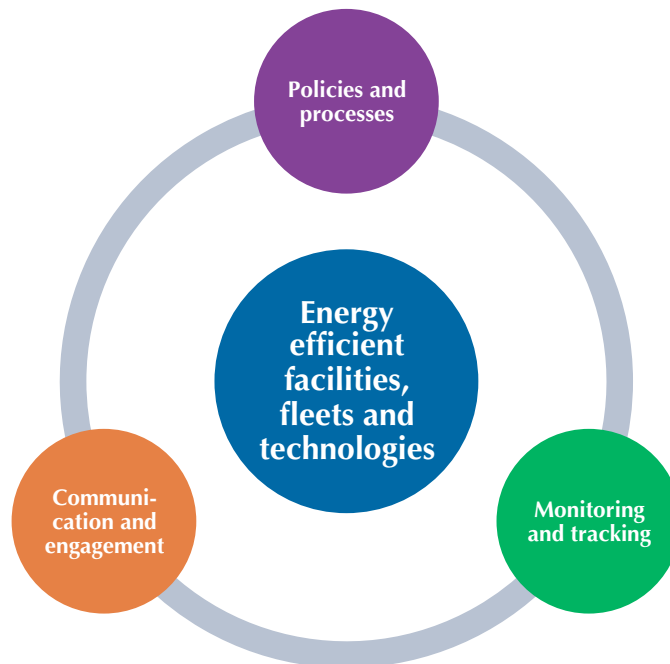


Figure 3 Framework for planning

2 Objectives and targets

2.1 Objectives

The primary objectives of the Town's *Corporate Energy Plan* are to achieve the following:

1. The Town of Halton Hills is a national leader in the efficient management of energy in its operations.
2. The efficient use of energy is part of the day-to-day activities of Town staff.
3. The Town's environmental and financial sustainability are improved through energy management initiatives that are Practical, Affordable, Reasonable, Educational, and Enforceable.

2.2 Targets

Figure 4 illustrates the set of quantitative targets that should guide the Town's efforts on energy management from July 2014 to July 2019.

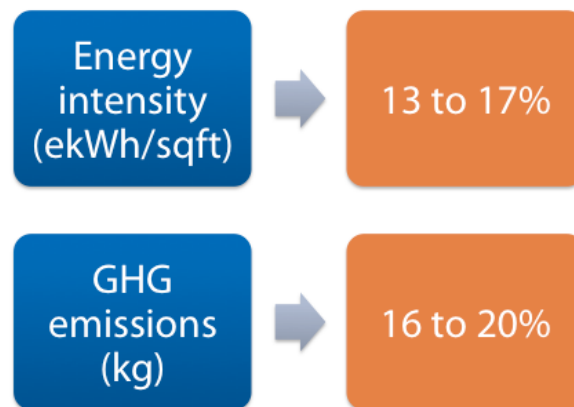


Figure 4 Energy intensity and GHG targets

The results of the ASHRAE Level 2 audits and benchmarking of the Town's buildings suggest that a 13% to 17% improvement in energy intensity and a 16% to 20% reduction in greenhouse gas (GHG) emissions in the existing building stock is very achievable. Halton Hills Hydro also estimates that by converting all streetlights to LED lights, the Town can achieve an additional 30% reduction in streetlight electricity consumption.

Table 1 outlines the break down of the targets over the 5-year term of the CEP based on the prioritization of technical actions discussed in Sections 3.2, 4.2, and 5.2.

Table 1 Breakdown of energy intensity and GHG emissions reductions targets by plan phase

	Energy intensity (ekWh/sqft)	GHG emissions (kg)
Year 1	8.3%	11.0%
Years 2-3	6.9%	8.0%
Years 4-5	1.5%	1.4%
Overall	16.7%	20.5%

The targets were calculated based on the results of the audits completed in seven representative “archetype” buildings (Table 2). The percentage of energy intensity and GHG emissions reductions from the last reported levels (2011) for these buildings was calculated based on all recommended measures being undertaken during the five-year period. The savings were grouped according to facility type with the assumption that similar measures and savings could be achieved in other facilities of the same type. In the case of arenas and community centres, where more than one building was audited, the average weighted by square footage was used. The overall targets were derived by extrapolating the savings based on square footage by facility type to all facilities of the same type. All buildings that the Town of Halton Hills pays the utilities for that remained open beyond 2013 were included in the calculations except for those facilities that were judged to have very limited or no potential for energy savings measures due to the nature of their construction or level of usage.⁴

Due to uncertainty about whether the measures identified in the audited buildings will be transferable to the unaudited buildings, a target range from 80% of the estimated reductions to 100% of estimated reductions has been used. Thus, the energy intensity reduction target is 13% to 17% and the GHG emissions reduction target is 16% to 20%.

The targets are in line with the publicly reported energy intensity and GHG emissions reductions targets found in a sample of other municipalities.

Table 2 Estimated energy intensity and GHG emissions savings from facility audits

Facility	Energy intensity (ekWh/sqft)	GHG emissions (kg)
Mold-Masters Arena ⁵	6.0%	6.5%
Acton Arena	9.7%	9.2%
Gellert Community Centre	30.6%	36.5%

⁴ Cedarvale Cottage, Prospect Park Pavilion, Central Yard – Office Trailer, Central Yard – Works Garage, Central Yard - Stores Building, Acton Yard - Equipment Depot.

⁵ Audit only included the old section of the arena, as the new section was not complete at the time of the audit.

Facility	Energy intensity (ekWh/sqft)	GHG emissions (kg)
Cedarvale Community Centre	9.3%	9.6%
Civic Centre	25.6%	35.6%
Acton Library ⁶	28.8%	37.9%
Acton Firehall	12.1%	12.6%

2.3 Updating and reporting on the plan

The *Corporate Energy Plan* should be reviewed at least once a year. As part of the annual review, the dedicated staff person assigned to oversee the implementation of the CEP (see Action 7, Table 3) should complete the following steps:

- Track the activities that have been implemented, based on a checklist of all of the actions included in the CEP;
- Track quantitative progress towards targets, using the KPIs provided in the action tables;
- Note any updates to the CEP based on new audits, organizational changes, or lessons from past projects;
- Identify the priority actions for the upcoming year, and secure funding and resources for their implementation;
- Compile a short report annually describing projects implemented, progress towards targets, updates to the CEP, and priority actions for the upcoming year; and
- In 2019, report on the implementation of the CEP as required under *Regulation 397/11*. Include detail on: energy and GHG emissions for 2017; current and proposed energy conservation and demand management measures; a report of results achieved; and a revised forecast of the expected results of the current and proposed measures.

⁶ Audit was conducted on the new Acton Library constructed in 2011.

3 Priority actions (Year 1, July 2014 – July 2015)

In the first year of the CEP (July 2014 – July 2015), the Town should implement the high-priority organizational actions presented in Table 3. These actions are very important, as they directly or indirectly impact the Town's energy performance. All of these actions are easy enough to be initiated (and often completed) in Year 1. These actions are grouped by category and are numbered for ease of identification. The numbering is not an indication of importance; however, some actions will need to be completed first as they may directly impact other actions. For instance, it will be imperative at the onset to establish the necessary resources for implementing the CEP, including assigning a dedicated staff person and developing a centralized energy facilities management role.

In the first year of the CEP, the Town should also implement the high-priority technical actions for retrofitting the Town's existing buildings, as presented in Table 4.

The technical actions were based on audits conducted on seven Town facilities of a variety of archetypes and then extrapolated across all Town buildings. The actions were grouped together based on the type of measure so that a single tender could be issued to implement a group of actions in order to reduce cost and administrative burden. The estimated cost for each measure was based on the project costs and incentives in the audit reports⁷. The internal rate of return (IRR) and net present value (NPV)⁸ for each measure were calculated from the estimated costs and reduced utility costs. The projected costs and NPV for each group of measures was based on extrapolating the measures in the group for all audited buildings to all applicable Town buildings. The groups of actions are prioritized based on average IRR of the component measures and ease of implementation.

The NPV is a way of assessing the financial benefit of spending the capital funds on an energy conservation measure. The NPV includes all of the cumulative energy cost savings that will be realized by

⁷ The project cost estimates are developed based on Mindscape's experience from other energy audits, project cost from previously implemented projects, and quotes from suppliers that Mindscape has worked with in the past. Project costs include purchase and installation of the measures, but do not include additional resources for project management, procurement, or preparation of specifications, etc. These costs are scaled to fit the subject project at the client's site, but do not account for many of the specific and unique requirements of each client or building. ASHRAE, the regulatory body that determines the requirements for a Level 2 audit, states that the project costing estimate should have an accuracy of +/- 50%. This is a wide range for accuracy, and further indicates that although the energy savings analysis should be accurate, detailed project costing is not within the purview of the audit.

⁸ The utility rates used to calculate the IRR and NPV were based on the average utility costs from the utility analysis in the audit reports. The electricity rate was adjusted based on the Industrial Price Forecast on page 8 of Ontario's Long-Term Energy Plan (http://www.energy.gov.on.ca/docs/LTEP_2013_English_WEB.pdf). The natural gas rate was adjusted based on the natural gas price reference projections in Natural Resource Canada's report on Canada's Energy Future: Energy Supply and Demand Projections to 2035 - Energy Market Assessment (<http://www.nrb-one.gc.ca/clf-nsi/rnrgynfntn/nrgyrprt/nrgyfr/2011/nrgsppldmndprjctn2035-eng.html>). A discount rate of 5% was used in calculating the NPV.

implementing the measure over the lifespan of the measure, taking into account expected increases in energy prices, based on government estimates. The NPV also takes inflation into account by including the value of the original capital cost multiplied by a standard interest rate (in this case, 5%). Thus, if a NPV is positive, it means that the capital cost investment on the energy efficiency measure is better than putting the money into an investment with a 5% rate of return. If the NPV is negative, the energy efficiency measure is not considered a good investment from a financial perspective.

For example, if an energy efficiency measure has an initial cost of \$1,000, a lifespan of 20 years and a net present value of \$10,000, this means that the value of the \$1,000 investment in the measure is \$10,000 in current value over the 20 years in comparison to investing the same \$1,000 at a 5% interest rate for the same time period. In this example the measure will have cumulative energy cost savings of \$10,000 over 20 years over and above the \$1,000 multiplied by a compound interest rate of 5% each year for the same 20 years. NPV is a more robust measure of the value of an investment than simply showing the annual return on that investment, as it takes into account the total value of the investment over its lifetime compared to the standard rate of return available on the same initial investment.

3.1 Organizational actions

Table 3 Preferred state, priority actions, and metrics for tracking implementation

Preferred state of energy management	Priority actions	Metric / KPI
Organizational commitment		
The Town's energy management activities are guided by ambitious yet achievable targets.	<ol style="list-style-type: none"> 1. Formally adopt 5-year corporate targets for energy intensity and GHG emissions. 2. Formally adopt long-term corporate GHG emissions targets to align with the community-wide targets. 3. Formally adopt interim targets to assist in tracking progress towards 5-year goals. (See section on Objectives and targets for specific objectives and targets). 	Targets adopted (y/n)
The Town is progressive in energy management and strives for excellence.	<ol style="list-style-type: none"> 4. Continue to apply to community awards (e.g. OPA Community Conservation Award, QUEST Community Energy Builder award). 	Number of award applications submitted Number of awards received

Preferred state of energy management	Priority actions	Metric / KPI
The Town's energy management activities are guided by an up-to-date energy plan.	5. Develop a process for updating the CEP in the interim and after 5 years.	Updating process developed (y/n)
The Town continues to own Halton Hills Hydro and maintains its excellent working relationship with Halton Hills Hydro and Union Gas.	6. Continue to foster an excellent relationship with Halton Hills Hydro and Union Gas.	Number of meetings Number of projects developed
Dedicated staff are available to implement the energy plan.	7. Assign a dedicated staff person to implement the CEP and track energy initiatives. (See section on Implementation of the plan for more detail).	Staff assigned to implementing the CEP (y/n)
The Town has a centralized facility management role to ensure a consistent approach to energy management across all buildings.	8. Develop a centralized energy facilities management role within the Town to act as a resource for implementing energy initiatives. (See section on Implementation of the plan for more detail).	Role developed (y/n) Person assigned to the role (y/n)
Existing buildings and equipment		
The Town strategically implements all cost effective energy efficiency projects in existing buildings.	Implement all retrofit measures identified as priority actions in all applicable buildings: 9. Plumbing – DHW optimization measures in all applicable buildings. 10-11. General and specialized HVAC optimization measures in all applicable buildings. 12. IT plug load measure in all applicable buildings. 13-14. General and specialized construction air sealing measures in all applicable buildings. (See full list in Table 4).	Retrofit projects implemented (y/n) ekWh and m ³ saved \$ saved on energy bills

Preferred state of energy management	Priority actions	Metric / KPI
Facilities staff proactively explore new energy efficiency opportunities and new technologies.	15. Consistently set ice temperatures in arenas to 23°F. 16. Develop a formal process for soliciting ideas from O&M staff. (See section on Communication and engagement for more detail).	Energy savings achieved (ekWh) Process developed (y/n) Number of ideas brought forward Number of ideas implemented ROI / savings achieved
Projects are prioritized in a consistent way, using clear criteria and appropriate metrics, and the Town implements retrofit projects that are cost-effective over longer time periods.	17. Formalize the criteria and metrics for prioritizing energy efficiency projects. Criteria should include: life-cycle costing of the project, available incentives, occupant comfort and regulatory requirements, ease of implementation, achievable energy savings, and contribution to demonstrating leadership. Appropriate weighting for these criteria should be developed. (See Appendix B Criteria for prioritizing actions for more detail).	Criteria and metrics formalized (y/n)
All buildings operate in an energy efficient manner.	18. Develop consistent guidelines and policies for energy management to be followed at all Town facilities. 19. Develop a corporate re-commissioning plan.	Guidelines and policies developed (y/n) Re-commissioning plan developed (y/n)

Preferred state of energy management	Priority actions	Metric / KPI
New buildings and equipment		
The Town has specific energy efficiency standards for new buildings that are outlined in the Corporate Sustainable Building Policy (CSBP) ⁹ .	<p>20. Implement the comprehensive CSBP.</p> <p>21. Develop energy efficiency processes for new construction to be incorporated into the CSBP.</p> <p>22. Include siting of Town buildings (e.g. close together) as part of the CSBP.</p>	<p>CSBP implemented (y/n)</p> <p>Energy efficiency process for new construction developed (y/n)</p> <p>Process incorporated into CSBP (y/n)</p> <p>Siting of buildings incorporated in CSBP (y/n)</p>
Monitoring and tracking		
The Town uses KPIs to track progress towards targets.	23. Formalize KPIs and tracking mechanisms to monitor and report on progress towards interim and 5-year targets (e.g. kWh/sqft, kg CO ₂ eq).	KPIs adopted (y/n)
The Town has real-time building level data for all utilities at an appropriate level of granularity (e.g. daily).	24. Investigate options for an energy management system (EMS) to be used to track and analyze energy use at the building level. (See section on Energy management systems for details).	EMS investigated (y/n) EMS chosen (y/n)
Project evaluation, monitoring and verification (EM&V) is simple and accurate thanks to energy data and monitoring processes.	25. Develop a process for evaluating the savings achieved from energy efficiency projects.	Evaluation process developed (y/n)
Communication and engagement		
Project-specific communication and education helps building occupants (staff and public) appreciate energy efficiency retrofits.	26. Make energy management related information available on the Town's Internet and Intranet websites so that staff and the community are aware of Town's energy initiatives. (See section on Communication and engagement for details).	Information on Town websites (y/n) Number of people visiting energy page

⁹ The CSBP includes the Town's position on LEED® standards.

Preferred state of energy management	Priority actions	Metric / KPI
All O&M staff are trained and understand how to identify energy saving opportunities.	<p>27. Investigate / develop general training on energy efficiency for all O&M staff. (See section on Communication and engagement for details).</p> <p>28. Ensure that all staff responsible for operation and maintenance of specific buildings are appropriately trained. (See section on Communication and engagement for details and audit reports for specific training recommendations).</p>	<p>Training investigated / developed (y/n)</p> <p>Number of staff trained</p>
The Town relays a common and consistent message about energy, greening and sustainability, and this message is communicated succinctly and directly to all staff including O&M staff.	29. Develop a single brand for communicating about energy, greening and sustainability (consider using the new sustainability logo). (See section on Communication and engagement for more detail).	<p>Brand established (y/n)</p> <p>Brand utilized (y/n)</p>
O&M staff communicate and share energy efficiency methods and best practices.	30. O&M staff across departments meet quarterly to discuss energy efficiency activities conducted in that quarter.	<p>Meetings set up quarterly (y/n)</p> <p>Number of O&M staff attending meetings</p>

3.2 Technical actions

Table 4 includes the priority technical actions to be implemented in the first year of the plan. The technical actions are based on recommendations from the audits conducted on seven representative buildings and are prioritized based on their IRRs. Detailed information on each technical action can be found in the accompanying audit reports for each of the facilities.

The actions are grouped together by type in order to facilitate the Town issuing a single tender for similar measures in all applicable buildings. For example, the auditors recommended doing air sealing at Cedarvale Community Centre and the conditioned part of the Acton Fire hall – these were grouped together and extrapolated to include air sealing in all applicable buildings. “All applicable buildings” refers to buildings where the measures were identified in the audits, in addition to buildings that were not audited where the same or similar measures could be undertaken.

The projected cost and NPV numbers are estimates based on industry average data, research and analysis; they may not match actual costs and savings.

Table 4 Priority technical actions for Year 1

Measures	Buildings	Projected cost (including incentives estimate)	Projected net present value	Internal rate of return
9. Plumbing - DHW optimization	All applicable buildings	\$0	\$3,454	
DHW recirculation pump on auto	Acton Library	\$0	\$2,300	N/A
DHW optimization	All unaudited buildings	\$0	\$1,155	N/A
10. General HVAC optimization	All applicable buildings	\$41,961	\$533,638	
Inspect RTU economizers, install CO ₂ sensors, and reduce exhaust fan operation	Gellert Centre	\$10,107	\$243,820	176%
Add basic controls to electric baseboard heaters	Civic Centre	\$8,868	\$38,573	40%
CO ₂ sensing	Civic Centre	\$7,826	\$44,537	48%
Vestibule heater settings	Acton Library	\$0	\$7,653	N/A
HVAC system controls	Acton Fire hall	\$1,134	\$20,685	139%
General HVAC optimization	All unaudited buildings	\$14,026	\$178,371	N/A
11. Specialized HVAC optimization	All applicable buildings	\$0	\$11,044	
Truck-bay temperature	All applicable buildings	\$0	\$3,023	N/A
Specialized HVAC optimization	All applicable buildings	\$0	\$8,021	N/A
12. IT - plug load	All applicable buildings	\$0	\$19,569	
Workstation and server electrical efficiencies	Civic Centre	\$0	\$13,028	N/A
IT - plug load	All unaudited buildings	\$0	\$6,541	N/A

Measures	Buildings	Projected cost (including incentives estimate)	Projected net present value	Internal rate of return
13. General construction air sealing	All applicable buildings	\$4,924	\$34,136	
Air sealing	Cedarvale Community Centre	\$1,200	\$6,516	46%
Air sealing of the conditioned building	Acton Fire hall	\$2,078	\$16,211	109%
General construction air sealing	All unaudited buildings	\$1,646	\$11,410	N/A
14. Specialized construction air sealing	All applicable buildings	\$2,923	\$14,429	
Air seal generator room	All applicable buildings	\$800	\$3,949	74%
Specialized air sealing	All applicable buildings	\$2,123	\$10,480	N/A
Totals for Year 1		\$49,808	\$616,270	

NOTE: THE INTERNAL RATE OF RETURN (IRR) WAS CALCULATED FOR MEASURES THAT WERE IDENTIFIED IN THE AUDITS. THE IRR COULD NOT BE CALCULATED FOR MEASURES WITH NO PROJECTED COSTS AND WERE NOT CALCULATED FOR THE ESTIMATES MADE FOR UNAUDITED BUILDINGS.

4 Medium-term actions (Years 2-3, July 2015 – July 2017)

In Years 2 and 3 of the CEP (July 2015 – July 2017), the Town should ensure that all of the priority actions have been completed, and are being maintained as required. The Town should also pursue the organizational actions presented in Table 5 below, and the technological actions presented in Table 6. These actions are grouped by category and are numbered for ease of identification. The numbering is not an indication of importance.

4.1 Organizational actions

Table 5 Preferred state, medium-term actions, and metrics for tracking implementation

Preferred state of energy management	Medium-term actions	Metric / KPI
Organizational commitment		
The Town's energy management activities are guided by ambitious yet achievable targets.	31. Re-affirm commitment to targets.	Targets re-affirmed (y/n)
The Town tracks progress towards targets.	32. Track and assess progress on interim targets and Year 1 actions.	Energy intensity (ekWh/m ²) Total energy use (ekWh, m ³) Percentage of actions implemented
Energy management is highly recognized as a strategic opportunity and priority in all policy and planning activities.	33. Include energy management as an important objective for the Town corporation.	Energy management included as an important objective (y/n)
The Town takes advantage of available incentives from utility companies.	34. Develop a process for continually monitoring available incentives, and applying for incentives.	Number of incentive applications submitted Monetary value (\$) of incentives obtained

Preferred state of energy management	Medium-term actions	Metric / KPI
The Town has a staff committee that keeps track of CEP initiatives.	35. Expand the scope of the Staff Sustainability Team to help champion the CEP's implementation and behaviour change programs, and to provide resources and assistance to the dedicated staff person. (See section on Implementation of the plan for more detail).	Staff Sustainability Team's scope expanded (y/n)
The Town has a clear and dedicated process to fund energy efficiency projects, and money obtained from energy savings is re-invested into energy projects.	36. Develop a mechanism (e.g. a revolving fund) through which savings from energy projects are re-invested in new energy projects.	Fund and mechanism developed (y/n) Amount of savings re-invested (\$)
Existing buildings and equipment		
The Town strategically implements all cost effective energy efficiency projects in existing buildings.	Implement all retrofit measures identified as medium-term actions in all applicable buildings: 37. Plumbing – DHW insulation measure in all applicable buildings. 38. Specialized plumbing – VFD measures in both arenas. 39. General plumbing – VDF measures in all applicable buildings. 40. Lighting control measures in all applicable buildings. 41. Specialized HVAC measures in all community centres. 42. Utility analysis measures in all applicable buildings. (See full list in Table 6).	Retrofit projects implemented (y/n) ekWh and m ³ saved \$ saved on energy bills
Energy efficiency is considered when conducting large renovations of existing buildings.	43. Develop a standard requiring that energy efficiency be considered in all building renovations.	Standard developed (y/n)

Preferred state of energy management	Medium-term actions	Metric / KPI
All buildings operate in an energy efficient manner.	<p>44. Implement guidelines and policies that were developed in Year 1 for energy management to be followed at all facilities.</p> <p>45. Develop and implement a corporate O&M preventative maintenance program in remaining buildings.</p> <p>46. Implement corporate re-commissioning plan that was developed in Year 1.</p>	O&M preventative maintenance program developed (y/n)
New buildings and equipment		
Strong, formal processes exist to ensure that all new equipment is highly energy efficient and appropriately sized.	47. Identify and adopt energy efficient equipment standards to be followed when replacing equipment (e.g. Energy Star).	Equipment standards adopted (y/n)
Energy is considered at all stages of new building design and development, including so the Town can add renewable energy technologies in the future.	48. Develop formal guidelines for considering energy at all stages of new building development (e.g. budgeting, procurement, design, construction / change management).	Guidelines developed (y/n)
Energy performance of new buildings is always verified after construction.	49. Develop a formal commissioning policy based on current practices for new buildings to verify energy performance after construction. Embed policy in the existing CSBP.	Formal commissioning policy developed and embedded in CSBP (y/n)

Preferred state of energy management	Medium-term actions	Metric / KPI
Monitoring and tracking		
The Town has real-time building level data for all utilities, at an appropriate level of granularity (e.g. daily).	<p>50. Conduct an assessment of the metering needs of each building.</p> <p>51. Ensure each building is appropriately metered for each utility (e.g. interval and sub-meters).</p> <p>52. Implement the EMS chosen in Year 1 to track and analyze energy use at the building level.</p>	<p>Assessment of metering needs conducted (y/n)</p> <p>Required meters purchased and installed (y/n)</p> <p>Energy management system implemented (y/n)</p>
The Town has the capacity to manage, analyze, and use energy data from meters.	<p>53. Develop a plan for analysis and use of energy data.</p> <p>54. Allocate sufficient and appropriate staff resources to collect and manage energy data.</p>	<p>Data analysis and reporting system developed (y/n)</p> <p>Staff resources allocated (y/n)</p>
Staff have easy and up-to-date access to energy data for each facility.	55. Develop / purchase an energy dashboard that provides operators, management, and the community with appropriate information on energy use utilizing existing resources (e.g. Halton Hills Hydro and Union Gas).	<p>Energy dashboard selected (y/n)</p> <p>Energy dashboard implemented (y/n)</p>
Project EM&V is simple and accurate thanks to energy data and monitoring processes.	56. Develop a process for rolling out successful energy efficiency projects.	Process for rolling out energy projects developed (y/n)
The Town uses KPIs to track progress towards targets.	57. Develop building level KPIs and produce a quarterly evaluation report for each building that is made public and identifies the status of the KPIs (e.g. number of energy efficiency initiatives implemented, energy saved).	<p>Building level KPIs developed (y/n)</p> <p>Building level KPIs reported each quarter (y/n)</p> <p>Energy saved (ekWh and m³)</p>

Preferred state of energy management	Medium-term actions	Metric / KPI
Communication and engagement		
Project-specific communication and education helps building occupants (staff and public) appreciate energy efficiency retrofits.	58. Develop standardized education and communication tools (e.g. poster boards, brochures) for retrofit projects (e.g. lighting retrofit) and/or changes in building comfort levels for staff and the public.	Standardized communication tools deployed (y/n) Changes in attitudes and behaviours
All staff have the tools and training to identify energy management opportunities and are actively engaged in submitting ideas.	59. Develop an employee engagement process for all staff based on the O&M pilot program implemented in Year 1. (See section on Communication and engagement for more detail).	Employee engagement process developed (y/n) Changes in attitudes and behaviours
All O&M staff are trained and understand energy and energy saving opportunities.	60. Implement general training on energy and energy efficiency for O&M staff identified in Year 1. (See section on Communication and engagement for more detail).	Number of staff trained
All O&M staff receive appropriate training on the use of new energy efficiency technologies and equipment.	61. Implement project specific training for O&M staff as needed (e.g. new technology, new piece of equipment). (See section on Communication and engagement for more detail).	Number of staff trained
All staff are aware of energy conservation and the actions they can take to save energy within the Town facilities.	62. Develop and implement a corporate Town-wide energy, greening and sustainability behaviour change program for all staff with the assistance of the Staff Sustainability Team. (See section on Communication and engagement for more detail).	Behaviour change program developed (y/n) Changes in attitudes and behaviours
The Town's O&M staff work together with other municipalities to share technologies and best practices.	63. Set up regular site visits and meetings with O&M staff from other municipalities to share information and tour facilities. 64. Continue to send O&M staff to conferences for information sharing.	Number of site visits Number of O&M staff attending site visits Number of O&M staff attending conferences

Preferred state of energy management	Medium-term actions	Metric / KPI
Fleets		
All fleet vehicles are operated in the most energy efficient manner while meeting the needs of their intended use.	<p>65. Develop guidelines to operate vehicles in the most energy efficient manner (e.g. anti-idling).</p> <p>66. Implement a driver-training program (e.g. Shuttle Challenge¹⁰). (See section on Communication and engagement for more detail).</p> <p>67. Develop a policy for purchasing the right-sized vehicles.</p>	<p>Guidelines developed (y/n)</p> <p>Number of drivers trained</p> <p>Reduction in annual fuel consumption per vehicle-km</p> <p>Policy for purchasing right-sized vehicles developed (y/n)</p>
Renewables and procurement		
The Town's energy procurement systems consider cost, predictability, and environmental impacts.	68. Ask contracted procurement advisors how to consider environmental impacts in electricity and natural gas purchasing decision (e.g. from renewable sources).	% of energy purchased from environmentally benign sources
All fleet vehicles selected and purchased are the most energy efficient and meet the needs for their intended use. All fleet vehicle fuel purchased is from alternative sources.	69. Develop procurement standards for vehicles to encourage vehicles that include energy efficiency and alternative fuel purchases.	Procurement standards developed (y/n)

4.2 Technical actions

Table 6 includes the medium-term technical actions to be implemented in Years 2 and 3 of the plan. The technical actions are based on recommendations from audits completed on seven representative buildings and are prioritized based on their internal rates of return. Detailed information on each technical action can be found in the accompanying audit reports for each of the facilities.

The actions are grouped together by type in order to facilitate the Town issuing a single tender for similar measures in all applicable buildings. For example, the auditors recommended installing daylighting & occupancy sensor in the Gellert Centre, fixing the daylighting sensors in the Acton Library and installing a motion sensor at the Acton Fire

¹⁰ For more information on the Shuttle Challenge, refer to: <http://www.shuttlechallenge.ca>

hall. These were grouped together and extrapolated to include retrofits to lighting controls in all applicable buildings. “All applicable buildings” refers to buildings where the measures were identified in the audits, in addition to buildings that were not audited where the same or similar measures could be undertaken.

The projected cost and NPV numbers are estimates based on industry average data, research and analysis; they may not match actual costs and savings.

Table 6 Medium-term technical actions for Years 2-3

Measures	Buildings	Projected cost (including incentives estimate)	Projected net present value	Internal rate of return
15. Plumbing - DHW insulation	All applicable buildings	\$4,506	\$7,387	
Water heaters (insulate)	Mold-Masters	\$3,000	\$4,918	38%
Plumbing - DHW insulation	All unaudited buildings	\$1,506	\$2,469	N/A
39. Specialized plumbing – VFD	All arenas	\$28,610	\$185,636	
VFD on glycol pumps	Mold-Masters	\$21,610	\$65,132	34%
VFD on circulation pumps	Acton Arena	\$7,000	\$120,504	147%
40. General plumbing – VFD	All applicable buildings	\$11,743	\$93,213	
VFD on glycol circulation pump	Civic Centre	\$7,818	\$62,056	74%
General plumbing – VFD	All unaudited buildings	\$3,925	\$31,157	N/A
41. Lighting controls	All applicable buildings	\$9,477	\$38,317	
Put daylighting & occupancy sensor on Kinsmen room lights	Gellert Centre	\$3,301	\$7,356	25%
Daylighting sensors over-ridden	Acton Library	\$0	\$4,145	N/A
Commission outdoor light timer	Acton Library	\$2,759	\$10,729	37%
Motion sensor for heritage room lights	Acton Fire hall	\$250	\$3,279	104%
Lighting controls	All unaudited buildings	\$3,168	\$12,808	N/A

Measures	Buildings	Projected cost (including incentives estimate)	Projected net present value	Internal rate of return
Specialized HVAC	All unaudited community centres	\$7,740	\$23,606	N/A
43. Consultant - utility analysis	All applicable buildings	\$7,510	\$59,143	
Investigate lost hydro	Acton Library	\$5,000	\$39,374	66%
Consultant - utility analysis	All unaudited buildings	\$2,510	\$19,769	N/A
Totals for Years 2-3		\$99,587	\$498,795	

NOTE: THE INTERNAL RATE OF RETURN (IRR) WAS CALCULATED FOR MEASURES THAT WERE IDENTIFIED IN THE AUDITS. THE IRR COULD NOT BE CALCULATED FOR MEASURES WITH NO PROJECTED COSTS AND WERE NOT CALCULATED FOR THE ESTIMATES MADE FOR UNAUDITED BUILDINGS.

5 Long-term actions (Years 4-5, July 2017 – July 2019)

In Years 4 through 5 of the CEP (July 2017 – July 2019), the Town should ensure that all of the priority and medium-term actions (both organizational and technological) have been completed, and are being maintained as required.

The Town should then pursue the organizational actions presented in Table 7. In addition, the Town should pursue the technical actions provided in Table 8 below. These actions are grouped by category and are numbered for ease of identification. The numbering is not an indication of importance.

5.1 Organizational actions

Table 7 Preferred state, long-term actions, and metrics for tracking implementation

Preferred state of energy management	Long-term actions	Metric / KPI
Organizational commitment		
The Town's energy management activities are guided by ambitious yet achievable targets.	70. Re-affirm commitment to targets. 71. Prepare plan update (See section on Updating and reporting on the plan).	Targets re-affirmed (y/n) Plan update prepared (y/n)
The Town tracks progress towards targets.	72. Track and assess progress on interim targets and Years 2-3 actions.	Energy intensity (ekWh/m ²) Total energy use (ekWh, m ³) Percentage of actions implemented.
Existing buildings and equipment		
The Town strategically implements all cost effective energy efficiency projects in existing buildings.	Implement all technical measures identified as long-term actions in all applicable buildings: 73. Lighting retrofits in all applicable buildings. (See full list in Table 8)	Retrofit projects implemented (y/n) ekWh and m ³ saved \$ saved on energy bills

Preferred state of energy management	Long-term actions	Metric / KPI
All buildings operate in an energy efficient manner.	<p>74. Continue to implement and update guidelines and policies for energy management to be followed at all facilities.</p> <p>75. Continue to implement the corporate O&M preventative maintenance program.</p> <p>76. Continue to implement the corporate re-commissioning plan.</p>	Guidelines updated (y/n)
Monitoring and tracking		
The Town has real-time building level data for all utilities, at an appropriate level of granularity (e.g. daily).	77. Continue to use the EMS selected in Year 1 to track and analyze energy use at the building level.	EMS utilized (y/n)
The Town has the capacity to manage, analyze, and use energy data from meters.	78. Conduct an assessment to ensure that energy data needs are being met, and that staff resources are adequate to manage and collect the data.	Assessment conducted (y/n)
The Town understands how all buildings are performing, relative to other comparable buildings.	79. Identify an appropriate benchmarking system to monitor the energy performance of buildings (e.g. Energy Star) or join an existing benchmarking group (e.g. Mayor's Megawatt Challenge).	<p>Benchmarking system used (y/n)</p> <p>Number of buildings benchmarked</p>
Communication and engagement		
The Town's O&M staff work together with other municipalities to share technologies and best practices.	<p>80. Continue to set up regular site visits and meetings with O&M staff from other municipalities to share information and tour facilities.</p> <p>81. Continue to send O&M staff to conferences for information sharing.</p>	<p>Number of site visits</p> <p>Number of O&M staff attending site visits</p> <p>Number of O&M staff attending conferences</p>

Preferred state of energy management	Long-term actions	Metric / KPI
Fleets		
All fleet vehicles are operated in the most energy efficient manner while meeting the needs of their intended use.	82. Continue to implement the driver-training program (e.g. Shuttle Challenge).	Number of drivers trained
Renewables and procurement		
The Town is pursuing net-zero energy use.	83. Examine the feasibility of installing renewables or other alternative generation (e.g. district energy, combined heat and power).	Number of feasibility studies conducted
The Town has a clear process to guide renewable energy development. This process leads to visible and cost-effective renewable energy projects.	84. Develop a process for identifying, evaluating, and developing renewable energy projects.	Process developed (y/n)
The most energy efficient option for work related travel is selected.	85. Produce guidelines for selecting the most energy efficient travel option for work related travel ¹¹ .	Travel guidelines developed (y/n)

5.2 Technical actions

Table 8 includes the long-term technical actions to be implemented in the fourth and fifth years of the plan. The technical actions are based on recommendations from audits completed on seven representative buildings and are prioritized based on their internal rates of return. Detailed information on the recommended action can be found in the accompanying audit reports for each of the facilities.

The actions are grouped together by type in order to facilitate the Town issuing a single tender for similar measures in all applicable buildings. In this case, the auditors recommended lighting upgrades in the Mold Masters SportsPlex and Acton Arena as well as an adjustment to lighting density in the Gellert Community Centre. These were grouped together and extrapolated to include energy saving lighting retrofits in all applicable buildings. “All applicable buildings” refers to buildings where the measures were identified in the audits, in addition to

¹¹ For all other travel to and from work, see the LAP component of the MCEP.

buildings that were not audited where the same or similar measures could be undertaken.

The projected cost and NPV numbers are estimates based on industry average data, research and analysis; they may not match actual costs and savings.

Table 8 Long-term technical actions for Years 4-5

Measures	Buildings	Projected cost (including incentives estimate)	Projected net present value	Internal rate of return
76. Lighting retrofit	All applicable buildings	\$101,244	\$41,480	
Lighting in rink A	Mold-Masters	\$19,400	\$7,414	21%
Lighting in both rinks	Acton Arena	\$25,400	\$13,592	27%
Adjust lighting density	Gellert Centre	\$22,603	\$6,609	17%
Lighting retrofit	All unaudited buildings	\$33,841	\$13,865	N/A
Totals for Years 4-5		\$101,244	\$41,480	

NOTE: THE INTERNAL RATE OF RETURN (IRR) WAS CALCULATED FOR MEASURES THAT WERE IDENTIFIED IN THE AUDITS. THE IRR COULD NOT BE CALCULATED FOR MEASURES WITH NO PROJECTED COSTS AND WERE NOT CALCULATED FOR THE ESTIMATES MADE FOR UNAUDITED BUILDINGS.

6 Capital costs and net present values

This section summarizes the extrapolated capital costs and net present values associated with implementing all of the technical actions recommended in the seven audited buildings and the equivalent measures in the appropriate unaudited buildings. The measures are listed in Table 4, Table 6, and Table 8 and include: plumbing upgrades; heating, ventilation, and air conditioning optimization; installing lighting controls; building envelope upgrades, and lighting retrofit measures. The groups of technical actions were allocated across the five years of the plan in order to facilitate an annual net capital cost of approximately \$50,100 in each year for budgeting purposes.

Table 9 shows the breakdown of net capital costs and NPVs of the technical measures broken down by the plan phases. This shows that, the Town will realize a total NPV of over \$1 million by investing an average of roughly \$50,100 each year over the next five years, for a total of \$250,639.

The costs listed in the table below only include the costs associated with the technical measures. Additional costs will be required to implement some of the organizational measures, which may include: hiring third party contractors (e.g. to implement training programs and communication and engagement activities), auditing additional facilities, sending staff to conferences, and purchasing an EMS. Other costs associated with organizational actions will be mainly in the form of staff time (e.g. full-time equivalents (FTEs)).

Table 9 Net capital costs and present values for all technical actions

	Net capital cost (all measures)	Net present value (all measures)
Year 1	\$49,808	\$616,270
Years 2-3	\$99,587	\$498,795
Years 4-5	\$101,244	\$41,480
Total	\$250,639	\$1,156,545

NOTE: THE PROJECTED COST AND NPV NUMBERS ARE ESTIMATES BASED ON INDUSTRY AVERAGE DATA, RESEARCH AND ANALYSIS, BUT MAY NOT MATCH ACTUAL COSTS AND SAVINGS.

7 Renewables and alternative energy

The Town of Halton Hills has installed geothermal heat pump units in two of its fire stations (Headquarters and Maple Avenue fire stations in Georgetown), as well as in its Acton and Georgetown libraries. All of these buildings were built in recent years and the geothermal heat pumps were included as part of the construction process. There was no prior energy use for these buildings without geothermal heat pumps to compare current usage. The following annual estimated savings associated with using geothermal heat pumps are provided below in Table 10 for each building. These estimates are based on the Buildings Table of the National Climate Change Program prepared by the Earth Energy Society of Canada for Natural Resource Canada's Renewable & Electrical Energy Division.¹²

Table 10 Energy savings estimates from geothermal heat pumps

Building	Estimated savings (kWh/a)
District Three Fire Station and HQ	173,697
District Two Fire Station (Georgetown)	203,268
Acton Library Branch (New)	114,812
Georgetown Library Branch & Cultural Centre (both facilities)	644,221

In addition, Town Council has recently supported an application to the Ontario Power Authority as part of the Feed-in-Tariff program to install a 450 kW (521,000 kWh/a) rooftop mounted solar PV project on the Mold-Masters SportsPlex.

Actions related to renewable and alternative energy have also been included in the CEP as actions to be implemented in the long-term (Years 4 and 5). These actions are listed in Table 11 below. It should be noted that when preparing the annual update of the CEP, these actions may be moved to the medium-term (Years 2 and 3) if new renewable installation opportunities arise.

Table 11 Actions related to renewable and alternative energy

Action number	Action description
83	Examine the feasibility of installing renewables or other alternative generation (e.g. district energy, combined heat and power).
84	Develop a process for identifying, evaluating, and developing renewable energy projects.

¹² Global Warming Impacts of Ground-Source Heat Pumps Compared to Other Heating Cooling Systems (<http://www.earthenergy.ca/climate.html>).

8 Implementation of the plan

Several organizational actions in Table 3, Table 5, and Table 7 identify the need for more staff resources to implement the CEP. Having sufficient resources will be imperative to ensuring the success of the Plan and for effectively managing energy use and GHG emissions at the Town.

As a first step, the Town should assign a staff member to be responsible for overseeing and monitoring the implementation of the CEP. This person will be responsible for ensuring the plan is implemented, tracking progress on all the actions, leading the Plan's five-year review and update, taking a lead role in designing and implementing all the actions outlined in the Communication and engagement section, as well as leading the implementation of the broader Mayor's Community Energy Plan and ensuring alignment with the Community Sustainability Strategy. An additional resource may be needed to effectively fulfill this role.

Obtaining a central facilities management role has also been identified as a priority action. Currently, there is no overall or consistent energy management of facilities across all departments. For a description of the responsibilities of this role, see Table 12 below. Funding is available to hire an Embedded Energy Manager from Halton Hills Hydro under the Process and System Upgrade Initiatives of the OPA *saveONenergy* programs. Currently, funding is only available until the end of 2015. Ultimately, it would be most effective to have a person dedicated to the role over the long-term; however, the Town can decide the best course of action. Many municipalities have a dedicated staff person responsible for managing energy, including: the Town of Caledon, the City of Pickering, the Town of Oakville, the City of Brantford, the City of Hamilton, and the City of Burlington.

The following table outlines the key actions related to staff resources and identifies the recommended roles and responsibilities for these positions.

Table 12 Staff roles and responsibilities for implementing the CEP

Role	Responsibilities
Dedicated staff to implement CEP	Taking the lead on overseeing and monitoring the implementation of the CEP and the broader MCEP. This includes ensuring actions are implemented and progress is tracked, as well as designing and implementing the communication, training, and behaviour change programs. This person would work closely with the central facilities management staff person and the Staff Sustainability Team. (See Action 7).

Role	Responsibilities
Central facilities management role	Overseeing energy management within all facilities and acting as a central resource and contact for O&M staff from different departments. Other responsibilities include: managing the selected EMS, working with the dedicated staff person responsible for implementing the plan on training programs and employee engagement for O&M staff, and taking the lead on overseeing the implementation of the technical actions. (See Action 8).
O&M staff	Identifying and implementing energy saving opportunities at facilities, and participating in training programs.
Staff Sustainability Team	Assisting the dedicated staff person responsible for implementing the plan in implementing staff behaviour change programs and providing resources where appropriate. (See Action 35).

9 Energy management systems

As a priority action (Action 24, Table 3) it is recommended that the Town investigate options for an energy management system (EMS) to be used to track and analyze energy use at the building level. Current Town data collection processes are very resource intensive and involve requesting information from multiple sources both internal (departments) and external (Halton Hills Hydro and Union Gas).

There is a range of EMS software available on the market. The selection of a particular system will depend on the specific features being sought, as well as the compatibility with existing IT systems. This includes ensuring buildings or specific equipment or systems have the appropriate meters to collect data at correct levels of granularity (e.g. real-time, hourly, daily, etc.).

This section provides an overview of the system characteristics the Town should be considering, as well as the supporting organizational capacity and processes the Town will need to implement the system.

9.1 Selecting an energy management system

System characteristics. The Town should look for the following capabilities in an EMS:

- Centralized data logging
- Data normalization
- User-friendly data reporting (automatic and customized report generation for diverse audiences)
- Near real-time display options (for individual buildings and for aggregated buildings)
- “Dashboard” summary options for Town-wide/public display
- Tracking of actual energy performance against expected performance
- Immediate notifications/alerts when monitored systems deviate from usual patterns
- Project evaluation, monitoring and verification capabilities
- Compatibility with the Town’s IT systems.

The Town may also want to seek the following additional capabilities:

- Electrical load shedding
- Verification of monthly bills
- Prediction of future bills

There are three major types of energy management systems:

1. In-house hardware and software solutions. With this option, the Town would have more control over how the suite of programs is used, but would have to provide permanent staff or assign person-hours to

generate and review energy reporting, and to maintain hardware and software systems.

2. Energy accounting as a service. A third party contractor collects and analyzes energy information from the Town’s metres and sub-metres, and then delivers the information to the Town via a web-portal. This option typically involves higher monthly cost and less control over the outputs (usually a high degree of customization is available); however, minimal organizational capacity is required.

3. Externally hosted and maintained software solution with a web interface. The software maintenance is outsourced, while monitoring tasks remain in-house. The Town is still responsible for “making sense” of the data and reports.

Before going to tender, the Town should consider which of the three types of systems it would prefer. Based on our understanding of the Town’s goals and capacity, energy accounting as a service (option 2) is recommended.

Most municipalities that have effectively managed their energy data and have achieved energy and cost savings have purchased and are using an EMS. For example, the Town of Caledon, the City of Pickering, the Town of Oakville, and the City of Burlington all track energy data through an EMS. Some municipalities have developed their own EMS. For example, the Region of York developed an EMS called Energy and Environmental Management System (EEMS), which is also used by other municipalities.

Evaluation criteria. Once the Town has decided which of the three approaches it prefers, the specific EMS can be selected based on:

- Functionality (inclusion of all desired capabilities)
- Ease of use
- Cost (capital and operational/maintenance)
- Staffing requirements
- Integration with other Town systems
- Security and redundancy of information/backups
- Current use by other municipalities.

Next steps. Within the next year, the Town can solicit proposals from different vendors for an EMS. The Town can then select and implement the preferred EMS.

9.2 Establishing the supporting organizational capacity and processes

Selecting and purchasing an EMS is one step; however, ensuring the appropriate resources are in place to use and manage the EMS is equally, if not more, important. The Town will need additional staff capacity to make use of the information from the EMS. The Town will also need new organizational processes to ensure that:

- The right information reaches the right people in a timely way; and
- These people can use the information to take action on energy efficiency.

Data and information. As part of the selection and implementation of the EMS, the Town will need to develop a reporting system for energy data (energy use, demand, costs, savings, progress, etc.). This reporting system should consider who will be reviewing the data, what they will be looking for, and what user interfaces are needed. For example:

- What information is relevant to O&M staff? What analysis / statistical techniques are needed to transform the data into the information desired?
- What format can best convey this information to O&M staff? How will the outputs be made available to staff (paper copy, e-mail reporting, web-based reporting)? How often should O&M staff receive this information?
- What information is relevant to management staff?
- What format can best convey this information? How often should management staff receive this information?

It is recommended that the Town start with a more limited and manageable set of outputs and reports. Then, as staff become more familiar with the energy management system, the Town can look to add additional features, based on staff input about what is most useful.

Implementation. The Town will also need to develop a system for acting based on the problems and opportunities identified from the data. This system will enable staff to use the outputs of the EMS to improve energy efficiency. For example:

- How should O&M staff respond to alerts about deviations from normal energy use patterns? How should staff report on the causes of the alert and any remedial action taken to address problems?
- Who should be responsible for analyzing weekly/monthly reports? How can they investigate any irregularities in the data? How can they pursue opportunities identified by the data?
- How should actions taken as a result of information from the energy management system be tracked on an ongoing basis?

All relevant staff should be trained to understand energy management systems. They should also be trained to analyze information from the EMS, and to take action as a result of this information.

Next steps. Within the next year, the Town should determine the desired outputs and reports, and secure the staff resources required to manage the energy management system. It is recommended that the new central Facilities Management (Action 8, Table 3) role take responsibility for managing and overseeing the energy management system.

Alongside deployment of the EMS, the Town can develop a system for translating data and analysis into action (including training for staff).

Once the EMS is deployed, the Town can use it to develop one-year baselines for each building and each utility. These will be the basis for ongoing monitoring and tracking.

9.3 Taking advantage of utility incentives

As part of the Integrated Energy Management Systems program, Union Gas will fund up to 75% of an energy management system assessment (up to \$20,000), and up to 50% for the installation of the energy management system (up to \$100,000).

Halton Hills Hydro also offers an Energy Management and Monitoring program under the Process and System Upgrade program. This program offers two types of incentives – one for an embedded Energy Manager and one for a monitoring and targeting system. For more details on incentives offered by Union Gas and Halton Hills Hydro see Appendix C.

10 Communication and engagement

This section complements and expands on the overarching communication and engagement actions identified in the *Organizational Actions* listed in Table 3, Table 5, and Table 7.

10.1 Overview and program management

The communication and engagement section focuses on three areas:

- Employee engagement
- Facilities staff training
- Behaviour change and communication

Each area is expanded upon in more detail below.

10.2 Employee engagement

In the first year of the CEP, the Town should develop a pilot employee engagement program that encourages O&M staff to identify energy efficiency opportunities across the Town's facilities. Based on the success of this program, the Town should role-out the program to all staff within Years 2 and 3 of the CEP.

The pilot program should be developed by the new central facilities management role in collaboration with the dedicated staff person assigned to oversee the implementation of the CEP. The program would establish a formal process for O&M staff to submit ideas based on their daily activities in Town facilities, and staff would receive recognition for their ideas. For example, O&M staff might identify opportunities related to:

- Operational inefficiencies (e.g. buildings where night-time setbacks are not in place);
- Equipment maintenance needs (e.g. air handling units requiring maintenance);
- Equipment upgrades (e.g. buildings that would benefit from occupancy sensors); and
- Policy and business process changes.

Staff that submit ideas would be rewarded for their contributions. This will encourage them to identify additional opportunities and submit additional ideas. The central facilities management staff person would review ideas from the employee engagement program, implement them wherever possible, and report on the results. Ideas for the specific components of the employee engagement program include:

- **A system for staff to submit ideas.** The Town should develop a new system for staff to submit ideas for energy efficiency opportunities. For example, creating a process where staff fill out a specific "energy opportunities" form to give to their

supervisors, who then submit the form to the central facilities management staff person. The form would include criteria such as: payback, life-cycle costing, ease of implementation, achievable energy savings, available incentives, occupant comfort, regulatory requirements, and contribution to demonstrating leadership.

- **A system for recognizing staff contributions.** Recognition / rewards for staff that contribute ideas should be designed based on culture of the organization. Particularly at the outset, the recognition and rewards system should convey that “any idea is a good idea”. The system could involve public recognition of individuals that submit ideas (e.g. contributing staff get their name in newsletter, their picture on the wall, and are eligible for the “opportunity spotter of the month” award). Or, it could involve rewards for group achievement (e.g. pizza lunches each month where over 25 ideas are submitted).
- **Tools for communicating about the program.** Particularly at the outset, the employee engagement program should be continuously promoted (e.g. reminders in meetings, advertized on posters, updates on progress visible on the wall) to encourage staff to submit ideas. Staff should also receive feedback about the implementation of their ideas, to realize that they are making a difference.

The pilot employee engagement program should be limited to O&M staff. Once the program is established, it can be rolled out more broadly across all Town staff in Years 2 and 3. The dedicated staff person assigned to oversee the implementation of the CEP would be responsible for facilitating the program to general staff; whereas, the central facilities management staff person would take the lead for O&M engagement.

Implementing an employee engagement program has many benefits, including: providing a formal system for staff to submit ideas, allowing for opportunities to be captured and not missed, and encouraging O&M staff to share their ideas and knowledge.

10.3 Staff training

This section provides further information on two types of training identified as actions in Tables 3 and 5:

- General training for O&M staff on energy efficiency (Action 27, Table 3 and Action 60, Table 5); and
- Energy efficiency training for fleet drivers (Action 66, Table 5).

10.3.1 O&M staff training

General energy training should be provided to all O&M staff to ensure that they have the knowledge and skills to contribute to efficient energy management within the Town. Training options should be investigated

and developed in Year 1 of the CEP, and then implemented in Years 2 to 3. The training could be provided as a half-day or full-day workshop, or through multiple weekly / monthly sessions.

Training may address:

- Energy basics (cost of energy, how and where energy is used);
- The difference between distribution vs. transmission costs
- Lighting and mechanical equipment basics;
- Building automation systems and re-commissioning;
- Metering, monitoring, and the energy management system;
- How to spot energy saving opportunities;
- The Town's Corporate Sustainable Building Policy, preventative maintenance program, and re-commissioning plan; and
- The Town's employee engagement program (including how to submit ideas and what types of ideas can be submitted).

O&M staff should receive a certificate upon completion of the training, recognizing that they have gained important knowledge and skills.

The Town should provide energy management training to all O&M staff every two to three years (or more often, if staff turnover is high). The content of the training can be updated to reflect "state of the art" knowledge about energy management, and to reflect changes in the Town's buildings, equipment, and practices. This training will provide a "refresher" for veteran staff and an opportunity for new hires to increase their skills and knowledge.

The central facilities management role should take the lead on designing and implementing these training programs in collaboration with the dedicated staff person assigned to oversee the implementation of the CEP. The program(s) may be designed and delivered by in-house staff, trainers may be hired from outside the organization and/or staff could be sent to more generic training (e.g. Natural Resource Canada's "Dollars to \$ense" Energy Management Workshops). The Town may also consider speaking with the Town of Oakville, who is partnering with Seneca College to deliver a training program to its staff responsible for operating, maintaining, and designing buildings.

10.3.2 Fleet driver training

All staff that drive Town vehicles should be trained to operate all fleet vehicles in a more fuel-efficient manner. Fuel-efficient driving will not only reduce GHG emissions and other pollutants, but it will also reduce fuel costs and save the Town money. The driver-training program should be implemented in Years 2 to 3 of the CEP. Training could be provided as a half-day or full-day workshop or as an online course with different modules.

Driver-training should include information regarding:

- Vehicle maintenance
- Idling reduction
- Routing optimization
- Vehicle “right-sizing”
- Driving habits (speeds, gear changing, braking, etc.)
- Determining and evaluating fuel saving options
- Analyzing performance

All staff that complete the training should receive a certificate upon completion, recognizing that they have gained important knowledge and skills.

The dedicated staff person assigned to oversee the implementation of the CEP should take the lead on designing and implementing the driver-training program. Training could be designed and delivered by in-house staff, trainers may be hired from outside the organization, and/or staff could be sent to more generic training (e.g. Natural Resource Canada’s “Fuel Management 101” Workshop). Natural Resources Canada also has an “Auto\$mart Driver Education” program that could be purchased by the Town and incorporated into a workshop delivered by in-house staff.

Another option for the Town could be to sign up for a challenge such as the Shuttle Challenge. This challenge involves measuring the baseline fuel usage and impact, taking the free online “Eco driver training” course, and then pledging to improve fuel impact by 10% over the next two weeks.

10.3.3 New hires

Training for energy management, including fuel-efficient driving, should be built into the training and orientation process for new hires. It could be more or less formal, as appropriate given current training and orientation practices.

10.4 Behaviour change and communication

Communicating about the CEP and encouraging staff to think about energy efficiency in their day-to-day activities is one of the objectives of this plan and is fundamental to improving the management of energy within the Town. Behaviour change programs are important for raising staff awareness about energy management. Change in behaviour can also lead to up to five percent savings in energy intensity. The Staff Sustainability Team and the dedicated staff person assigned to oversee the implementation of the CEP should work together to develop a behaviour change and communication strategy. This strategy should involve a combination of tools and initiatives to communicate and engage the Town staff. These could include:

- Using a consistent set of high impact tools for corporate Town-wide communication. These may include: visual displays in the lobbies of facilities, dashboard tools on the Town's intranet, e-newsletters, brochures, YouTube videos, event calendars, etc. Staff indicated in the internal survey that they would prefer communication via e-mail updates and e-newsletters, followed by information tips and lunch-n-learn sessions.
- Taking advantage of existing communication tools currently used to promote awareness of sustainability and environmental initiatives. For example, the new sustainability logo could easily be used to communicate about energy as well as greening and sustainability.
- Developing building-specific poster boards and educational materials discussing the building's energy efficient features, technologies, retrofits, etc.
- Promoting the "spot the energy efficiency opportunities" program for staff outlined above in the Employee engagement section. This will help encourage staff to think about energy management in their day-to-day activities, and change their behaviours to include energy efficiency.

Progress on the CEP should also be communicated to the community so they are aware of the energy initiatives being undertaken by the corporation. The Office of Sustainability website is very informative and already has a lot of information about sustainability, the Green Report Card, and other greening initiatives being undertaken by the Town. Updates on the CEP and energy efficiency initiatives should also be included on the website.

11 Conclusion

There are significant opportunities for the Town of Halton Hills to improve the energy efficiency of its buildings, to reduce utility costs, and to minimize its environmental footprint. From July 2014 to July 2019, the Town will work to reduce its energy intensity between 13% and 17% and to reduce greenhouse gas emissions between 16% and 20%.

The Town of Halton Hills can take advantage of these opportunities by implementing the organizational and technological actions of the *Corporate Energy Plan*, including:

- Adequate resources to implement the CEP, including a dedicated staff person responsible for the CEP, as well as a centralized facilities management role.
- Systematic and strategic implementation of retrofits in existing buildings;
- Development of a rigorous and effective monitoring and tracking system, through an EMS with supporting organizational capacity;
- Implementation of education, communication, engagement and training initiatives for staff; and
- Organizational policies and processes for implementing the CEP, tracking progress, and updating the CEP.

The Town of Halton Hills has the motivation and expertise to implement all of the actions in the CEP. However, the Town will likely need additional human and financial resources. The Town's investments in energy efficiency will yield significant returns, in the traditional economic sense, and will allow the Town to reduce its GHG emissions. Finally, they will help to establish the Town of Halton Hills as a national leader in the efficient management of energy.

Appendix A Present state

This section provides an overview of the present state of energy use in the Town of Halton Hills facilities, including the Town's 2012 utility energy data, a description of existing policies and plans, and the results of the corporate survey.

A.1 Utility data analysis

Table 13 shows the 2012 calendar year utility data, GHG emissions, and energy intensity for the Town of Halton Hills buildings that are required to be reported to the Ministry of Energy under *Regulation 397/11* of the Green Energy Act. This list only includes buildings for which the Town pays the utility bills.

Table 13 Town of Halton Hills 2012 energy data for facilities

Energy Consumption and Greenhouse Gas Emissions Reporting - for 2012								
12-mth period	Jan-2012 to Dec-2012							
Operation Name	Operation Type	Address	Total Floor Area (ft ²)	Avg hrs/w k	Purchased and Consumed		webform)	
					Electricity	Natural Gas	GHG Emissions (Kg)	Energy Intensity (ekWh/sqft)
					Quantity (kWh)	Quantity (m ³)		
Acton Arena	Indoor ice rinks	415 Queen Street	40862	133	763225.889	89423.513	242366.723	41.93625
Acton Community Centre (excluding Seniors Centre)	Community centres	415 Queen Street	2960	133	55287.275	6477.7446	17556.7887	41.93625
Acton Seniors Centre	Community centres	415 Queen Street	2086	40	38962.5864	4565.0592	12372.791	41.93625
Mold-Masters SportsPlex	Indoor ice rinks	221 Guelph Street	60762	133	1236884.47	124388.53	353962.705	42.1128019
Mold-Masters SportsPlex	Community centres	221 Guelph Street	7042	133	143348.481	14415.985	41022.4379	42.1128019
Mold-Masters SportsPlex	Cultural facilities	221 Guelph Street	2196	133	44702.2528	4495.5272	12792.5694	42.1128019
Georgetown Memorial Arena	Indoor ice rinks	42 Mill Street	29378	133	338796.568	14626.946	60192.1218	16.8237624
Georgetown Memorial Arena	Community centres	42 Mill Street	3200	133	36903.4318	1593.2408	6556.42964	16.8237624
Cedarvale Community Centre	Community centres	185 Main Street South	11500	35	52780.99	14832.362	33111.5504	18.2970457
Gellert Community Centre	Indoor swimming pools	10241 Eighth Line	14514	101	368602.572	77476.408	181879.581	82.1279153
Gellert Community Centre	Community centres	10241 Eighth Line	21771	101	552903.858	116214.61	272819.371	82.1279153
Town Hall	Administrative offices and related facilities, including municipal council chambers	1 Halton Hills Drive	40000	65	545938.749	24955.634	99613.7529	20.2790416
Prospect Park Pavilion (aka Boat House)	Community centres	30 Park Avenue	4800	45	13948.5889	2441.91	5956.36345	8.3126383
District One Station (Acton)	Fire stations and associated offices and facilities	21 Churchill Road South	11136	70	108428.716	17693.332	43864.9851	26.6226206
District Two Station (Georgetown) new	Fire stations and associated offices and facilities	53 Maple Avenue	15934	42	213148.772	1629.001	23550.6413	14.4635014
District Three Station - HHFD HQ	Fire stations and associated offices and facilities	14007 10 Side Road	13616	98	233778.162	1002.76	24347.8998	17.9520617
Acton Library Branch (New)	Public libraries	17 River Street	9000	52	137743.921	959.742	15043.4403	16.4382049
Temporary Georgetown Library Branch	Public libraries	224 Maple Avenue	7500	52	26482.7348	32471.138	63934.2121	49.5438331
Temporary Georgetown Library Branch - RECTORY Building	Administrative offices and related facilities, including municipal council chambers	224 Maple Avenue	6000	5	159774.979	90.09	15515.1155	26.7887392
Central Yard - Works Garages and Sand/Salt & Equipment Storage	Storage facilities where equipment or vehicles are maintained, repaired or stored	11620 Trafalgar Road	30000	42.5	171766.311	63017.558	135639.133	28.0500954

Operation Name	Operation Type	Address	Total Floor Area (ft ²)	Avg hrs/w k	Purchased and Consumed		webform)	
					Electricity	Natural Gas	GHG Emissions (Kg)	Energy Intensity (ekWh/sqft)
					Quantity (kWh)	Quantity (m ³)		
Central Yard - Office Trailer	Administrative offices and related facilities, including municipal council chambers	11620 Trafalgar Road	1200	42.5	6870.65245	2520.7023	5425.5653	28.0500954
Central Yard - Stores Building- Peters	Storage facilities where equipment or vehicles are maintained, repaired or stored	11618 Trafalgar Road	1750	22.5	29373.5768	7087.413	16220.6927	59.8268695
Acton Yard - Equipment Depot	Storage facilities where equipment or vehicles are maintained, repaired or stored	3 Commerce Cres.	3700	40	11429.1333	8681.803	17511.7051	28.0263242
Totals					5,291,083	631,061	1,701,257	Average
Estimated average price (per unit)					\$0.12	\$0.32		34.46529
Estimated cost					\$612,254	\$204,644		

A.2 Description of existing policies and plans

For the Town of Halton Hills, energy has additional strategic importance. Well before undertaking the *Corporate Energy Plan* and the *Mayor's Community Energy Plan*, the Town has been actively implementing and exploring energy conservation opportunities. In addition, several Town plans and strategies support energy conservation and GHG emissions reduction. These reports demonstrate the Town's commitment to the environment, energy, and sustainability. They establish relevant goals for the Town, as a community and as a corporation. These plans and strategies are briefly described in more detail below.

A.2.1 Town of Halton Hills Strategic Plan

The Halton Hills Strategic Plan identifies a community vision and corporate mission to plan for a "vibrant urban and rural community". The Strategic Plan also includes a comprehensive list of objectives to meet the Town's strategic directions.

The Mayor's Community Energy Plan will advance a number of Strategic Directions, including to:

- Foster a healthy community;
- Preserve, protect and enhance the environment;
- Foster a prosperous economy;
- Achieve sustainable growth;
- Provide sustainable infrastructure & services; and
- Provide responsive, effective municipal government.

The objectives that specifically address energy and GHGs include:

- Developing innovative programs and partnerships related to sustainable design and energy efficiency;
- Encouraging improvements to air quality through facility management, land use planning, transportation management and other programs, and work with other orders of government to address greenhouse gas emissions; and

- Conserving energy through community design, land use planning, transportation planning, and the design/retrofitting of public and private buildings.

Also within the Strategic Plan are actions that support each objective, further demonstrating the Town’s commitment to energy conservation and sustainability. Below is a list of key actions:

- Develop a Community Energy Plan, in cooperation with Halton Hills Community Energy Corporation;
- Establish minimum standards for sustainable design and energy efficiency for all new Town funded capital projects;
- Continue to encourage and promote sustainable design and energy efficiency to home and business owners, by way of policy development and/or by Town example of best practice implementation;
- Work with developers to facilitate best practices in sustainable design and energy efficiency objectives;
- Continue to monitor best-practices, and implement energy conservation in municipal buildings and infrastructure;
- Assess alternate fuel for fleet applications;
- Complete a comprehensive review of fleet composition to determine where efficiencies can be achieved through “right sizing”;
- Implement the Cycling Master Plan and the Active Transportation initiatives identified in the Transportation Master Plan; and
- Design new Facilities to incorporate LEED Strategies.

A.2.2 Integrated Community Sustainability Strategy

The Integrated Community Sustainability Strategy (ICSS) establishes environmental, social, economic, and cultural sustainability goals, and a long-term vision for the Town of Halton Hills to the year 2060. Energy is a main focus area for achieving environmental health, and several energy-related goals provide strategic direction to reach the Town’s vision. These goals include:

- Fostering a culture of conservation by preparing energy plans focusing on efficiency and renewable power generation;
- Demonstrating leadership in local renewable energy generation and conservation;
- Using sustainable building standards for design, construction and operation of new developments and renovations;
- Reducing energy consumption through vehicle technologies;
- Reducing the amount of energy consumed by residential, industrial, commercial, institutional, and business sectors; and

- Maximizing the amount of locally generated thermal and electrical energy from renewable sources.

The ICSS has been endorsed by Council as being the Town’s key document used to position Halton Hills as a leader in sustainability by acting as a blueprint to seamlessly integrate sustainability into the Town’s day-to-day decision making, plans, policies and other initiatives.

A.2.3 Town of Halton Hills Official Plan

The Halton Hills Official Plan, as amended by Official Plan Amendments No. 9 and 10, outlines a long-term vision for the Town and provides direction as to how development should take place to meet the current and future needs of its people to the year 2031. The Plan demonstrates the Town’s commitment to energy conservation by identifying five topics that relate to energy and land use planning. These topics encourage the promotion of:

- Compact urban form in new greenfield areas that is transit supportive;
- Mixed use development in appropriate locations and live-work relationships that reduce automobile use;
- Lot and building design that maximizes direct access to sunlight during the winter;
- The use of vegetation that will reduce energy consumption of buildings; and
- Cycling and walking.

A.2.4 Halton Hills Green Plan

The Halton Hills Green Plan demonstrates the commitment of residents, businesses, and the municipality to “thinking globally and acting locally”. The intent of the Green Plan is to lead the community in a direction that will “preserve, protect and enhance [the] environment” in accordance with the Town’s Strategic Plan.

The Plan lists several energy-related initiatives that the Town has already implemented, including: lighting retrofits and programs, installation of energy efficient features and equipment, use of LEED principles in the design of new buildings, and DSM load reduction, among many others.

The Plan also highlights 70 ways to further engage the community and promote energy conservation at Town facilities. Recommended actions that specifically address energy include:

- Purchasing an Energy and Environmental Management System to track energy performance and costs;
- Meeting with developers and builders to discuss standards for new subdivision development that will reduce energy and water consumption;

- Making bio-diesel available for all Town owned diesel vehicles;
- Sourcing renewable energy for Town facilities; and
- Requiring that energy efficient vehicle quotations be included in vehicle bids.

In 2012, 65 actions were taken which advanced approximately 73% of the Green Plan's 70 recommendations. Some of these actions include:

- Obtaining LEED® Gold certification for the Acton Library and designing the Halton Hills Library and Cultural Centre to LEED® Silver;
- Installing energy-efficiency windows at the Cedarvale Community Centre and reducing heat loss;
- Creating Sustainable Purchasing procedures;
- Participating in "Smart Commute", a transportation demand reduction program, to reduce GHG emissions, vehicle kilometers travelled, and commuting costs;
- Community events and programs such as: Bike it to the Market, Earth Hour, Halton Fresh Food Box program, and the Walking School Bus program;
- Focusing on "complete streets" that allow for pedestrians, bicyclists, motorists, and transit riders of all ages and abilities to move safely along a street; and
- Processing applications under the provincial Feed-in-Tariff program.

A.2.5 Green Development Standards Study

The Town recently completed the Green Development Standards Study. These new Standards put in place more comprehensive 'second-generation' green development requirements for new development, including residential and non-residential uses. The new Standards are an update and enhancement of the Town's existing award-winning Green Development Evaluation Checklist. The new Green Development Standards will allow the Town to maximize the many positive attributes of development while minimizing its potentially negative impacts.

A.2.6 Economic Development Strategy

The Economic Development Strategy was developed to guide the Town over the next 10 years (2013-2023) and assist in creating and retaining jobs and increasing property assessments for the community. Although there are no recommendations specific to energy, it is suggested that many companies are attracted to the area due to the Town's "pro-active energy sustainability model". The Town has demonstrated its commitment to energy by updating and implementing the Green Development Evaluation Checklist to ensure new developments are

more energy efficient and by introducing various energy-related programs and policies; continuation of this commitment will contribute to continued economic growth and prosperity in the area.

A.2.7 Transportation Master Plan and Cycling Master Plan

The Transportation Master Plan identifies strategies to meet the transportation challenges facing the Town to the year 2031. The Plan builds upon and supports existing policies and plans including the Strategic Plan, Official Plan and Green Plan. The Cycling Master Plan was developed to guide Halton Hills in the implementation of a Town-wide cycling network over the next ten years and beyond. Both Plans promote increased use of public transit (i.e. GO Transit) and active transportation, which will reduce energy use and GHG emissions.

A.2.8 Smart Commute Plan

Transportation is a major energy user and greenhouse gas emission generator. Smart Commute is a transportation demand reduction program, focused on reducing traffic congestion, improving air quality, encouraging alternative travel choices, and reducing the environmental, economic and community costs of vehicle travel. In 2012, Metrolinx and Smart Commute Halton recognized the Town with a “Smart Commute Workplace” designation. This designation recognizes the Town’s commitment to being an employer that supports sustainable transportation options through its participation in the Smart Commute program. These options include carpooling, cycling, providing sheltered bike lockers, and walking.

A.2.9 Vision Georgetown

Vision Georgetown is a three-year, multi-phase project that will guide the development of future residential/mixed use in the southwest area of Georgetown. The plan is unique in that it addresses sustainable and environmental planning considerations including: broad-based community engagement, community visioning, sub-watershed planning, urban design, heritage conservation, energy management, and development phasing. The new development will align with strategic directions outlined in the Town of Halton Hills Strategic Plan, and will contribute to the sustainability and energy vision of the Town. These new communities will be more people-friendly, community-oriented, cleaner, greener, and more sustainable.

A.2.10 Halton Hills Generating Station

Halton Hills is home to a natural gas-fired combined cycle electricity generating facility capable of producing 641.5 MW of electricity. Located along the 401-407 Industrial Corridor, the facility became operational in 2010 and is under a 20-year power purchase arrangement with the OPA. The generating station uses high efficiency and low emissions technologies, and has the capacity to generate

power to meet the needs of 700,000 homes. This generating facility is relevant to the Energy Plan because it is a major local energy producer.

A.3 Corporate survey results

As part of the CEP planning process, Town staff were asked to complete a short survey about energy management at the Town of Halton Hills. In total, 77 out of 340 staff either fully completed or partially completed the survey, representing a response rate of 23%. Responses were very useful and gave a sense of how energy management is perceived presently by staff and suggestions on what can be done moving forward. The responses from the survey fed into the recommendations made in the Communication and engagement section.

When asked how familiar staff were with the Town's corporate energy use and energy management processes, almost half of respondents indicated that they were not familiar (48.7%). Thirty-four percent said they were somewhat familiar. However, when asked how well they think the Town is managing its corporate energy use, half said "well".

The majority of staff (63.5%) indicated that e-mail updates and e-newsletters would be the best way to assist them in better understanding the Town's corporate energy use and management processes, followed by information tips (43.2%) and lunch-n-learn sessions (29.7%). Over two-thirds of Town staff said they were very interested (34.2%) or interested (36.8%) in assisting the Town in reducing its corporate energy use. A large majority of staff agreed that it is either important (37.8%) or very important (48.6%) that the Town is seen as a leader in corporate energy management.

Staff were also asked what opportunities they have to reduce energy at work on a typical day. Most respondents said that they turn lights off in rooms not being used and make maximum use of natural light when possible; they turn off computers and monitors when not in use and at the end of the day; and they set printers to sleep mode when not used.

Finally, staff were asked what energy conservation measures they would like to see implemented by the Town in its operations. Some of the most common and/or interesting answers were:

- Improve temperature controls (i.e. increase indoor temperatures in the summer and decrease temperatures in the winter)
- Formalize work-at-home arrangements
- Install motion activated light switches in seldom used rooms and washrooms
- Increase budgets for implementing energy saving projects
- Update energy consuming devices to more energy efficient models including installing energy efficient lights and high efficiency toilets
- Install more rooftop solar panels and solar energy lights

- Reduce solar heating of buildings by installing crushed white rock on building roofs
- More fuel efficient fleet vehicles
- Mandatory and enforced turning-off of computers at the end of the day
- Install better reflective glazing on the windows or UV blocking blinds
- Reduce the amount of printing to save paper and energy

Appendix B Criteria for prioritizing actions

The Town of Halton Hills can evaluate and prioritize energy management actions identified in the future (e.g. from future ASHRAE Level 2 audits, employee engagement and renewable/alternative energy feasibility studies), based on the following criteria:

1. **Leadership:** Does the action help the Town become a leader in energy management? Does it demonstrate the Town's commitment to improving its energy performance? The Town should implement projects that are not cost-effective if they have high visibility, demonstrate new or emerging technologies, are an established "best practice", etc.).
2. **Cost-effectiveness:** Is the action cost-effective over its lifetime, based on internal rate of return (IRR)? Unlike simple payback, IRR captures lifetime energy savings. IRR conveys that projects with high capital costs (and long paybacks) but long effective lives are a good investment. The Town should plan to implement *all* projects with IRRs that are higher than the cost of capital, or minimum desired rate of return. The net present value (NPV) of each action is also a useful calculation for decision makers, as it provides a measure of the estimated net financial benefit of each action. A positive NPV for an action should also be used as indicator that the Town should implement that action.
3. **Contribution to day-to-day energy efficiency:** Does the action make energy management visible at Town facilities, change the behaviour of staff, help the Town to publicize its successes, and contribute to the Town's reputation?

These criteria align directly with the three objectives presented in the Objectives and targets section:

1. The Town of Halton Hills is a national leader in the efficient management of energy in their corporation.
2. The efficient use of energy is part of the day-to-day activities of Town staff.
3. The Town's environmental and financial sustainability are improved through energy management initiatives that are Practical, Affordable, Reasonable, Educational, and Enforceable.

In addition, the Town can consider the following criteria:

- **Annual energy savings:** For projects with an acceptable IRR and a positive NPV, the Town should prioritize actions with the highest annual energy savings. Though these larger projects will likely have high capital costs, they will have the most significant impact on the Town's overall energy performance. They will also yield the highest returns per hour of Town staff time devoted to implementation. This is linked to objective 1 and leadership in energy performance.

- **Ease of implementation:** Projects may be accelerated (or decelerated) based on ease of implementation. For example, a project with a lower IRR should be scheduled for immediate implementation if renovations in the building make it very easy to implement. A project with a higher IRR should be delayed if implementation is currently very difficult, and if planned renovations (or other changes) will make it significantly easier in the future. This is linked to objective 3 and cost-effectiveness (considering the value of staff time).
- **Occupant comfort and regulatory requirements:** Projects that increase comfort, address occupant concerns, or address regulatory requirements will improve the overall experience of Town staff, enhance the Town's reputation, or contribute to the culture of effective energy use (objective 2).
- **Availability of incentives:** The Town should also accelerate implementation of projects that are eligible for funding from electric and gas utilities, or from provincial or federal governments. This is particularly important where incentives are likely to be discontinued in the near future (e.g. in 2015 for current saveONenergy programs). This is linked to objective 3 and cost-effectiveness.

Appendix C Utility incentive programs

This section describes incentives and services that are currently available from the Town's electricity and natural gas utilities. The Town of Halton Hills can take advantage of these incentives to implement some of the measures identified in Table 4, Table 6, and Table 8.

Currently, there is no funding available from Natural Resources Canada (NRCAN) or the Federation for Canadian Municipalities (FCM). However, funding may become available in the future and these incentives should be monitored as per Action 36 "develop a process for continually monitoring available incentives, and applying for incentives".

For the most part, the applicable incentive program for the majority of technical measures related to electricity would fall under the Equipment Replacement Incentives Initiative (ERII) from Halton Hills Hydro. For natural gas, most technical measures would fall under the New and Retrofitted Equipment Incentive program from Union Gas. For specific recommendations on incentives for each of the technical measures please refer to the audit reports. For metering measures, the Process and System Upgrade Initiative would be applicable on the electricity side, and the Meters and Integrated Energy Management System would be applicable for natural gas.

Halton Hills Hydro / Ontario Power Authority saveONenergy Programs

Full details are available at: www.haltonhillshydro.saveonenergy.ca

Demand Response (DR3) Program

The OPA's Demand Response 3 (DR3) Program offers rebates to voluntary participants in the commercial and industrial sector, of 50 kW or greater, to reduce the amount of power being used during certain periods of the year. Participants are scheduled to be on standby approximately 1,600 hours per calendar year and are notified to reduce their load up to 100 to 200 hours within the year depending on the contract. Payments are made to participants based on their actual energy reduction during the demand response event. Alternatively, participating organizations can sign a contract with an aggregator to reduce the risk of not meeting required load reductions.

Process and System Upgrade Initiatives (PSUI)

The process and systems upgrade program provides support for facilities to identify major energy saving opportunities and continue to take advantage of these savings. The program offers two types of services:

1. Energy efficiency upgrades – includes a three-step feasibility and upgrade process (preliminary engineering study, detailed engineering study and capital incentives).

2. Energy management and monitoring – provides long-term support to increase savings (includes an embedded energy manager and/or a monitoring and targeting plan).

Organizations can receive up to 70 percent funding for major energy-saving upgrade projects.

Equipment Replacement Incentive Initiative (ERII)

This program offers incentives to non-residential customers to reduce electricity demand and consumption by upgrading to more energy-efficient equipment for uses such as, lighting, space cooling, ventilation, elevators, and sub-metering. Upgrades are subject to project measurement and verification (M&V) to confirm the new equipment achieves energy and demand savings. Successful participants are eligible to receive between \$10,000 to \$25,000 for “basic” upgrades, and more than \$25,000 for “enhanced” upgrades.

High Performance New Construction program

The Ontario Power Authority supports up to 100% of the cost of modeling a new energy efficient building (up to \$10,000). Approved projects are also eligible for incentives for energy savings through a prescriptive path, an engineered path, or a custom path with incentives based on modelled energy performance. There is no cap on the incentives for energy savings.

Audit funding program

Businesses can receive up to 50% of the cost of an energy audit, or up to a certain dollar amount (whichever is less based on the size of the facility and complexity of the audit). Energy audits can identify ways to save energy through equipment replacement, operational procedures, or participation in Demand Response initiatives.

Existing Building Commissioning

The program provides incentives for large buildings (>50,000ft²) with chiller water plants. Incentives cover: hiring an expert to analyze the Chilled Water System and make recommendations for increasing its energy efficiency; buying and installing metering equipment; and implementing the recommended upgrades.

The participant incentives are broken down into four project phases:

1. Scoping Study: amount charged, to a maximum of \$2,500.
2. Investigation Phase: up to \$30,000.
3. Implementation Phase: up to \$5,000 plus up to 50% of purchasing and installing equipment costs.
4. Completion Phase: amount charged, to a maximum of \$2,500.

Union Gas EnerSmart Programs

Full details are available at:

<http://www.uniongas.com/business/savemoneyenergy/index.asp#1>

New and Retrofitted Equipment Incentive Program

This program provides 15% of incremental high efficiency upgrade costs, up to \$40,000, to implement measures that reduce natural gas consumption. Typical projects include building controls, high efficiency process equipment, and building envelope technologies.

Energy Efficiency Engineering Feasibility Study Program

This program covers 30-50% of costs of an energy audit or engineering analysis study on an existing building or process. Audits and studies aim to determine the changes that would increase the overall energy efficiency of the building or process. Typical projects include thermal surveys, facility air-balances, HVAC audits, energy audits, benchmarking activities and equipment upgrade studies.

Stream Trap Survey Program

This program covers 50% of costs, up to \$6,000, to inspect steam traps. The inspection will ensure that steam traps are functioning properly and determine if there is a need for condensate return system improvements.

Process Improvement Study Program

This program provides an incentive of 66% of costs, up to \$20,000, for the completion of a study on optimizing the energy use of a specific natural gas process, operation, or piece of equipment. The study identifies opportunities, determines a detailed cost analysis, establishes financial justification and verifies energy savings. Typical projects include steam plant audits, process integration analyses, heat integration studies and process operation improvement studies.

RunSmart Building Optimization

This program provides \$0.10/m³, to a maximum of \$20,000, for the implementation of low-cost/no-cost energy saving measures and activities that optimize a building's energy use. Examples include: verifying dampers and valves on air handling units, calibrating sensors and instruments, reducing excessive exhaust quantities, and checking insulation integrity. Buildings must use at least 200,000 m³ of natural gas a year, not have been recommissioned in the past five years, and have natural gas heating.

Demonstration of New Technologies Program

This program offers incentives for the adoption of new technologies that improve energy efficiency and can be used as demonstration sites. The program covers 10% of costs, up to a maximum of \$50,000.

Meters and Integrated Energy Management Systems

Union Gas helps fund the installation of natural gas, steam or hot water meters (50% of each meter, up to \$5,000 per customer). Union Gas will also fund up to 50% of the assessment and installation of energy management system.

Prescriptive and quasi-prescriptive incentives

Incentives are also offered for boiler tune-ups, and space heating, water-heating, and cooking equipment, including: air curtains, destratification fans, condensing boilers, non-condensing high efficiency boilers, energy and heat recovery ventilators, infrared heaters, condensing rooftop make-up units, condensing gas water heaters, and Energy Star dishwashers.

Customer education

Union Gas will help fund workshops and seminars, and can provide access to technical information.

Appendix D List of acronyms

ASHRAE – American Society of Heating, Refrigerating and Air Conditioning Engineers

CAO – Chief Administrative Officer

CDM – Conservation and demand management

CEP – Corporate Energy Plan

CO₂eq – Carbon dioxide equivalent

CSBP – Corporate Sustainability Building Policy

DHW – Domestic hot water

EEMS – Environmental and Energy Management System

EM&V – Evaluation, monitoring and verification

EMS – Energy management system

FCM – Federation of Canadian Municipalities

FTE – Full-time equivalent

GHG – Greenhouse gas

HVAC – Heating, ventilation and air conditioning

IRR – Internal rate of return

IT – Information technology

KPI – Key performance indicator

LAP – Local Action Plan

LED – Light-emitting diode

MCEP – Mayor’s Community Energy Plan

NPV – Net present value

O&M – Operations and maintenance

OPA – Ontario Power Authority

PCP – Partners for Climate Protection

QUEST – Quality Urban Energy Systems of Tomorrow

RTU – Remote terminal unit

VFD – Variable frequency drive



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