TOWN OF
WHITCHURCH–STOUFFVILLE

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IndEco Strategic Consulting Inc.
Attention: Ms. Shona Adamson, President
412-77 Mowat Avenue
Toronto, Ontario
M6K 3E3

June 26, 2014

RE: Town of Whitchurch-Stouffville's 5 Year Energy Conservation and Demand Management Plan Approval and Ministry of Energy Website Posting

Dear Ms. Adamson,

Please be advised that the Town of Whitchurch-Stouffville Senior Management Team reviewed and approved the Town of Whitchurch-Stouffville's 5 Year Energy Conservation and Demand Management Plan, as prepared by your firm in mid-June. Further, at their meeting of June 24, 2014, Town Council authorized the posting of this Plan and 2012 Summary of the Town's Energy Consumption and Greenhouse Gas Emissions on the Ministry of Energy's website, as required under Ontario Regulation 397/11 of the Green Energy Act, prior to July 1, 2014.

In order to meet the Ministry of Energy's deadline, effective immediately please post the Plan prepared by your firm and submitted to Town Council at their meeting on June 24, 2014, on the Ministry of Energy's website as per their instructions.

On behalf of the Town of Whitchurch-Stouffville thank you for your efforts in preparing this Plan, the Senior Management Team look forward to implementing this Plan over the course of the next five years.

Yours truly,

Andrew McNeely, M.C.I.P., R.P.P.
Chief Administrative Officer

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MINDSCAPE INNOVATIONS

Energy conservation and demand management plan

Energy conservation and demand management plan

Town of Whitchurch-Stouffville

This document was prepared for the Town of Whitchurch-Stouffville by IndEco Strategic Consulting Inc.

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IndEco report B4901

27 June 2014

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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 Whitchurch-Stouffville – 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.

The *Energy Conservation and Demand Management Plan* (ECDMP) provides a 5-year roadmap for energy management in the Town of Whitchurch-Stouffville. It focuses on the use of electricity and natural gas in Town facilities, as well as fuel for fleet. It covers the period from July 2014 to July 2019, and is designed to help the Town comply with the energy CDM planning requirements of Ontario *Regulation 397/11* under the *Green Energy Act (2009)*.

The ECDMP addresses buildings, technologies, and street and traffic signals – as well as people, processes, and information.

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 ECDMP will provide valuable opportunities for the Town of Whitchurch-Stouffville. 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 objectives of the Town of Whitchurch-Stouffville's *Energy Conservation and Demand Management Plan* are to achieve the following:

- Meet and exceed the requirements of Ontario *Regulation 397/11* under the *Green Energy Act (2009)*.
- Improve energy management and performance of the Town.
- Promote the efficient use of energy as part of the day-to-day activities of all Town staff through education and training.

The ECDMP establishes the following quantitative targets to guide the Town's efforts on energy management from July 2014 to July 2019:

- 7.3% improvement in energy intensity; and
- 6.9% reduction in greenhouse gas emissions.

Scope and method

The ECDMP addresses buildings, technologies, and street and traffic lights – as well as people, processes, and information. The plan draws on information from a number of sources: interviews, a strategic planning workshop, three walk-through audits of Town facilities, and a review of Town policies, plans and programs.

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 four in-person interviews and a strategic planning workshop held with key Town staff.

The second step involved defining the present state of energy use in the Town by reviewing the Town's energy management practices. 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 from three walk-through audits of Town facilities. The organizational actions, which relate to corporate processes, were identified through interviews and a strategic planning workshop. The actions are grouped in the ECDMP 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;
- **Procurement and renewables** – measures related to the procurement of energy and renewable technologies;
- **Fleets** – measures related to all Town fleet vehicles that reduce energy consumption; and
- **Streetlights and traffic signals** – measures related to installing more energy efficient lighting 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); and
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 measure type and were allocated across the five years of the plan in order to facilitate an annual net capital cost of approximately $31,000 in each year for budgeting purposes. These actions were prioritized based on their simple payback.

Organizational actions

The following tables present the recommended actions the Town should implement within the five years of the ECDMP. The first table below presents all the priority actions that should be implemented in Year 1 (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.

Year 1	
Organizational commitment	
1.	Formally adopt 5-year corporate targets for energy intensity and GHG emissions.
2.	Develop a process for updating the EMP in the interim and after 5 years, and ensure compliance with the *Green Energy Act* reporting requirements.
3.	Assign the Manager of Facilities and Parks responsibility for overseeing implementation of the ECDMP.
4.	Continue to hold semi-annual meetings with Facilities and Park staff (Manager and Supervisors) to discuss energy efficiency opportunities.
5.	Assess staff resources for managing and operating Town facilities and hire additional resources where required (e.g. HVAC technician).
6.	Investigate hiring an Embedded Energy Manager or a Roving Energy Manager from Hydro One to assist with implementing the ECDMP.
7.	Obtain an account manager with Hydro One and Enbridge Gas and set up semi-annual meetings to discuss opportunities for energy efficiency projects.
8.	Develop a process and assign Manager of Facilities and Parks responsibility for continually monitoring and applying for available incentives/grants through information obtained from meetings with utility account managers and contractors / suppliers.

9. Explore opportunities for funding capital projects using an Energy Services Company (ESCO).
Existing buildings and equipment
10. Implement workstation power management policy & server virtualization measure.
11. Implement HVAC measures.
12. Implement domestic hot water circulation pump timer.
13. Include an energy component on the existing capital projects request form to facilitate more energy efficiency projects.
14. Include technical action recommendations in existing capital projects list.
15. Review the criteria and metrics for prioritizing 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.
New buildings and equipment
16. Develop a formal commissioning policy, including retaining an independent commissioning consultant, to verify energy performance after construction. As a first step, ensure WS Museum and Community Centre is commissioned after completion.
Monitoring and tracking
17. Formalize KPIs and tracking mechanisms to monitor and report on progress towards interim and 5-year targets. Use BAS to monitor and track the actions.
18. Develop a formal process for evaluating the savings achieved from energy efficiency projects
19. Develop a process for rolling out successful energy efficiency projects.
20. Develop a demand management plan for each facility and ensure O&M staff are aware of how energy is billed in their facilities.
21. Identify an appropriate benchmarking system to monitor the energy performance of buildings (e.g. Energy Star) or join an existing benchmarking group (e.g. Ministry of Energy, Mayor's Megawatt Challenge).
Communication and engagement
22. Continue to participate in N6 meetings to share information and best practices.
23. Continue to send O&M staff to conferences, trade shows, and industry offered courses for information sharing (e.g. Ontario Recreation Facilities Association).
Streetlights and traffic signals
24. Continue to investigate opportunities for replacing and updating Town streetlights with LEDs.

The table below presents the medium-term actions that should be implemented in Years 2-3 of the ECDMP (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.

Years 2-3
Organizational commitment
25. Re-affirm commitment to targets through SMT and Council, as required.
26. Track and assess progress towards targets and Year 1 actions.
27. Include an "energy impacts" section on Council reports so that energy implications are included when staff make proposals to Council.
Existing buildings and equipment
28. Implement VFD measures.
29. Develop a plan for conducting audits on the remaining unaudited Town facilities based on the recommendations outlined in the ECDMP.
30. Develop consistent guidelines and policies for energy management to be followed at all facilities.
31. Expand and continue to implement the corporate O&M preventative maintenance program based on the current HVAC program.
32. Develop and implement a corporate re-commissioning plan focusing on facilities built within the last 5 years.
33. Add an energy component to the existing facility logs to ensure equipment is operating efficiently.
New buildings and equipment
34. Develop a best practices policy to ensure costs other than capital cost are considered when procuring energy efficient technologies.
Monitoring and tracking
35. Conduct an assessment of the metering needs of each building (e.g. interval meters, sub-meters) and ensure each building or piece or equipment is appropriately metered for each utility.
36. Select a Town-wide energy management system (EMS) to be used to track and analyze energy use at the building level.
37. Develop a high-level report card on the annual energy consumption of each Town facility to track changes in energy consumption.
38. Conduct an assessment of the energy usage information needs of O&M staff.
Communication and engagement
39. Develop a plan and format for regularly communicating about energy to staff and the community, including communicating the rationale and positive results of energy initiatives (e.g. this could be included in the Town's Annual Community Reports).
40. Implement general training on energy and energy efficiency for all O&M staff.

41. Continue to implement project specific training for staff as needed (e.g. new technology, new piece of equipment).
42. Continue to participate in N6 meetings to share information and best practices.
43. Set up quarterly site visits and meetings with managers and O&M staff from other municipalities to share information and tour facilities.
44. Continue to send O&M staff to conferences, trade shows, and industry offered courses for information sharing.
Renewable energy and procurement
45. Investigate opportunities for solar roof space rental on Town facilities.
46. Develop a process for identifying, evaluating, and developing renewable and alternative energy projects (e.g. wind, solar, geothermal). As a first step, investigate the opportunity for solar heating in the new pool expansion.

The table below presents the longer-term actions that should be implemented in Years 4-5 of the ECDMP (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.

Years 4-5
Organizational commitment
47. Re-affirm commitment to targets through and SMT and Council, as required.
48. Prepare plan update and report on the results of the plan that can be shared with staff and the community. Include a summary of results in the Annual Community Report.
49. Track and assess progress on targets and Years 2-3 actions.
50. Include energy management as a strategic priority for the Town.
51. Investigate establishing a mechanism (e.g. a revolving fund) through which savings from energy projects (e.g. solar rooftop rental) are re-invested in new energy projects.
Existing buildings and equipment
52. Implement lighting measures.
53. Continue to conduct audits on Town facilities according to the audit plan developed in Years 2-3.
54. Continue to implement the corporate O&M preventative maintenance program.
55. Continue to implement the corporate re-commissioning plan.
New buildings and equipment
56. Develop an energy efficiency building standard for all new construction and major renovations (e.g. LEED®, BOMA, etc.).
57. Develop guidelines for considering energy at all stages of new building development (e.g. budgeting, procurement, design, construction / change management).

Monitoring and tracking
58. Continue to use the EMS chosen in Years 2-3 to track and analyze energy use at the building level.
59. Conduct an assessment to ensure that energy data needs are being met, and that staff resources are adequate to manage and collect the data.
60. Develop / purchase an energy dashboard that provides O&M staff with appropriate information on energy use.
61. Develop a plan for installing energy dashboards in Town facilities that provides staff and the public with appropriate information on energy use in buildings.
Communication and engagement
62. Implement the energy communication plan developed in Years 2-3.
63. Develop and implement a corporate Town-wide energy behaviour change program for all staff.
64. Develop and implement an employee engagement process for all O&M staff.
65. Include general training on energy and energy efficiency in the training process for all new hires.
66. Continue to participate in N6 meetings to share information and best practices.
67. Continue to set up quarterly site visits and meetings with managers and O&M staff from other municipalities to share information and tour facilities.
68. Continue to send O&M staff to conferences, trade shows, and industry offered courses for information sharing.
Fleets
69. Develop guidelines to operate vehicles in the most energy efficient manner (e.g. anti-idling).
70. Include energy efficiency in the driver-training program (e.g. Shuttle Challenge).
71. Develop a formal policy for purchasing the right-sized vehicles that includes considerations other than cost (e.g. life-cycle costs, operational costs).

Introduction

The Town of Whitchurch-Stouffville *Energy conservation and demand management plan* (ECDMP) provides a roadmap for energy management in the Town of Whitchurch-Stouffville. The ECDMP 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 consumption, and minimize its environmental footprint. 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 CEMP 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 Technical actions
- Section 7 Capital costs and savings
- Section 8 Renewables and alternative energy
- Section 9 Energy management systems
- Section 10 Communication and engagement
- Section 11 Conclusion

The CEMP also has appendices that contain the following:

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

Planning horizon and scope

The ECDMP for the Town of Whitchurch-Stouffville is a 5-year plan covering the period from July 2014 to July 2019.

The ECDMP provides a roadmap for energy management at all Town facilities. As can be seen in Figure 1, it addresses the use of electricity and natural gas in Town facilities, streetlights and traffic signals, as well as fuel for fleets.

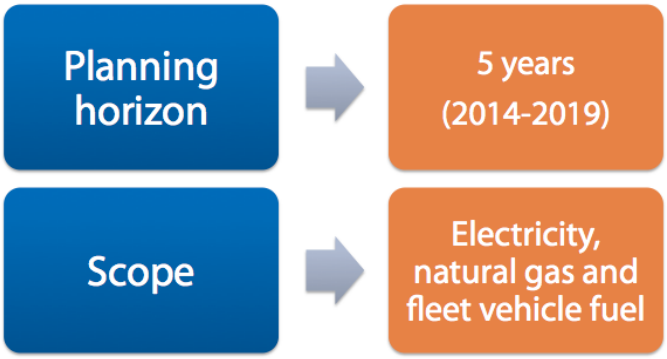

Figure 1 Planning horizon and scope

Planning process

Figure 2 depicts the major steps in the planning process that were used to develop the Town's *Energy conservation and demand management plan*. 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;
- Walk-through audits of three Town facilities;
- Interviews with Town staff (including department directors, managers, and O&M staff); and
- A strategic planning session for key Town staff.

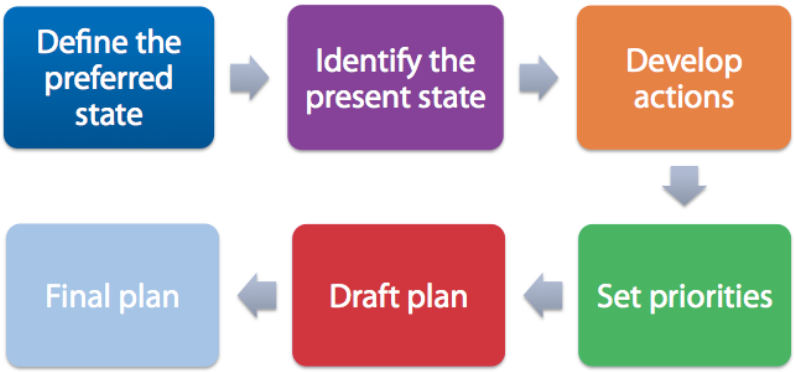

Figure 2 Overview of the planning process

Defining the preferred state involved exploring where the Town of Whitchurch-Stouffville would like to be with respect to energy management. The elements of the preferred state were identified through interviews with staff and a strategic planning session. The preferred state informed the ECDMP'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; walk-through audits of three Town facilities; and a review of

the Town's existing policies, plans, and past energy efficiency projects were among the inputs that were used to identify the present state.

Developing actions involved identifying technical measures (i.e. measures identified from the walk-through 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 walk-through audits, interviews, and the strategic planning session. 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;
- **Renewable energy and procurement** – measures related to the procurement of energy and renewable and alternative energy technologies
- **Fleets** – measures related to all Town fleet vehicles that reduce energy consumption; and
- **Streetlights and traffic signals** – measures related to installing more energy efficient lighting technologies.

Setting priorities involved determining the timeframe for implementation of each action in the ECDMP. Organizational measures were prioritized based on their importance and ease of implementation. Technological measures were prioritized based on their simple payback 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 of this report, *Updating and reporting on the plan*, the ECDMP will be reviewed annually and updated at the end of the five years.

Framework for planning

The Town's ECDMP addresses buildings, fleets, and technologies, including street and traffic signals – as well as people, processes, and information. As illustrated in Figure 3, the ECDMP centers on the Town's facilities, fleets, and technologies. It aims to ensure that existing and any new 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.

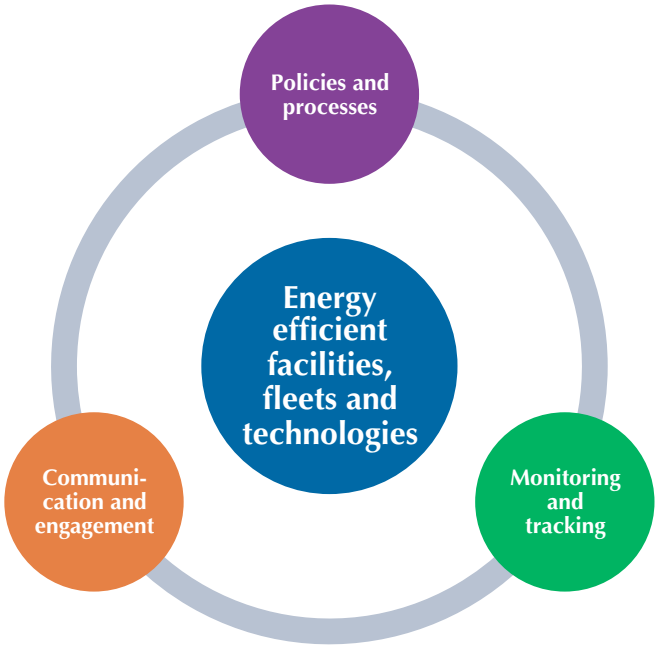

Figure 3 Framework for planning

Objectives and targets

Objectives

The primary objectives of the *Energy Conservation and Management Plan* are to achieve the following:

- Meet and exceed the requirements of Ontario *Regulation 397/11* under the *Green Energy Act (2009)*.
- Improve energy management and performance of the Town.
- Promote the efficient use of energy as part of the day-to-day activities of all Town staff through education and training.

Targets and key performance indicators

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

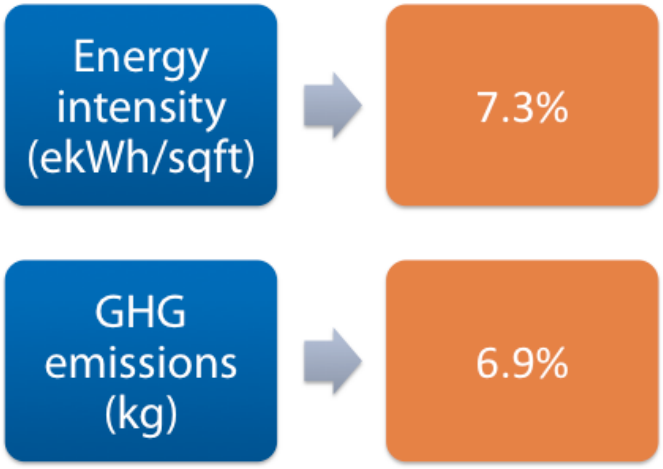

Figure 4 Energy intensity and GHG targets

The results of the Level I ASHRAE audits conducted in three of the Town's buildings suggest that a 7.3% improvement in energy intensity and a 6.9% reduction in greenhouse gas (GHG) emissions in the existing building stock is achievable. With the implementation of additional technical measures, through additional recommended audits and re-commissioning studies, as well as the energy savings associated with the behavioural changes, it anticipated that the Town will be able to exceed these targets.

The targets were calculated based on the results of the Level I ASHRAE audits of three Town facilities conducted by Mindscape Innovations. The estimated energy intensity reductions and GHG emissions savings that could be achieved by implementing the recommended measures identified in the audit reports can be found in Table 1. The targets are calculated based on implementing the measures and achieving the savings potential identified in the three facilities.

The percentage energy intensity and GHG emissions reductions for these three facilities was deducted from the total energy consumption and GHG emissions for all of the Town's facilities from the last reported levels (2011) to determine the overall targets. All buildings that the Town reported for under the Ontario Green Energy Act *Regulation 397/11* reporting requirements were included in the calculations. Refer to Appendix A, Table 8 for a complete list of buildings.

Table 1 Estimated energy intensity reductions and GHG emissions savings from measures identified in the Level I ASHRAE audits

Facility	Energy intensity reductions	GHG emissions reductions
Municipal Offices	16%	18%
Leisure Centre	15%	15%
Stouffville Arena	18%	16%

Updating and reporting on the plan

The *Energy conservation and demand management plan* should be reviewed at least once a year. As part of the annual review, the Manager of Facilities and Parks assigned to oversee the implementation of the ECDMP (see Action 3, Table 2) should complete the following steps:

- Track the activities that have been implemented, based on a checklist of all of the actions included in the ECDMP;
- Track quantitative progress towards targets, using the KPIs described in this plan;
- Note any updates to the ECDMP, 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 ECDMP, and priority actions for the upcoming year; and
- In 2019, report on implementation of the ECDMP 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.

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

In the first year of the ECDMP (July 2014 – July 2015), the Town should implement the high-priority organizational actions presented in Table 2. 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. The technical actions to be implemented in this time period can be found in the Technical actions section.

Organizational actions

Table 2 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.	1. Formally adopt 5-year corporate targets for energy intensity and GHG emissions. (See Objectives and targets section for specific objectives and targets).	Targets adopted (y/n) Interim targets adopted (y/n)
The Town's energy management activities are guided by an up-to-date Energy Plan.	2. Develop a process for updating the ECDMP in the interim and after 5 years, and ensure compliance with the *Green Energy Act* reporting requirements.	Updating process developed (y/n)
Dedicated staff are available to implement the energy plan.	3. Assign the Manager of Facilities and Parks responsibility for overseeing implementation of the ECDMP. 4. Continue to hold semi-annual meetings with Facilities and Park staff (Manager and Supervisors) to discuss energy efficiency opportunities.	Staff assigned to overseeing and implementing the ECDMP (y/n) Number of meetings held

Preferred state of energy management	Priority actions	Metric / KPI
The Town has appropriate resources to effectively manage and operate facilities in an energy efficient manner.	5. Assess staff resources for managing and operating Town facilities and hire additional resources where required (e.g. HVAC technician). 6. Investigate hiring an Embedded Energy Manager or a Roving Energy Manager from Hydro One to assist with implementing the ECDMP. (See Appendix C for details).	Staff resources assessed (y/n) Embedded Energy Manager investigated (y/n) Number of staff hired
The Town has an excellent working relationship with Hydro One and Enbridge Gas.	7. Obtain an account manager with Hydro One and Enbridge Gas and set up semi-annual meetings to discuss opportunities for energy efficiency projects.	Account manager obtained (y/n) Number of meetings Number of projects developed
The Town takes advantage of available incentives from utility companies.	8. Develop a process and assign Manager of Facilities and Parks responsibility for continually monitoring and applying for available incentives/grants through information obtained from meetings with utility account managers and contractors / suppliers.	Process developed (y/n) Responsibility assigned (y/n) Number of incentive applications submitted Monetary value ($) of incentives obtained
The Town has cost effective and practical means of funding energy efficiency projects.	9. Explore opportunities for funding capital projects using an Energy Services Company (ESCO).	Number of projects funded using the ESCO model

Preferred state of energy management	Priority actions	Metric / KPI
Existing buildings and equipment		
The Town strategically implements all cost effective energy efficiency projects in existing buildings.	Implement all technical priority actions: 10. Workstation power management policy & server virtualization 11. HVAC measures 12. Domestic hot water circulation pump timer (See Technical actions section for further details).	Retrofit projects implemented (y/n) ekWh and m^3 saved Money ($) saved on energy bills
Energy efficiency projects are considered and their implementation is coordinated with capital projects.	13. Include an energy component on the existing capital projects request form to facilitate more energy efficiency projects.	Energy component included (y/n) Number of energy efficiency projects approved (y/n)
Cost effective technical actions identified from building condition assessment reports are prioritized and implemented.	14. Include technical action recommendations in existing capital projects list.	Energy recommendations included in list (y/n) Number of recommendations implemented
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.	15. Review the criteria and metrics for prioritizing 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 for details on criteria for prioritizing actions).	Criteria and metrics reviewed (y/n)

Preferred state of energy management	Priority actions	Metric / KPI
New buildings and equipment		
Energy performance of new buildings, major renovations, and additions to buildings are always verified after construction.	16. Develop a formal commissioning policy, including retaining an independent commissioning consultant, to verify energy performance after construction. As a first step, ensure WS Museum and Community Centre is commissioned after completion.	Policy developed (y/n) WS Museum and Community Centre commissioned (y/n)
Monitoring and tracking		
The Town uses KPIs to track progress towards targets.	17. Formalize KPIs and tracking mechanisms to monitor and report on progress towards interim and 5-year targets. Use BAS to monitor and track the actions.	KPIs formalized (y/n) Tracking mechanisms formalized (y/n)
Project evaluation, monitoring and verification (EM&V) is simple and accurate thanks to energy data and monitoring processes.	18. Develop a formal process for evaluating the savings achieved from energy efficiency projects. 19. Develop a process for rolling out successful energy efficiency projects.	Evaluation process developed (y/n) Process for rolling out energy projects developed (y/n)
Energy demand is effectively managed in all facilities.	20. Develop a demand management plan for each facility and ensure O&M staff are aware of how energy is billed in their facilities.	Number of plans developed
The Town understands how all buildings are performing, relative to other comparable buildings.	21. Identify an appropriate benchmarking system to monitor the energy performance of buildings (e.g. Energy Star) or join an existing benchmarking group (e.g. Ministry of Energy, Mayor's Megawatt Challenge).	Benchmarking system identified (y/n) Benchmarking system utilized (y/n)

Preferred state of energy management	Priority actions	Metric / KPI
Communication and engagement		
The Town's O&M staff are aware of best practices in energy management and energy efficiency.	22. Continue to participate in N6 meetings to share information and best practices. 23. Continue to send O&M staff to conferences, trade shows, and industry offered courses for information sharing (e.g. Ontario Recreation Facilities Association).	Number of N6 meetings attended Number of staff attending conferences
Streetlights and traffic signals		
All Town streetlights are LED and energy savings are evaluated.	24. Continue to investigate opportunities for replacing and updating Town streetlights with LEDs.	ekWh saved Money ($) saved on electricity bills Report card developed

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

In Years 2 and 3 of the ECDMP (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 3 below. The technical actions to be implemented in this time period can be found in the Technical actions section.

Organizational actions

Table 3 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.	25. Re-affirm commitment to targets through SMT and Council, as required.	Targets re-affirmed (y/n)
The Town tracks progress towards targets.	26. Track and assess progress towards 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 relevant policy and planning activities.	27. Include an "energy impacts" section on Council reports so that energy implications are included when staff make proposals to Council.	Energy impacts section included on Council reports (y/n)
Existing buildings and equipment		
The Town strategically implements all cost effective energy efficiency projects in existing buildings.	Implement all technical medium-term actions: 28. VFD measures (See Technical actions section for further details).	Retrofit projects implemented (y/n) ekWh and m^3 saved $ saved on energy bills

Preferred state of energy management	Medium-term actions	Metric / KPI
All buildings operate in an energy efficient manner.	29. Develop a plan for conducting audits on the remaining unaudited Town facilities based on the recommendations outlined in the ECDMP. (See the Technical actions section for details). 30. Develop consistent guidelines and policies for energy management to be followed at all facilities. 31. Expand and continue to implement the corporate O&M preventative maintenance program based on the current HVAC program. 32. Develop and implement a corporate re-commissioning plan focusing on facilities built within the last 5 years. 33. Add an energy component to the existing facility logs to ensure equipment is operating efficiently.	Auditing plan developed (y/n) Number of facilities audited Guidelines and policies for energy management developed (y/n) O&M preventative maintenance program formalized (y/n) Re-commissioning plan developed (y/n) Energy component added to logs (y/n)
New buildings and equipment		
Strong, formal processes exist to ensure that all new equipment is highly energy efficient and appropriately sized.	34. Develop a best practices policy to ensure costs other than capital cost are considered when procuring energy efficient technologies.	Best practices policy developed (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).	35. Conduct an assessment of the metering needs of each building (e.g. interval meters, sub-meters) and ensure each building or piece or equipment is appropriately metered for each utility. 36. Select a Town-wide energy management system (EMS) to be used to track and analyze energy use at the building level. (See Energy management systems section for details).	Assessment of metering needs conducted (y/n) Number of new meters identified EMS selected (y/n)
The Town understands how all buildings are performing, relative to other comparable buildings.	37. Develop a high-level report card on the annual energy consumption of each Town facility to track changes in energy consumption.	High-level report card developed (y/n)
Staff have easy and up-to-date access to energy data for each facility.	38. Conduct an assessment of the energy usage information needs of O&M staff.	Assessment of energy usage needs conducted (y/n)
Communication and engagement		
Energy and energy efficiency is effectively communicated across the corporation.	39. Develop a plan and format for regularly communicating about energy to staff and the community, including communicating the rationale and positive results of energy initiatives (e.g. this could be included in the Town's Annual Community Reports). (See Communication and engagement section for details).	Plan and format developed (y/n) Number of successful initiatives communicated to staff

Preferred state of energy management	Medium-term actions	Metric / KPI
Appropriate O&M / building staff are trained and understand energy saving opportunities.	40. Implement general training on energy and energy efficiency for all O&M staff. (See Communication and engagement section for details).	Training investigated / developed (y/n) Number of staff trained
All relevant staff receive appropriate training on the use of new energy efficiency technologies and equipment.	41. Continue to implement project specific training for staff as needed (e.g. new technology, new piece of equipment).	Number of staff trained
The Town's O&M staff work together with other municipalities and public agencies to share technologies and best practices.	42. Continue to participate in N6 meetings to share information and best practices. 43. Set up quarterly site visits and meetings with managers and O&M staff from other municipalities to share information and tour facilities. 44. Continue to send O&M staff to conferences, trade shows, and industry offered courses for information sharing.	Number of N6 meetings attended Number of site visits set Number of staff attending site visits Number of staff attending conferences
Renewable energy and procurement		
The Town is pursuing net-zero energy use.	45. Investigate opportunities for solar roof space rental on Town facilities.	Solar roof space rental investigated (y/n)
The Town has a clear process to guide renewable energy development. This process leads to visible and cost-effective renewable energy projects.	46. Develop a process for identifying, evaluating, and developing renewable and alternative energy projects (e.g. wind, solar, geothermal). As a first step, investigate the opportunity for solar heating in the new pool expansion.	Process developed (y/n) Number of renewable energy projects identified

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

In Years 4 through 5 of the ECDMP (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 4. The technical actions to be implemented in this time period can be found in the Technical actions section.

Organizational actions

Table 4 Preferred state, longer-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.	47. Re-affirm commitment to targets through SMT and Council, as required. 48. Prepare plan update and report on the results of the plan that can be shared with staff and the community. Include a summary of results in the Annual Community Report.	Targets re-affirmed (y/n) Plan update prepared (y/n) Report prepared (y/n)
The Town tracks progress towards targets.	49. Track and assess progress on targets and Years 2-3 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 relevant policy and planning activities.	50. Include energy management as a strategic priority for the Town.	Energy management included as a strategic priority (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.	51. Investigate establishing a mechanism (e.g. a revolving fund) through which savings from energy projects (e.g. solar rooftop rental) are re-invested in new energy projects.	Revolving fund investigated (y/n)

Preferred state of energy management	Long-term actions	Metric / KPI
Existing buildings and equipment		
The Town strategically implements all cost effective energy efficiency projects in existing buildings.	Implement all technical long-term actions: 52. Lighting measures (See Technical actions section for further details).	Retrofit projects implemented (y/n) ekWh and m^3 saved $ saved on energy bills
All buildings operate in an energy efficient manner.	53. Continue to conduct audits on Town facilities according to the audit plan developed in Years 2-3. 54. Continue to implement the corporate O&M preventative maintenance program. 55. Continue to implement the corporate re-commissioning plan.	Number of audits conducted Preventative maintenance program implemented (y/n) Re-commissioning plan implemented (y/n)
New buildings and equipment		
The Town has specific energy and efficiency standards for new buildings that considers future operational costs.	56. Develop an energy efficiency building standard for all new construction and major renovations (e.g. LEED®, BOMA, etc.).	Energy efficiency building standard developed (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.	57. Develop guidelines for considering energy at all stages of new building development (e.g. budgeting, procurement, design, construction / change management).	Guidelines developed (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).	58. Continue to use the EMS chosen in Years 2-3 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.	59. 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)

Preferred state of energy management	Long-term actions	Metric / KPI
Staff have easy and up-to-date access to energy data for each facility.	60. Develop / purchase an energy dashboard that provides O&M staff with appropriate information on energy use[1].	Energy dashboard chosen (y/n)
The public is aware of energy usage in Town facilities.	61. Develop a plan for installing energy dashboards in Town facilities that provides staff and the public with appropriate information on energy use in buildings.	Plan developed (y/n)
Communication and engagement		
Energy and energy efficiency is effectively communicated across the corporation.	62. Implement the energy communication plan developed in Years 2-3. (See Communication and engagement section for details).	Standardized communication tools deployed (y/n) Changes in attitudes and behaviours
All staff are aware of energy conservation and the actions they can take to save energy within the Town facilities.	63. Develop and implement a corporate Town-wide energy behaviour change program for all staff. (See Communication and engagement section for details).	Behaviour change program developed (y/n) Changes in attitudes and behaviours
Staff have the tools and training to identify energy management opportunities and are actively engaged in submitting ideas.	64. Develop and implement an employee engagement process for all O&M staff. (See Communication and engagement section for details). 65. Include general training on energy and energy efficiency in the training process for all new hires. (See Communication and engagement section for details).	Employee engagement process developed (y/n) Changes in attitudes and behaviours General training included in existing training for all new hires (y/n)

[1] Energy dashboards are used to display energy consumption information in a clear and visually appealing manner. Dashboards are particularly helpful for O&M staff to help them improve operations of facilities and equipment. Dashboards can also be used to provide basic information to the public to increase awareness about the amount of energy facilities consume. As an example, see the online energy dashboard for Western University's facilities: http://energy.uwo.ca**.** Dashboards can be included as part of an Energy Management System. See the Energy management systems section for details.

Preferred state of energy management	Long-term actions	Metric / KPI
The Town's O&M staff work together with other municipalities and public agencies to share technologies and best practices.	66. Continue to participate in N6 meetings to share information and best practices. 67. Continue to set up quarterly site visits and meetings with managers and O&M staff from other municipalities to share information and tour facilities. 68. Continue to send O&M staff to conferences, trade shows, and industry offered courses for information sharing.	Number of N6 meetings attended Number of site visits set Number of staff attending site visits Number of staff attending conferences
Fleets		
All fleet vehicles are operated in the most energy efficient manner while meeting the needs of their intended use.	69. Develop guidelines to operate vehicles in the most energy efficient manner (e.g. anti-idling). 70. Include energy efficiency in the driver-training program (e.g. Shuttle Challenge)[2]. (See Communication and engagement section for details). 71. Develop a formal policy for purchasing the right-sized vehicles that includes considerations other than cost (e.g. life-cycle costs, operational costs).	Guidelines developed (y/n) Number of drivers trained Reduction in annual fuel consumption per vehicle-km Policy for purchasing right-sized vehicles developed (y/n)

[2] For more information on the Shuttle Challenge, refer to: http://www.shuttlechallenge.ca

Technical actions

The technical actions for each phase of the plan are listed in Table 5, below. The technical actions were prioritized based on simple payback. The actions have been grouped together by type in order to facilitate the Town issuing a single tender for similar measures in all applicable buildings.

The capital costs and energy cost savings presented below have been amalgamated from the three Level I ASHRAE audits conducted by Mindscape Innovations. Detailed information on each technical action can be found in the accompanying audit report for each of the facilities.

The capital cost, energy cost savings, and payback numbers are estimates based on industry average data, research and analysis; they may not match actual costs and savings. Some capital costs were updated to reflect costing data provided by the Town.

Table 5 Technical actions for each phase of the plan

Measures	Buildings	Estimated cost	Estimated annual savings	Simple payback	Cumulative lifetime savings[1]
		Year 1			
52. Workstation power management policy & server virtualization	Municipal Offices	$0	$1,037	0.0	$20,732
53. HVAC measures		$23,012	$9,063	2.5	$107,719
Replace personal space heaters with panel heaters	Municipal Offices	$1,000	$730	1.4	$14,593
Free cooling for server room	Municipal Offices	$10,000	$648	15.4	$12,958
CO_2 sensored controllers for makeup air on RTUs	Municipal Offices	$4,812	$3,310	1.5	$26,482
CO_2 testing and adjustment of fresh-air makeup	Leisure Centre	$6,000	$2,818	2.1	$22,545
Reduce summer gas consumption	Stouffville Arena	$1,200	$1,557	0.8	$31,140
54. Domestic hot water circulation pump timer	Stouffville Arena	$300	$199	1.5	$3,980
Year 1 totals		**$23,312**	**$10,299**	**2.3**	**$132,431**

Measures	Buildings	Estimated cost	Estimated annual savings	Simple payback	Cumulative lifetime savings[1]
Years 2-3					
28. VFD measures		$29,792	$52,878	0.6	$370,146
VFD on Leisure Pool filter pump[3]	Leisure Centre	$5,500	$9,587	0.6	$67,111
VFD controller - brine pumps	Stouffville Arena	$13,000	$40,744	0.3	$285,210
VFD controller - condenser fan	Stouffville Arena	$11,292	$2,547	4.4	$17,826
Years 2-3 totals		**$29,792**	**$52,878**	**0.6**	**$370,146**
Years 4-5					
52. Lighting measures		$31,165	$8,157	3.8	$78,404
Daylighting controllers in Finance	Municipal Offices	$750	$1,280	0.6	$10,240
Motion sensors for washroom lights	Municipal Offices	$609	$305	2.0	$2,438
Pool lighting retrofit	Leisure Centre	$22,806	$3,583	6.4	$35,833
Foyer lighting retrofit	Leisure Centre	$7,000	$2,989	2.3	$29,893
Years 4-5 totals		**$31,165**	**$8,157**	**3.8**	**$78,404**
Grand totals		**$84,269**	**$71,334**	**1.0**	**$580,981**

[1]NOTES: The cumulative energy cost savings are based on current energy prices and do not reflect estimated price increases. The energy cost savings are calculated for the lifetimes of the measures. The lifetimes of some measures extend beyond 20 years, but calculations were limited to the cumulative savings over 20 years from the date of implementation.

To identify additional technical actions in the medium term (Years 2 – 3), the Town should develop a plan for conducting ASHRAE Level II audits on their remaining unaudited facilities. These audits should be conducted according to the schedule developed in the auditing plan (Action 29). It is recommended that the oldest buildings and/or those with the highest consumption should be audited first. Technical measures identified through these audits should be implemented in priority sequence based on the savings potential of each measure. For additional information on how to prioritize these energy conservation actions, please see Appendix B Criteria for prioritizing actions.

[3] Installation of VFDs on the pool filter pump is contingent upon the Ontario Health regulations on filter rates.

Additional technical actions will also be identified through the development and implementation of the re-commissioning plan (Action 32).

Capital costs and savings

This section summarizes the estimated capital costs and savings associated with implementing all of the technical actions recommended for the three audited buildings. The measures are listed in Table 5, and include: computer energy efficiency technologies, VFDs, lighting upgrades, HVAC upgrades, and hot water heating efficiency technologies. 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 $17,000 in each year for budgeting purposes.

Table 6 shows the breakdown of net capital costs and annual energy savings of the technical measures over the five years of the plan. This shows that the Town will realize a total of approximately $249,000 in cumulative energy savings by investing an average of roughly $17,000 each year over the next five years, for a total of roughly $84,000. The five-year implementation plan was designed to accomplish those measures with the shortest payback first, while overall maintaining a balanced yearly budget. In this way, the Town can make the most of the energy cost savings in the early actions, even using these savings to help fund the later measures.

The costs listed in Table 6 below only include the capital 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, and sending staff to conferences. The cost values also do not take into account complexities, such as: the salvage value of equipment being replaced, changes in operating costs, or rising energy costs. As well, the reduced capital costs and energy savings associated with bundling measures have not been factored in. Other costs associated with organizational actions will be mainly in the form of staff time (e.g. full-time equivalents (FTEs)). Additional operating budget costs will also be required to implement the technical measures, primarily in the form of staff time.

Table 6 Net capital costs and cumulative energy savings for all technical actions over the five years of the plan

Year	Capital cost, including incentives	Cumulative energy cost savings[1]
Year 1	$23,312	$10,299
Year 2	$14,896.04	$36,737.60
Year 3	$14,896.04	$63,176.64
Year 4	$15,582.31	$67,255.31

Year	Capital cost, including incentives	Cumulative energy cost savings[1]
Year 5	$15,582.31	$71,333.99
Total	**$84,269**	**$248,802**

[1]NOTES: The cumulative energy cost savings are based on current energy prices and do not reflect estimated price increases. The energy cost savings are also expected to persist for the lifetimes of the measures.

Over the lifetimes of the measures, the estimated cumulative energy cost savings add up to $580,981. The lifetimes of some measures extend beyond 20 years, but calculations were limited to the cumulative savings over 20 years from the date of implementation. This works out to an estimated savings of $6.89 on average for each dollar spend on energy efficiency measures. This does not take into account expected price increases for utilities.

Renewables and alternative energy

The Town of Whitchurch-Stouffville does not have any renewable or alternative sources of energy at the present time.

Actions described in the ECDMP that relate to renewable and alternative energy are listed below in Table 7.

Table 7 Actions related to renewable and alternative energy

Action number	Action description
45	Investigate opportunities for solar roof space rental on Town facilities.
46	Develop a process for identifying, evaluating, and developing renewable and alternative energy projects (e.g. wind, solar, geothermal). As a first step, investigate the opportunity for solar heating in the new pool expansion.

Energy management systems

As a medium-term action (Action 36, 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. There are 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 a high level 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.

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)
- Internet based
- "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, though 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 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.

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 Years 2 and 3, the Town can develop the terms of reference and functional requirements for the EMS. The Town can then select and implement the preferred EMS.

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 may 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 staff responsible for operating and maintaining buildings? What analysis / statistical techniques are needed to transform the data into the information desired?
- What format can best convey this information to staff responsible for operating and maintaining buildings? How will the outputs be made available to staff (paper copy, e-mail reporting, web-based reporting)? How often should staff responsible for operating and maintaining buildings 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 EMS, 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 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 staff responsible for operating and maintaining buildings 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 Years 4 to 5, the Town should determine if they have sufficient staff resources to collect and manage energy data, and then develop a plan for the analysis and use of the energy data including the desired outputs and reports. It is recommended that the Manager of Facilities and Parks take responsibility for managing and overseeing the EMS.

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.

Taking advantage of utility incentives

As part of the Fixed Retrofit and Custom Retrofit Incentives program, Enbridge Gas will fund the installation of an energy management system up to $100,000, not exceeding 50% of the project's capital cost (before tax).

Hydro One 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 Enbridge Gas and Hydro One see Appendix C.

Communication and engagement

This section complements and expands on the high level communication and engagement actions identified in the Organizational actions table.

Overview and program management

The communication and engagement section will focus on three areas:

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

Each area is expanded upon in more detail below.

Employee engagement

In Years 4 and 5 of the ECDMP, the Town should develop a pilot employee engagement program that encourages all O&M staff to identify energy efficiency opportunities across the Town facilities (Action 64). Based on the success of this program, the Town can roll out the program to all staff.

The program would establish a formal process for all O&M staff to submit ideas based on their daily activities in Town facilities, and staff would receive recognition for their ideas. For example, 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 would encourage them to identify additional opportunities and submit additional ideas. Ideas from the employee engagement program would be reviewed and implemented wherever possible, along with reporting 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 for review. 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.

Based on the success of the pilot, the program can be implemented more broadly across all staff at the Town.

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 Facilities staff responsible for operating and maintaining buildings to share their ideas and knowledge.

Staff training

This section provides further information on four types of training identified as actions in the Organizational actions section.

- General training on energy efficiency for all O&M staff (Action 40);
- Project specific training for Facilities staff, as needed (e.g. new technology, new piece of equipment, etc.) (Action 41);
- General energy efficiency training for all new hires (Action 64); and
- Energy efficiency training for fleet drivers (Action 70).

Facilities 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 developed and 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);
- 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 building policies, 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 an internal certificate upon completion of the training, recognizing that they have gained important knowledge and skills.

The Town should provide general 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.

More specific training on energy management and energy efficiency should be provided to all O&M staff responsible for operating and maintaining specific buildings. This training would be catered toward specific features of the operator's building, allowing the operator to manage energy more effectively within individual buildings.

Additionally, project specific training on energy should be provided to operators, as needed, when new equipment or a new piece of technology is installed. This includes any updates to the building and its systems.

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).

New hires

Training for energy management should be built into the existing training and orientation process for all new hires. General training on energy efficiency should be provided for all new staff (see Action 64) while more specific training on energy efficiency should be provided to new staff that will be operating and maintaining buildings. Training could be more or less formal, as appropriate given current training and orientation practices.

Fleet driver training

All staff that drive Town vehicles should be trained to operate 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. Energy efficiency training could be incorporated into an existing training program, or could be provided as a half-day or full-day workshop or as an online course with different modules. The driver-training program should be implemented in Years 4 and 5 of the ECDMP.

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

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[4]. 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.

Behaviour change and communication

Communicating about the ECDMP 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 may also lead to up to five percent in energy intensity savings. A behaviour change program and communication strategy should be developed with an initial focus on O&M staff. This strategy should involve a combination of tools and initiatives to communicate and engage the staff. These could include:

[4] For more information on the Shuttle Challenge, refer to: http://www.shuttlechallenge.ca

- 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.
- Developing an energy brand (e.g. logo) to promote awareness of energy initiatives. The branding could easily be used to communicate about other related initiatives such 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.
- Implementing a friendly competition between departments focusing on energy efficiency and energy reduction.

Progress on the ECDMP should also be communicated to the community so they are aware of the energy initiatives being undertaken by the corporation. The Town of Whitchurch-Stouffville has an energy conservation website that includes basis information for how residents can conserve energy at home or work. The Town should expand upon this website and include updates on the ECDMP and progress on corporate energy efficiency initiatives. Additionally, the Town should include updates on energy efficiency projects and progress on the ECDMP actions in the Town's Annual Community Report.

Conclusion

There are significant opportunities for the Town of Whitchurch-Stouffville to improve the energy efficiency of its buildings, to reduce utility costs, and to minimize its environmental footprint. From 2014 to 2019, the Town will work to reduce its energy intensity by 7.3% and to reduce GHG emissions by 6.9%.

The Town of Whitchurch-Stouffville can take advantage of these opportunities by implementing the organizational and technological actions of the *Energy Conservation and Demand Management Plan*, including:

- Assigning appropriate staff resources, including assigning the Manager of Facilities and Parks to oversee the plan and implement the actions recommended in the ECDMP;
- Developing an energy strategy that is communicated to all Town staff;
- Implementing identified technical measures and conducting energy audits on buildings with the greatest energy savings potential to discover further opportunities;
- Developing a rigorous and effective monitoring and tracking system through an EMS and supporting organizational capacity;
- Implementing the education, communication, engagement and training initiatives for staff; and
- Developing organizational policies and processes for implementing the ECDMP, tracking progress, and updating the ECDMP.

The Town of Whitchurch-Stouffville has the motivation and expertise to implement all of the actions in the ECDMP. 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. This commitment will help the Town of Whitchurch-Stouffville to manage energy efficiently and ensure it is part of the day-to-day activities of Town staff.

Appendix A. Present state

This section provides an overview of the present state of energy use in the Town of Whitchurch-Stouffville facilities, including the Town's 2012 utility energy data, and a description of existing policies and plans.

A.1. Utility data analysis

Table 8 shows the energy consumption and greenhouse gas emissions reporting template for 2012 for the Town of Whitchurch-Stouffville, including the utility data, GHG emissions, and energy intensity for the Town of Whitchurch-Stouffville buildings that are required to be reported to the Ministry of Energy under *Regulation 397/11* of the Green Energy Act.

Table 8 Energy consumption and greenhouse gas emissions reporting template for 2012 for the Town of Whitchurch-Stouffville

	Energy Consumption and Greenhouse Gas Emissions Reporting - for 2012									
12-mth period (mth-yr to mth-yr)	Jan-2012 to Dec-2012									
					Energy Type and Amount Purchased and Consumed in Natural Units				Total (calculated in webform)	
					Electricity	Natural Gas	Fuel Oil 1 & 2	Propane		
Operation Name	Operation Type	Address	Total Floor Area (ft^2)	Avg hrs/ wk	Quantity (kWh)	Quantity (m^3)	Quantity (L)	Quantity (L)	GHG Emissions (Kg)	Energy Intensity ($ekWh/ft^2$)
Town of Whitchurch-Stouffville Municipal Offices	Administrative offices and related facilities, including municipal council chambers	111 Sandiford Drive	59000	50	763919	59074	0	0	185053.68	23.588886
Ballantrae Community Centre	Community centres	5592 Aurora Sideroad	7200	35	76658	13352	0	0	32605.886	30.355566
Lemonville Community Centre	Community centres	13453 McCowan Road	5036	35	8914	0	4843	0	14102.461	12.134784
Former Library	Community centres	6240 Main Street	8100	50	77448	11938	0	0	30008.411	25.224988
Train Station	Administrative offices and related facilities, including municipal council chambers	6176 Main Street	2150	70	27058	2696	0	0	7695.7807	25.911854
Latcham Hall	Community centres	8 Park Drive South	5750	35	11401	3774	0	0	8230.1783	8.9583009
Silver Jubilee	Community centres	6297 Main Street	6350	35	19551	9691	0	0	20199.744	19.298392
Lebovic Centre for the Arts & Entertainment, Nineteen on the Park	Performing arts facilities	19 Civic Avenue	6700	40	122814	19204	0	0	48102.657	48.792512
Whitchurch-Stouffville Leisure Centre	Indoor swimming pools	30 Burkeholder Street	39000	95	1237131	118292	0	0	342460.11	63.956718
Stouffville Arena	Indoor ice rinks	12483 Ninth Line	79000	90	1251786	139577	0	0	384109.57	34.622522
Stouffville Clippers Sports Complex	Indoor ice rinks	120 Weldon Road	76534	90	2325344	71966	0	0	359386.9	40.376599
Whitchurch-Stouffville Operations Centre	Administrative offices and related facilities, including municipal council chambers	5061 Bethesda Road	45172	40	415837	63036	0	0	159114.55	24.03634
Bethesda Sports Field & Fieldhouse	Administrative offices and related facilities, including municipal council chambers	6323 Bethesda Road	3300	15	131393	0	0	0	12618.984	39.816061

Operation Name	Operation Type	Address	Total Floor Area (ft^2)	Avg hrs/ wk	Energy Type and Amount Purchased and Consumed in Natural Units				Total (calculated in webform)	
					Electricity	Natural Gas	Fuel Oil 1 & 2	Propane	GHG Emissions (Kg)	Energy Intensity ($ekWh/ft^2$)
					Quantity (kWh)	Quantity (m^3)	Quantity (L)	Quantity (L)		
Bethseda Parks Shop / Storage Building	Storage facilities where equipment or vehicles are maintained, repaired or stored	6301 Bethesda Road	7000	15	11877	0	0	5870	10186.243	7.5923368
Parks Depot	Administrative offices and related facilities, including municipal council chambers	4 Park Drive South	3000	168	7296	6473	0	0	12938.736	25.3632
Stouffville Fire Station 51	Fire stations and associated offices and facilities	100 Weldon Road	18730	84	189355	28558	0	0	72178.18	26.314098
Ballantrae Fire Station 52	Fire stations and associated offices and facilities	15400 Highway 48	12400	15	140900	16975	0	0	45625.429	25.911816
Whitchurch-Stouffville Museum and Community Centre	Community centres	14732 Woodbine Avenue	9118	10	141253	16975	0	0	45659.331	35.27742
Museum Vandorf Public School	Cultural facilities	14732 Woodbine Avenue	3200	10	20179	2371	0	0	6420.6678	14.180456
Museum Brown House	Cultural facilities	14732 Woodbine Avenue	2800	10	20179	2371	0	0	6420.6678	16.206235
Museum Bogartown School House	Cultural facilities	14732 Woodbine Avenue	2800	10	20179	2371	0	0	6420.6678	16.206235

A.2. Description of existing energy initiatives, policies, and plans

For the Town of Whitchurch-Stouffville, energy is an important focus. Well before undertaking the Energy Conservation and Demand Management Plan, the Town has been actively implementing and exploring energy conservation and sustainability opportunities. In addition, several Town plans and strategies support energy conservation and GHG emissions reduction. Most of these plans focus on the community, however, they demonstrate the Town's commitment to energy efficiency and the environment. These plans and strategies are briefly described in more detail below.

Corporate Strategic Plan 2011 – 2014

The Corporate Strategic Plan provides a decision-making framework to guide Council and staff in priority setting, developing work plans, and assigning budgets. The plan outlines four priorities and 23 goals for the Town to address within the four-year timeframe. Goals that relate to the actions recommended in the ECDMP include:

- Balance land use planning – environment, economic and social considerations;
- Orderly/phased development;
- Sustainable long term fiscal plan for all infrastructure and buildings;
- Explore partnerships to deliver new infrastructure/services;

- Foster a strategically aligned and engaged workforce, where people are challenged, recognized and valued; and
- Master planning for municipal operations.

Office Consolidation of the Town of Whitchurch-Stouffville Official Plan

The consolidation of the Town's Official Plan includes the Primary Plan (comprised of policies related to rural and agricultural area), and the Secondary Plan, which consists of policies for the main communities within the Town. The Consolidated Plan demonstrates the Town's commitment to energy conservation by including policies that encompass energy under the Sustainable Development section. These policies are listed below:

Section 12.5.6: "Any change in the Community of Stouffville should be undertaken in a manner which is sustainable and which will preserve and enhance the integrity of the natural environment of the community. In particular, the Town will encourage development designed to:

a) Create livable, healthy and efficient environments;

b) Reduce the consumption of energy, land and other non-renewable resources including support for energy efficient building and opportunities for co-generation;

c) Minimize the waste of materials, water and other limited resources[5]; and

d) Employ ecological practices and consider the needs of future generations.

To achieve this, the Town specifically will promote:

a) A development pattern that encourages and supports transit usage;

b) A development pattern that is adaptable over time for future generations and promotes redevelopment of land and repurposing of buildings;

c) A land use and development pattern which establishes good connectivity and mobility in the area for automobiles, cyclists and pedestrians;

d) Development which enhances the health and vibrancy of the existing and future community through a mix of housing and other uses which contributes to the development of Stouffville as a complete community; and,

e) Development standards that promote energy efficiency, environmental quality and the efficient management of energy and waste in the community within over-all Town standards and objectives."

[5] Contingent upon Ontario Health regulations

Section 12.5.6.2 requires that:

"To ensure that major, new development carried out in conformity with this Plan is as sustainable as feasible; such development shall be evaluated with respect to the Community of Stouffville Sustainable Development Guidelines. A Sustainability Report shall be submitted with development proposals to demonstrate how they are consistent with the Guidelines."

Community of Stouffville Sustainable Development Guidelines

The Community of Stouffville 2012 Sustainable Development Guidelines are used by the Town as a tool for assessing the sustainable features of development applications. Minimum standards must be achieved in order for applications to considered, and a checklist is provided that itemizes the various types of design features that will be considered in the evaluation process. The features are organized under three categories:

1. Community design – efficient development and infrastructure design, healthy community design, employment generation/economic enhancement and open space enhancement;
2. Buildings – enhanced design features, development standards; and
3. Energy and water – energy efficient design, water and waste water reduction.

The Guidelines are currently under review and will be updated in 2014.

Annual Community Report

The Town publishes an annual report for the community that showcases major achievements and initiatives that have been accomplished throughout the year. The reports include information on building renovations and infrastructure development, branding, plans and policy updates, as well as financial decisions, opportunities for local businesses, and partnerships with neighbouring municipalities. A general update on progress made toward the actions in the ECDMP could be included in these annual community reports.

Other initiatives

Other energy-related initiatives that have been implemented within the Town include:

- Installing a BAS in the new 6,000 square foot Whitchurch-Stouffville Leisure Centre, along with energy efficient heat pumps and exchange pipes;
- Currently in the process of developing a plan to convert all streetlights to LEDs;

- Harvesting rainwater at the Operations Centre to wash the trucks;
- Building the Clippers Sports Complex to a LEED® Silver standard and installing heat exchangers and a glycol system to heat the seats in the arena;
- Installing motion sensors in both arenas and using set-backs at night so the compressor do not run all the time;
- Following a preventative maintenance program for HVAC equipment.

Appendix B. Criteria for prioritizing actions

The Town of Whitchurch-Stouffville can evaluate and prioritize energy management actions identified in the future (e.g. from future Level II audits, staff ideas, and renewable/alternative energy feasibility studies), based on the following criteria:

1. **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.
2. **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?
3. **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.).

In addition, the Town can consider the following criteria:

- **Annual energy savings:** For projects with good 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.
- **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.
- **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.

- **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).

Appendix C. Utility incentives

This section describes incentives and services that are currently available from the Town's electricity utility. The Town of Whitchurch-Stouffville can take advantage of these incentives to implement some of the technical measures identified.

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 Hydro One. For natural gas, all applicable technical measures would fall under the Fixed Retrofit and Custom Retrofit Incentives program from Enbridge Gas. For metering measures, the Process and System Upgrade Initiative would be applicable on the electricity side, and the Custom Retrofit Incentives program would be applicable for natural gas.

C.1. Hydro One / Ontario Power Authority saveONenergy Programs

Full details are available at:
http://www.hydroone.com/MyBusiness/SaveEnergy/Pages/default.aspx

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

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).

An Embedded Energy Manager can be obtained through the PSUI program where the utility company will fund up to 80% of the

Embedded Manager's annual salary. The Embedded Energy Manager must:

- Be hired by the municipality;
- Implement 0.3MW of peak demand savings and 0.3MW x Facility Load Factor x 8,760 hours of energy savings each year;
- Enrol in energy management related training programs;
- Develop an energy management plan and provide quarterly reporting; and
- Commit to implementing projects with a less than one-year payback.

Another option is to hire a Roving Energy Manager if hiring a full time Embedded Energy Manager is not warranted. A Roving Energy Manager is shared between multiple municipalities and is available for a short-term stay. For example, the Town of Aurora shares a Roving Energy Manager from PowerStream Inc. with other municipalities. For further information, contact Hydro One.

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 (>50,000ft^2) 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.

C.2. Enbridge Gas Energy Management Programs

Full details are available at:
https://www.enbridgegas.com/businesses/energy-management/

Fixed Retrofit and Custom Retrofit Incentives

Fixed commercial retrofit incentives are offered for condensing boilers, high efficiency boilers, air doors, infrared heaters, energy and heat recovery ventilators, condensing make-up air systems, ozone laundry systems, low-flow showerheads, and dishwashers. Qualifying custom projects may include: improving boiler or ventilation controls, installing energy or heat recovery systems, installing energy management systems or other automated controls, insulation upgrades, installing reflective panels on radiators, or high extraction washers. Implementing any number of energy-saving measures could result in a savings of $0.10 per m^3 of gas saved, up to $100,000 per facility or project, not exceeding 50% of the project's capital cost (before tax).

Energy Compass

This is a free diagnostic service that evaluates the operating efficiency of buildings to identify energy efficiency improvement opportunities along with applicable financial incentives.

Appendix D.List of acronyms

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

BAS – Building automation system

CDM – Conservation and demand management

ECDMP – Energy conservation and demand management plan

EM&V – Evaluation, monitoring and verification

EMS – Energy management system

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

LED – Light-emitting diode

NPV – Net present value

O&M – Operations and maintenance

OPA – Ontario Power Authority

RTU – Remote terminal unit

SMT – Senior Management Team

VFD – Variable frequency drive

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