

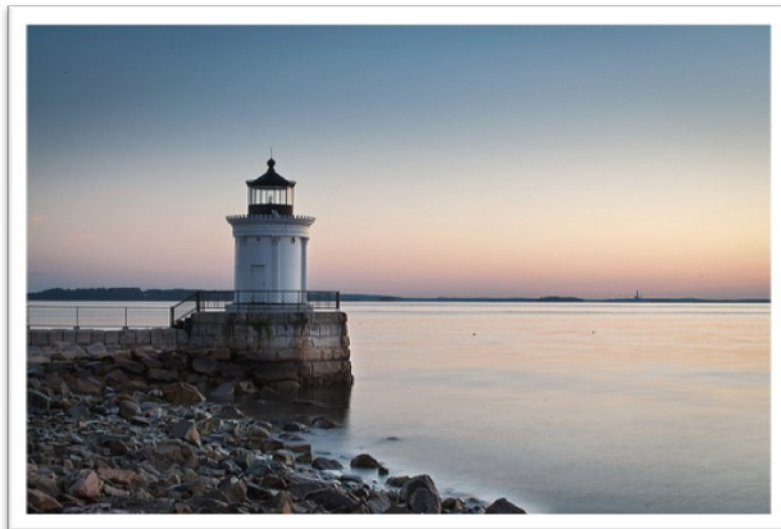


Municipal Climate Action Plan

*Proposal Submitted to City Council
South Portland, Maine
2014*

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ACKNOWLEDGEMENTS

The City of South Portland would like to thank the following people for their input and guidance on this Climate Action Plan:

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EXECUTIVE SUMMARY

“If not addressed, [climate change] will consume our national resources and threaten the well-being of future generations, and volatile energy prices and more extreme weather will devastate our economy.” – Former White House Chief of Staff John D. Podesta (speech to National Association of State Treasurers, 2007).

Global warming is a documented and present threat to the planet—the combustion of fossil fuels releases greenhouse gases (GHG) into the atmosphere, causing global surface temperatures to increase. Scientific evidence continues to support the theory that carbon dioxide (CO₂) and other GHGs that have been released into the atmosphere since the beginning of the industrial era are having a profound effect on the Earth’s climate.

These documented and observed impacts are not only affecting the Earth’s climate, but are also increasing costs for municipal governments. Predicted changes in Maine’s climate over the next century include diminished snow pack, topsoil loss from rainfall events, declines in local ecosystem health, increased coastal flooding and demand on wastewater infrastructure, and less economic growth in core local industries such as tourism, fishing, and forestry.¹

The City of South Portland signed the U.S. Mayors’ Climate Protection Agreement in 2007, which called for municipalities to address “global warming pollutants through programs that provide economic and quality of life benefits, such as reduced energy bills in residential, commercial and public buildings, green space preservation, air quality improvements, reduced traffic congestion, improved transportation choices, and economic development and job creation through energy conservation and new energy technologies.” This agreement sets a specific goal for all participating municipalities— to reduce GHG emissions by **17 percent** (based on 2007 emissions) by the year **2017**, or **“17 by ’17”**.

GHG emissions from “municipal activities” include those emissions occurring from municipal functions within the City of South Portland’s jurisdictional boundary, and this Climate Action Plan addresses emissions that are under the City’s influence or control. Through adopting and implementing this Climate Action Plan, the City intends to meet or exceed the goal of 17% emissions reduction by 2017.

South Portland’s Climate Action Plan (CAP) discusses the findings of a 2007 Inventory of Municipal Greenhouse Gas Emissions, and identifies emission reduction strategies for the municipality. The City’s Climate Action Plan is divided into three phases: Phase 1, “City Department Actions for

¹ Jacobson, G.L., I.J. Fernandez, P.A. Mayewski, and C.V. Schmitt (editors). 2009. Maine’s Climate Future: An Initial Assessment. Orono, ME: University of Maine. <http://www.climatechange.umaine.edu/mainesclimatefuture/>.

Reducing Energy Consumption”; Phase 2, “Business Energy Consumption Reduction”; and Phase 3, “Residential Opportunities for Energy Use Reduction”. Phase 1 is included in this document; Phases 2 and 3 are currently under development.

INTRODUCTION

Development of the Climate Action Plan (CAP)

An inventory of 2007 municipal greenhouse gas emissions was completed in 2011 (See Appendix B). South Portland produced **10,100 metric tonnes of GHGs** (CO_{2e}) in 2007 and aims to cut **1,700 metric tonnes** of CO₂ Equivalent (CO_{2E}) to meet the goal set by the Mayors’ Agreement. The City’s target is a 17% reduction in greenhouse gas emissions by 2017.

It is the vision of the City of South Portland to create a sustainable city that benefits the lives of all citizens through energy savings, preservation of the environment, economic opportunity, and improvement of the health and welfare of the employees and people of the City. This vision and its accomplishment will create a “Legacy of leadership [that is] taking action on climate change [to provide] tangible benefits for citizens today – and ensures that future generations will have access to the resources that support healthy, prosperous, and livable communities.”²

This CAP was envisioned to identify attainable goals for the following: using energy more efficiently to keep municipal operating costs low, harnessing renewable energy to power City buildings, enhancing access to sustainable transportation modes, and recycling local waste, in order to keep dollars in the local economy, support local green jobs, and improve community quality of life.

The strategies and actions in this plan are based on local ideas, and similar plans developed by other cities and states. Currently, over 1,000 cities have signed the U.S. Mayors’ Climate Protection Agreement established by Seattle Mayor Greg Nickels in February 2005. Under the Agreement, participating cities must strive to meet or beat the Kyoto Protocol targets in their own communities, as well as urge the state and federal government to enact policies and programs to reduce greenhouse gas emissions.

Similarly, over 1,200 international cities, including many U.S. cities, participate in the Cities for Climate Protection program managed by the International Council for Local Environmental Initiatives (ICLEI). One of the milestones set by the program is to develop a local action plan to reduce emissions. Currently, a relatively small percentage of participating cities in one or both of the programs have developed and begun implementation of state, regional and local action plans. A number of Maine municipalities have signed the agreement, including South Portland neighbors Cape Elizabeth, Falmouth, Yarmouth, Portland, Saco, and Biddeford.³

² U.S. Mayors’ Climate Protection Agreement, Climate Action Handbook, 2008.

³ <http://www.usmayors.org/climateprotection/list.asp>

In addition, the Maine Department of Environmental Protection (DEP) is working with its partners and regional stakeholders to develop a statewide Climate Action Plan, and the [Greater Portland Council of Governments](#) (GPCOG), in partnership with [Clean Air – Cool Planet](#) (CA-CP), formed EmPowerMe, a local Energy Working Group, in early 2010. The mission of the Working Group is:

“To reduce energy use and greenhouse gas emissions through strategic energy planning, public outreach and the provision of resources and technical support to municipalities and local energy committees.”

In 2008, the City Council created the standing Energy and Recycling Committee (ERC) and empowered it to define the City’s approach toward achieving the Mayors’ Agreement in Chapter 2, Section 2-134 of the City’s Code of Ordinances. In 2010, at the recommendation of the ERC, the City Council adopted the first Sustainability Resolve (#1-10/11), specifically calling for energy and other resource conservation practices to be put in place and carried out by all City departments.

The Climate Action Plan is the result of the ERC’s work and establishes Phase 1 as the foundation for the implementation of GHG- and resource- reduction measures at the municipal level to be carried out immediately upon acceptance by City Council. Currently under development, Phase 2 will address the roles of commercial and industrial opportunities and demands while Phase 3, not nearly least in importance, will address residential opportunities for resource conservation, and dovetail these actions with the City’s Comprehensive Plan.

The Climate Action Plan is a living document which continues to be updated by the ERC and City staff. Many goals have been achieved to date, and many new measures have been identified and incorporated.

Commitment to the CAP

Budgets for investing in energy efficiency measures are being evaluated on an ongoing basis, and will be greatly impacted by the language in the Climate Action Plan and targeted savings in future energy bills achieved through GHG-reducing activities, such as upgrading building systems, using renewable energy supplies, reducing miles traveled, and reducing consumption of water and other non-renewable resources.

With the support of the City Manager’s Office, the Comprehensive Plan Committee, and all the City departments, South Portland can meet its goal to be the foundation of environmental stewardship from which residents and neighbors can build. To this end, and through the adoption of the City’s Sustainability Resolve, the City will invest significant time, energy, resources, and capital to achieve the goals set forth in this document.

Greenhouse Gas Emissions Baseline (2007)

To ensure that the municipality stays on course to meet its aggressive GHG reduction target, it is necessary to track its progress by conducting regular, community-wide GHG emissions inventories. It helps to think of the inventory as a “snapshot” of South Portland’s GHG emissions for a given year. The 2007 base inventory for the municipality was completed in 2011. This study identifies the major sources and quantity of GHG emissions produced by residents, businesses, and public institutions. The complete 2007 Inventory Report is attached to this CAP as Appendix B.

Municipal Emissions

In 2007, South Portland’s government operations emitted approximately 10,100 metric tonnes of GHG emissions, at a direct cost of over \$3 million. Table 2 of the Inventory, shown below, displays municipal energy-use categories, sorted by GHG output as CO_{2e} (metric tonnes emitted). Table 5 of the Inventory shows the emissions associated with each City building.

Table 2: 2007 South Portland government emissions, energy costs, and energy output by sector.

South Portland: GHG Emissions Inventory Overview (2007)						
Sector	Cost (\$)	Cost (%)	Energy Output (MMBtu)	Energy Output (%)	CO _{2e} (tonnes)	CO _{2e} (%)
Buildings: Heat & Hot Water	894,294.45	29.4%	54,539.1	48.1%	3,766.6	37.3%
Buildings: Electricity	794,822.04	26.2%	17,665.0	15.6%	2,194.6	21.7%
Total Buildings	1,689,116.49	55.6%	72,204.1	63.6%	5,961.2	59.1%
Wastewater	399,039.96	13.1%	12,454.2	11.0%	1,833.6	18.2%
Vehicle Fleet*	446,291.94	14.7%	19,086.4	16.8%	1,380.1	13.7%
Lights & Traffic Signals	357,525.72	11.8%	3,993.2	3.5%	496.1	4.9%
Transit Fleet*	143,877.30	4.7%	5,602.7	4.9%	409.9	4.1%
Water Delivery	1715.84	0.06%	95.2	0.08%	11.8	0.12%
Port Facilities	1193.16	0.04%	16.9	0.01%	2.1	0.02%
GRAND TOTALS	3,038,760.41		113,452.8		10,094.9	
*Fuel usage data for the vehicle and transit fleets was not available for 2007; fuel usage data for calendar year 2008 was used for the 2007 base year inventory.						

Table 5: 2007 government buildings' analysis including energy cost per square foot, energy intensity (kBtu/s.f.), and GHG intensity. Buildings preceded by a superscript number indicate instances where energy usage is split between two or three separate line items; these buildings had different square footage values for electricity and heated space or, as in the case of the Cash Corner Fire Station, the discernment between building sections found in data collection were maintained for data analysis.

Buildings (2007): Cost, Energy, GHG Emissions, & Square Footage Analysis							
Department / Building Name* (Year Built) (Fuel Type)	Square Footage	Cost (\$)	Energy Cost per Sq. Ft. (\$)	Energy Output (MMBtu)	Energy Intensity (kBtu** / s.f.)	CO2e (tonnes)	GHG Intensity (tonnes CO2e /1,000 s.f)
Rec, Pool (1978) (#2)	3,690	63,230.23	17.14	3,909.44	1,059.47	287.61	77.94
¹ Fire, Cash Corner/Rear (1971?) (Prop, Elec)	896	7,993.73	8.92	211.02	235.51	22.82	25.47
Maine Military Museum (1940) (#2, Elec)	704	3,912.80	5.56	231.82	329.28	17.10	24.29
Parks, Greenhouse (1968) (#2, Elec)	960	4,757.23	4.96	269.64	280.88	20.31	21.15
Police Garage (1972?) (#2)	1,000	3,547.54	3.55	218.05	218.05	16.04	16.04
Bus Service, Office (1982) (Kero, Elec)	480	1,770.00	3.69	73.55	153.23	7.40	15.42
² Schools, School Bus Building (1984) (#2, Kero)	6,925	23,929.15	3.46	1,379.17	199.16	101.02	14.59
³ Public Safety (Police/Fire Admin) (1972/1998) (Elec)	6,814	30,519.00	4.48	784.21	115.09	97.43	14.30
⁴ PW, Admin Office & Gar. Bay 1 (1930) (#2, NatGas)	6,600	20,295.12	3.08	1,354.85	205.28	89.13	13.50
City Hall (1898) (#2, NatGas, Elec)	8,500	32,572.33	3.83	1,183.22	139.20	113.15	13.31
Parks, Maintenance Bldng (1968) (#2, Elec)	2,800	8,803.47	3.14	436.64	155.94	35.28	12.60
PW, Transfer Station Entrance Shed (1998) (Elec)	400	1,541.99	3.85	40.17	100.42	4.99	12.48
Schools, Hamlin (1961) (#2, Elec)	7,858	25,423.14	3.24	1,214.08	154.50	95.63	12.17
Schools, Memorial (1960) (#2, Elec)	77,074	205,533.09	2.67	10,286.69	133.47	826.21	10.72
Parks, Wainwright Field, CmmBldng (2002) (Prop, Elec)	2,504	8,394.93	3.35	268.98	107.42	25.37	10.13
³ Police/Public Safety Furnaces (1972/1998) (#2)	12,975	26,950.70	2.08	1,669.88	128.70	122.85	9.47
Assessing (1955) (NatGas, Elec)	1,444	4,396.43	3.04	172.83	119.69	13.24	9.17
Schools, SPHS (1950/1960) (#2, NatGas, Elec)	189,349	452,698.38	2.39	18,764.67	99.10	1,615.81	8.53
Bus-Service, Garage (1945) (NatGas, Elec)	6,251	15,670.88	2.51	788.89	126.20	51.64	8.26
Water Resources, Sewer Maint. Gar. (1980) (Prop, Elec)	2,600	9,285.56	3.57	287.99	110.77	21.47	8.26
Library, Branch, Wescott (1978) (Prop, Elec)	4,642	13,868.90	2.99	452.28	97.43	37.96	8.18
Fire, Central (1940) (#2, NatGas, Elec)	14,288	28,921.63	2.02	1,427.98	99.94	114.41	8.01
Fire, West End Station (2003) (NatGas, Elec)	10,698	26,222.97	2.45	1,096.59	102.50	84.00	7.85
Schools, Robotics (One Clsrm Prgrm Bldng) (#2)	1,920	3,067.63	1.60	188.49	98.17	13.87	7.22
Library, Public, Broadway (1970) (#2, Elec)	12,300	27,503.08	2.24	900.57	73.22	88.60	7.20
Fire, Ferry Village Station (1920)(#2, NatGas, Elec)	1,760	3,177.94	1.81	157.24	89.34	12.28	6.98

Buildings (2007): Cost, Energy, GHG Emissions, & Square Footage Analysis

Department / Building Name* (Year Built) (Fuel Type)	Square Footage	Cost (\$)	Energy Cost per Sq. Ft. (\$)	Energy Output (MMBtu)	Energy Intensity (kBtu** / s.f.)	CO2e (tonnes)	GHG Intensity (tonnes CO2e /1,000 s.f)
Schools, Brown (1940) (NatGas, Elec)	31,774	74,963.00	2.36	3,079.83	96.93	219.06	6.89
³ Police (1972) (Elec)	6,161	12,596.70	2.04	316.00	51.29	39.26	6.37
Schools, Dyer (1971) (NatGas, Elec)	29,278	66,455.00	2.27	2,492.81	85.14	185.91	6.35
Rec, Wilkinson Function Hall (1950) (#2, Elec)	2,748	4,325.97	1.57	217.74	79.23	17.35	6.31
Schools, Small (2003) (NatGas, Elec)	30,728	67,085.00	2.18	2,401.53	78.15	186.41	6.07
Schools, Skillin (1940) (#2, Elec)	50,290	82,444.77	1.64	3,481.61	69.23	300.10	5.97
Fire, Thornton Heights (1939) (#2, Prop, Elec)	1,628	3,636.34	2.23	122.31	75.13	9.58	5.88
Planning & Development (1961) (NatGas, Elec)	4,546	8,214.66	1.81	383.00	84.25	26.24	5.77
¹ Fire, Cash Corner/Front (1971) (#2, Elec)	7,250	9,025.94	1.24	539.50	74.41	40.01	5.52
Schools, Mahoney Jr HS (1940) (#2, NatGas, Elec)	62,060	90,404.18	1.46	4,085.78	65.84	340.07	5.48
Schools, Kaler (2003) (NatGas, Elec)	30,728	59,343.00	1.93	1,997.23	65.00	165.48	5.39
Fire, Willard Square Station (1940) (#2, Elec)	4,576	5,762.10	1.26	283.06	61.86	24.12	5.27
Rec, Redbank Gym (1997) (NatGas, Elec)	11,674	19,479.83	1.67	777.45	66.60	61.23	5.25
PW, Dugout & Sign Shop (1950) (#2, Elec)	4,262	5,448.73	1.28	250.02	58.66	20.93	4.91
Rec, Community Center (2000) (NatGas, Elec)	49,888	76,049.61	1.52	2,782.95	55.78	243.25	4.88
⁴ PW, Admin & Gar. Bays 1 & 2 (1930/1950) (Elec)	11,400	13,601.60	1.19	307.78	27.00	38.24	3.35
Police Garage (Elec)	1,600	1,785.59	1.12	40.10	25.06	4.98	3.11
Water Resources, Office (2007) (Prop)	1,360	1,786.46	1.31	63.93	47.00	4.06	2.98
² Schools, School Bus Building (1984) (Elec)	42,528	26,283.71	0.62	661.84	15.56	82.22	1.93
PW, Engineer's Bldng (1950) (#2, Elec)	1,664	943.79	0.57	38.02	22.85	3.20	1.92
Golf Course Maint. Bldng (1979) (Elec)	1,664	873.55	0.52	18.21	10.94	2.26	1.36
PW, Salt Shed (1985) (Elec)	5,026	873.55	0.17	18.21	3.62	2.26	0.45
Parks, Willard Beach Beach House (1973) (Elec)	1,408	338.09	0.24	5.34	3.79	0.66	0.47
Armory (1941) (Elec)	24,904	653.09	0.03	10.92	0.44	1.36	0.05
⁴ PW, Gar. Bay 2 (1950) (Nat Gas)	4,800	125.41	0.03	1.13	0.23	0.06	0.01
Parks, Mill Creek Park Pumphouse (Elec)	N/A	3,005.00	N/A	67.97	N/A	8.44	N/A

*Buildings which shared an electricity meter, but not a furnace/boiler –or- vice versa –or- buildings in which the entire square footage did use electricity, but was not heated were split in this table to enable greater transparency. Buildings preceded by a superscript number indicate instances where energy usage is split between two or three separate line items.

**kBtu = one thousand "British thermal units." A BTU is a measurement of energy equivalent to approximately 1,055 joules.

Municipal Fuel Usage

The graph below, Figure 6 of the Inventory, displays fuel use by sector as a percentage of CO_{2e} emissions.

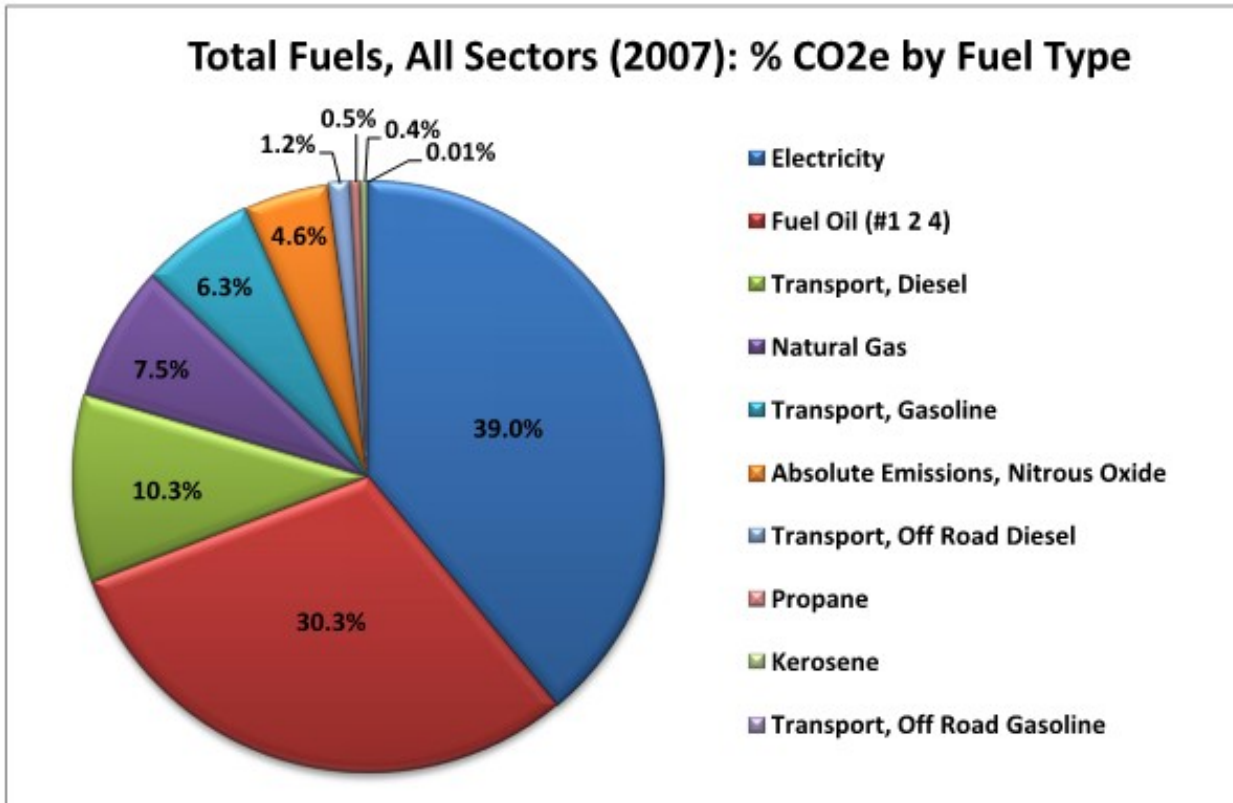


Figure 6: Energy usage by fuel type across all sectors. Percentages represent actual CO_{2e} emissions resulting from specific fuel usages.

ACTION RECOMMENDATIONS

A successful Climate Action Plan addresses all the GHG-producing activities of a community. As defined in the City's 2010 Sustainability Resolve, Resolve #1-10/11 (included as Appendix A), which established goals and guidelines for sustainability initiatives and emissions reductions strategies, the ERC will continue to update this plan, address changes to the GHG inventory, compile budgeting and investment strategy information, and otherwise assist in the evolution of the Climate Action Plan toward its goal of achieving the Mayors' Agreement target of 17% reduction in GHGs and reaching the City's goals of reducing costs and becoming more energy independent.

The Climate Action Plan is the result of the ERC's work and establishes a 3-phase plan of action. Phase 1 is the foundation for the implementation of GHG- and resource-reducing measures at the municipal level. Some of these measures are already being carried out in municipal buildings and departments, while others will be adopted soon after approval by City Council. Phase 2 addresses the roles of commercial and industrial opportunities and demands. Phase 3, not nearly least in importance, addresses residential opportunities for resource conservation and the continued dovetailing of these actions with the goals of the City's Comprehensive Plan, which was adopted in 2012.

Beginning in 2011, the City followed the recommendation of the ERC to act on Phase 1 immediately and aggressively. Although the Climate Action Plan will address GHG reduction and resource conservation for the entire City, at this juncture and with time of the essence, this Plan is predominately focused on immediate action items and implementation strategies for municipal buildings and infrastructure, including the South Portland School Department.

Methodology

Recognizing that there was no method in place to measure and verify GHG reductions from projects already completed, the ERC began to assemble the data for a base inventory for the municipal infrastructure in 2009. The result of this effort was the 2007 Emissions Inventory included in Appendix B. These data form the basis for evaluating emissions reduction projects, and allow the Municipality to measure its progress toward the 2017 GHG emissions reduction goal. The inventory will be updated regularly in order to form the basis for further reduction goals.

Following the completion of the inventory, the ERC, in conjunction with the City Manager's in-house team, examined a range of action strategies to reach the stated goal. The initial list of action items compiled by the committee in 2011 had 51 items. Through careful discussion and evaluation, the ERC established a manageable list of project-related action items and behavior/policy changes. These items are specific to Phase 1 - Municipal Opportunities.

PHASE 1—MUNICIPAL OPPORTUNITIES FOR REDUCING ENERGY CONSUMPTION

To reach the goal of 17% GHG emissions reduction from 2007 levels by 2017 (“17 by ‘17”) the City must reduce annual emissions by 1,700 metric tonnes. Savings in both costs and GHG emissions from these projects will result in a reduction of GHG from the 2007 Base Inventory, which will be tracked once projects are completed.

The action steps in this Climate Action Plan incorporate the guidance of the US EPA EnergyStar™ Building Upgrade Manual⁴. This manual recommends a five-stage process and a staged approach to building upgrades. This CAP includes these EPA steps and supplemental actions as well.

These Phase 1 municipal action items are divided into three subcategories: General, Facility-Related Projects, and Behavior/Policy Changes. As the Phase 2 and Phase 3 revisions of the Climate Action Plan are completed, they will also include these subcategories. This Plan identifies all strategies adopted since 2011, and provides a progress report for each recommended action. As of fall 2013, many of these strategies have been adopted and are in progress, others have been analyzed for feasibility, and some have been successfully completed.

Category 1: General Recommendations for Municipal Energy Consumption Reduction

1. Change data tracking so that energy usage can be tracked for all municipal infrastructure, including schools.
 - The first step towards identifying the issues that make tracking energy usage difficult began in spring, 2011. A new method of capturing energy use by building is currently being developed. The School Department is now in the process of starting to use the EPA Portfolio Manager to track the carbon footprint of the school buildings.

⁴ US EPA EnergyStar™ Building Upgrade Manual, p. 4.

2. Compile and complete the FY 2012 Emissions Inventory when the required data becomes available (there is a current lag in data availability), and prepare reports to determine the City's movement toward the goal of this plan.
3. Management of energy usage, costs, and managing technical energy systems is a specialized field, which should be addressed through the creation of new City positions focused on facilities management and sustainability.
 - While the School Department has a facilities director, the Municipality does not. Furthermore, the school position is spread too thinly for effective management of all City buildings, schools, and fleets.
 - One of the most cost-effective investments for the City would be the creation of a facilities manager/sustainability coordinator that manages the operation, maintenance, and upgrades to all municipal buildings.
 - ICLEI USA provides evidence that energy offices or staff positions have been shown to finance themselves within two years through energy cost savings, and are often eligible for federal grants which are worth many times the operating costs of the office.⁵
 - In the same way, a vehicle and equipment operations and maintenance department in a central garage for both the municipality and the school district could consolidate both costs and maintenance schedules to achieve efficiencies and, presumably, cost savings. A new, centralized municipal services facility was approved by voters in November 2013 for this purpose.
4. Continue to monitor and revise the City/School procurement policies to build in specific language ensuring all purchases of equipment, vehicles, and building upgrades meet the highest energy standards possible at the time. The City's Purchasing Ordinance was updated in 2012 to include Sec. 2-160: "Environmentally Preferable Products and Services"⁶, but should be reviewed continually to reinforce the City's commitment to reducing GHG emissions. The policy does not currently address energy standards at this time.
5. The City and its schools should strive to document all the energy reduction projects or initiatives that have been completed after 2007 above and beyond those resulting from the respective Siemens contracts. Many of the initiatives completed to date have been included in this document, but others have not yet been tracked and

⁵ <http://www.icleiusa.org/library/documents/Energy%20Office%20One%20Pager.pdf>

⁶ SECTION 2-160: The City supports the purchase of environmentally preferable products and services as evidenced by its commitment to sustainability set forth in City Council Resolve #1-10/11. Where practicable, City departments should endeavor to ensure that specifications do not discriminate against environmentally preferable products and services; evaluate environmentally preferable products and services to determine the extent to which they may be used by the department; and review and revise specifications to include environmentally preferable products and services.

(Ord. No. 22-89/90, 6-4-90, Ord. 15-98/99, 4/21/99, [Fiscal note less than \$1000]; Ord. No. 7-11/12, 1/4/12 [Fiscal Note: Less than \$1000])

summarized. A City sustainability coordinator or facilities manager would be useful in this capacity.

- This analysis shall be completed for each building so that a comparison can be made with current energy usage rates, in order to accurately measure usage reductions.
 - The City in-house team is currently investigating the costs and benefits of membership in the ULI Greenprint program, which is a software program operated by a non-profit geared towards improving the environmental performance of member properties. If cost-effective, this program would allow a sustainability/facilities manager to easily enter data at any frequency (annual, monthly, weekly) on energy consumption, waste generation, water usage, emissions, at both the asset and meter level. Greenprint's software also generates reports on-demand, lessening the technical reporting burden on City staff.
6. Encourage department or building initiatives initiated by staff, such as participation in the State-wide program "Zero Waste" at the Memorial School. Ensure all City buildings and schools have adequate recycling containers and storage to support increased recycling efforts.
 7. Continue advocacy for energy efficient policies at the Maine State Legislature level. In 2013, City staff was successful in drafting and advocating for LD 1251, a bill which would require electricity utilities to provide three options for municipal street light programs.⁷ These different ownership or lease structures will allow Maine municipalities to choose the most cost-effective and energy-efficient option each year. In other New England states, municipalities' total costs for street lighting have declined 30% to 40% through efficiency upgrades.⁸

Category 2: Municipal Facility-Related Actions

Energy Efficiency Actions

Action: Replace existing refrigerators with ENERGY STAR models that are rated as at least 30% more efficient than the current Federal standard. Replace compact refrigerators with one standard size in each department.

Responsible Department	All departments with refrigerators.
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⁷ http://www.mainelegislature.org/legis/bills/bills_126th/billtexts/HP088501.asp

⁸ Town of Falmouth, Resolution to Support LD 1251. Retrieved from: http://www.town.falmouth.me.us/Pages/FalmouthME_CouncilAgendas/2013/04082013/S03E8960F.1/912013_Resolution_LD1251.pdf

GHG Emissions Reduction	40% less CO _{2e} each year per refrigerator unit. ⁹
Annual Cost Savings	\$85-\$1,000 over five years, depending on the size and age of refrigerator replaced with an Energy Star model. ¹⁰ The Energy Star Refrigerator Calculator, available online, can be used to determine annual costs savings per refrigerator replaced.
Challenges	Behavior change for staff, who are accustomed to compact refrigerators in several offices.
Benefits	Health and social benefits from the use of larger, communal refrigerators. All ENERGY STAR models use at least 40% less energy than conventional models. Many models replaced will pay for themselves in energy cost savings in one to two years.
Action Status	Ongoing. Each City Hall Department has replaced their aging refrigerators with communal Energy Star-rated models. The Library, Police Department, Public Works, Fire Department, and Water Resources have not yet begun to phase out refrigerators.

This change involves replacing as many municipal refrigerators as possible with more energy-efficient models, and consolidating multiple smaller refrigerators into larger, communal refrigerators. Due to the nature of this change, it would have to be on a case-by-case implementation. While consolidating refrigerators may be appropriate in some facilities, it may not be in others. In selecting upgrades, models with top-mounted freezers and without automatic ice makers would be favored, as they are more efficient.

Action: Replace individual air conditioners with central systems where cost-efficient, or individual EnergyStar units.

Responsible Department	All departments with individual air conditioners.
GHG Emissions Reduction	15% less CO _{2e} each year per air conditioning unit.
Annual Cost Savings	\$90 per each individual unit replaced.
Challenges	Behavior change for staff, who are accustomed to having control over individual air conditioning units. Central cooling systems are difficult and very expensive to install in older City buildings, due to the duct and sealing work needed.
Benefits	Cost-savings from the use of central cooling systems in new City buildings,

⁹ http://www.energystar.gov/ia/business/EPA_BUM_Full.pdf, Ch. 7, p. 6.

¹⁰ <http://www.energystar.gov/index.cfm?fuseaction=refrig.calculator&>

	and from replacing older individual units already in City buildings. Energy Star individual room models use at least 15% less energy than conventional models, and save \$90 in energy costs over the life of each unit.
Action Status	Ongoing. City Hall has also begun the process of replacing outdated air conditioners with more efficient Energy Star-rated models. To date, approximately 11 air conditioners have been replaced with Energy Star. The Library, Police Department, Public Works, Fire Department, and Water Resources have not yet begun to phase out older air conditioners.

A majority of City buildings have air conditioners, but most are small, residential-purpose units. Many of the units in City Hall were over 20 years old before replacement began in 2013. The US EPA recommends replacing heating and cooling equipment (residential) over the age of ten years with Energy Star models.¹¹ Energy Star-certified room air conditioners use 15% less energy than older models, which can equate to \$90 in energy cost savings over the lifetime of the replaced unit.¹²

The ERC recommends purchasing individual units with timers, which use the minimum amount of energy necessary to cool an individual office. The ERC also recommends that any new buildings or buildings under significant renovations investigate the costs and benefits of central heating and cooling systems, including the new Public Works facility.

Action: Separate heat and hot water where the systems are combined, and install an energy-efficient hot water heater with an Energy Star-rating. Continue boiler efficiency improvements through upgrades or replacement with Energy Star-rated models. Prepare and implement a schedule of retro-commissioning of all municipal buildings.

Responsible Department	All buildings that have never been commissioned. The schedule can be prioritized for any of the following reasons: high or unexplained changes in energy consumption; persistent failure of building equipment, control systems, or both; or excessive occupant complaints about temperature, airflow, and/or comfort.
GHG Emissions Reduction	Reduction depends on the size and energy usage of the building.
Annual Cost Savings	Up to a 15% annual cost savings.
Challenges	Maintenance of the retro-commissioned systems so that they continue to perform at the optimum level.
Benefits	Immediate energy use reductions when recommendations are implemented and maintained, immediate health and comfort benefits for occupants of the building.
Action Status	Ongoing. See the detailed "Siemens Energy Performance Contract: Performance

¹¹ http://www.energystar.gov/ia/partners/publications/pubdocs/HeatingCoolingGuide%20FINAL_9-4-09.pdf?8802-84fc

¹² http://www.energystar.gov/certified-products/detail/air_conditioning_room

Assurance Report”, attached as Appendix C, for a full list of upgrades completed to date and the resulting emissions reductions after 1 year of installation.

The US EPA Building Upgrade Manual identifies “retro-commissioning” as its first stage to reduce building energy usage. Retro-commissioning helps to identify heating and cooling systems that need to be replaced, and equipment which is not functioning properly. Retro-commissioning can also be used to identify opportunities to increase the operational efficiency of existing municipal systems.

To forward its GHG emissions reduction goal, the City has negotiated two “paid through savings/performance” contracts with Siemens Industries. As a result of these contracts, Siemens completes energy upgrades and retrofits in municipal buildings and the cost is paid for over time by the amount of money the City saves on energy bills over the next 5 to 20 years, depending on the upgrade/retrofit scenario and the technology installed. The first contract resulted in energy upgrades for all of the schools in the City, and completed in the fall of 2010. The second contract was for energy upgrades at 14 municipal buildings. Construction for these projects started in June 2011 and completed in 2012. A progress report of these savings and resulting GHG reductions is provided annually by Siemens (see Appendix C for the impressive Performance Year 1 results). As a result of the Siemens Contract, the City’s single-year realized energy savings amounted to the equivalent of the removal of 73.4 cars from the road for a year. **The total one-year reduction of 883,594.7 pounds of CO_{2e} equated to approximately 400 metric tonnes of CO_{2e}, or almost 24% of the City’s overall goal of 1,700 metric tonnes.**

The goal of the retro-commissioning stage in a building upgrade effort is to ensure that the building operates as intended and meets current operational needs, despite its age. Doing so can be cost effective, with the EPA reporting typical costs for existing buildings at about \$0.27/ ft², energy savings of 15 percent, and a payback period of 0.7 years.¹³

According to the 2007 Inventory, the building with the highest GHG intensity (that is, tonnes CO_{2e} per thousand square feet) is the South Portland Community Center Pool building, followed by the police headquarters. As such, it was suggested that the priority for retro-commissioning should start with these buildings. The oil boilers in the pool building were replaced with natural gas boilers as part of the 2011-12 Siemens projects. At current rates, energy costs should now be lower with the change from #2 heating oil to natural gas.

As of 2013, all City buildings have been converted to natural gas or propane with the exception of the Police Department and Public Safety Building, Cash Corner and Western Avenue fire stations, the Fire Garage, and Police Garage. The Fire and Police Garages do have new waste oil burners, however.

In addition to the Siemens Contract upgrades, HVAC systems have also been upgraded at the Branch Library and Redbank Community Center.

¹³ http://www.energystar.gov/ia/business/EPA_BUM_Full.pdf, Ch. 5, p. 3.

Action: Install energy efficient LED exit signs

Responsible Department	All buildings that have exit signs.
GHG Emissions Reduction	Roughly 158 pounds of CO _{2e} /year for each sign (fluorescent to LED conversion), which equates to 0.07 metric tonnes CO _{2e} per sign, or 3.5 metric tonnes per year if 50 signs were replaced.
Annual Cost Savings	\$7.00 per sign, per year (fluorescent to LED). Roughly \$1,400/year (based on 50 replaced signs).
Challenges	None – ROI 1.4 years, simple replacement
Benefits	Longer-lasting, brighter, and, therefore, safer exit signs for municipal buildings
Action Status	TBD.

The EPA recommends lighting upgrades as the second stage of building upgrades, as lighting has a substantial impact on electrical use. Lighting upgrades range from new light fixtures to new control systems.

Replacement of older exit signs with incandescent bulbs saves on electricity and maintenance costs. A conventional exit sign with incandescent bulbs will go one year without needing bulb replacement; a new LED sign will last 25. LED bulbs are also brighter, and provide better visibility, improving workplace safety.¹⁴

Action: Install lighting occupancy sensors in appropriate, intermittently-used rooms in all buildings, and install efficient lighting retrofits in buildings that have not already received this upgrade.

Responsible Department	Municipality – priority for any un-upgraded fixtures.
GHG Emissions Reduction	83% energy savings per year.
Annual Cost Savings	TBD. A combination of sensors, lighting upgrades, and daylight dimming has a payback period of 3.3 years, and reduces energy use by 83%. ¹⁵
Challenges	Initial cost of conversion/replacement of existing systems.
Benefits	Choice of lighting affects energy loads, occupant comfort and productivity.
Action Status	Ongoing.

According to EPA’s Building Upgrade Manual, “lighting consumes close to 35 percent of the electricity used in commercial buildings in the United States and affects other building systems through its electrical requirements and the waste heat that it produces. Upgrading lighting systems

¹⁴ http://www.energystar.gov/ia/business/EPA_BUM_Full.pdf, Ch. 10, p. 9.

¹⁵ http://www.energystar.gov/ia/business/EPA_BUM_Full.pdf, Ch. 6, p. 8.

with efficient light sources, fixtures, and controls can reduce lighting energy use, improve the visual environment, and affect the sizing of HVAC and electrical systems.”

The payback of investment in these two measures is between 4.5 and 8.5 years, according to the City’s Siemens contract (see Appendix C). Completing these retrofits in all appropriate buildings is highly recommended.

Action: Creation of a “Green CIP” budget for yearly efficiency improvements of City facilities and infrastructure.

Responsible Department	All City Departments submitting yearly Capital Improvement Plans.
GHG Emissions Reduction	TBD.
Annual Cost Savings	TBD.
Challenges	Cost. Many efficiency improvements are not included in the annual Capital Improvement Program (CIP) because of high cost and lower priority than other vital department needs.
Benefits	Eliminates purchasing silos, and identifies department-specific efficiency improvements that could be made if funds allowed. The Green CIP will help to identify worthwhile efficiency improvements that could be made, but might otherwise not be included in a department’s request due to lower priority.
Action Status	New policy for 2014. Green CIP submissions will begin prior to the 2015-16 budget cycle.

The City Sustainability Committee and ERC recommend the creation of a “Green CIP”, an annual plan for energy efficiency-related capital improvements needed at the various department buildings. The City’s current Capital Improvement Program (CIP) focuses on priorities for funding of capital infrastructure investment in the City.

While the ERC strongly recommends that City departments consider all facility upgrades as an opportunity to install more energy efficient equipment and infrastructure (such as boiler upgrades and new windows), it recognizes the value in establishing a secondary, “Green”, CIP which could allow City departments to identify worthwhile, department-specific energy-efficiency improvement needs (such as centralized air conditioning, or new LED outdoor lighting), that might otherwise not be considered high enough priority to be included in their annual CIP request. This Green CIP would also help to eliminate purchasing silos by identifying needs that span departments (for example, purchasing new LED lighting in bulk for outdoor lighting upgrades at all City buildings, rather than hiring electricians to buy and replace a few lights at a time, over an extended period).

The Green CIP will function as a yearly list of priority sustainability upgrades, which could be managed by the City’s Sustainability Coordinator. The ERC recommends that the Sustainability Coordinator endeavor to research and apply for grant funding to cover all or some of these improvements.

Transportation Actions

Action: Replace existing municipal vehicles with better fuel economy models, and establish MPG purchasing standards.

Responsible Department	Each department with non-emergency vehicles.
GHG Emissions Reduction	1.66 metric tonnes of CO _{2e} per vehicle per year, if the MPG standards rose from 20 MPG to 29 MPG. ¹⁶
Annual Cost Savings	Roughly \$654 per vehicle per year ¹⁷ .
Challenges	For many vehicles, serviceability versus sustainability, and the cost to upgrade the City's fleets.
Benefits	Fosters a culture of energy consciousness; reduces or eliminates emissions from City's non-emergency fleet. Increased MPG also decreases the costs for fueling each vehicle.
Action Status	<p>The City applied for a 2013 Central Maine Power grant for funding towards the lease of a 2014 Nissan Leaf, a plug-in Hybrid Electric Vehicle (PHEV). If this grant is awarded, the City intends to evaluate the functionality/practicality of the PHEV as the new two-wheel drive non-emergency fleet vehicle.</p> <p>The City is also updating the RTA software program, which tracks the City's vehicle inventory, and includes information on fuel consumption, age, and mileage, to better be able to identify opportunities to phase out and upgrade inefficient, older vehicles.</p>

The City currently has vehicle efficiency standards, but these standards have not been updated in many years. Opportunity exists to raise these standards. The ERC recommends that the City adopt the vehicle fuel efficiency ratings published by the Massachusetts Department of Energy Resources' Green Communities Division.¹⁸ These standards were developed using 2010 EPA data on combined city and highway MPG ratings, and have been successfully adopted in many Massachusetts cities and towns.

The standards recommended are:

- 2 wheel drive cars: 29 MPG
- 4 wheel drive cars: 24 MPG
- 2 wheel drive SUVs: 21 MPG
- 4 wheel drive SUVs: 18 MPG
- 2 wheel drive small trucks: 21 MPG

¹⁶ <http://www.epa.gov/otaq/climate/documents/420f11041.pdf>, p. 2.

¹⁷ The annual cost savings and emissions reduction estimates are based on the following assumptions: Cost of gasoline: \$3.50/gallon; Fuel efficiency of new vehicle: 29 mpg; Fuel efficiency of replaced vehicle: 20 mpg; Average annual miles: 12,042 per vehicle. Sources: Fuel Economy.gov (find a car): <http://www.fueleconomy.gov/feg/findacar.htm>.

¹⁸ <http://www.mass.gov/eea/docs/doer/green-communities/grant-program/criterion-4-guidance.pdf>

- 4 wheel drive small trucks: 19 MPG
- 2 wheel drive standard trucks: 17 MPG
- 4 wheel drive standard trucks: 16 MPG

Heavy-duty vehicles (those with a manufacturer’s gross vehicle weight rating of more than 8,500 pounds) and all emergency vehicles will remain exempt from these purchasing standards. (However, some emergency vehicles have already voluntarily been replaced with Flex Fuel models with “Active Fuel Management” systems, allowing employees to save fuel during light load conditions, while still driving a vehicle with the required power and acceleration of a V-8 engine.) At current tally, the City has 97 vehicles that could eventually be replaced with new models meeting the above standards.

The ERC also recommends that City departments begin to identify fuel-efficiency as a consideration when replacing their smaller vehicles as well, such as commercial lawn mowers. The U.S. Department of Energy offers a “*Clean Cities*” *Guide to Alternative Fuel Commercial Lawn Equipment*, which lists options for fuel efficient and alternative energy-powered commercial equipment.¹⁹

Action: Re-examine the purchase of alternative fuels, such as biodiesel from a renewable source, for all appropriate vehicles and equipment. This item might include the installation of a fueling station for the municipality.

Responsible Department	Public works - maintenance and fueling; Transportation/Bus Department.
GHG Emissions Reduction	The use of B20 reduces CO _{2e} by 15%. B100 reduces emissions by 75% when compared to petroleum diesel. ²⁰
Annual Cost Savings	TBD.
Challenges	Getting municipal staff behind the change in light of a previously “unsatisfactory” trial with biodiesel; high costs for mandated safety measures at storage facilities if fleet converted to natural gas.
Benefits	Dramatically decreased emissions, no engine modifications required for biodiesel. Biodiesel is also non-toxic, and less combustible than traditional diesel.
Action Status	Ongoing. On November 5, 2013, citizens of South Portland voted to approve a bond to finance a new municipal services facility on Highland Avenue. This new facility will house a central fueling station for the municipality. The City has also attended multiple workshops as a stakeholder in the Maine Clean Communities Program on biodiesel and compressed natural gas for municipal fleets. These 2013 workshops included presentations and Q & A with fleet managers who utilize alternative energy sources (such as Oakhurst Dairy and

¹⁹ <http://www.afdc.energy.gov/pdfs/52423.pdf>

²⁰ http://www.afdc.energy.gov/fuels/biodiesel_benefits.html

	Casella/Pine Tree Waste), and representatives from Maine Standard Biofuel and Advanced Fuel Solutions, Inc.
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The City performed a trial-run of bio-fuels in 2008. While that trial was unsuccessful, the City hopes to re-examine the use of biofuels and take advantage of new technologies and lower per-gallon costs. Other New England municipalities and businesses are now using biodiesel for their fleets, with great success through improved technology and different mixtures of biodiesel. The most commonly used grade of biodiesel is B20 (i.e. 20% bio-fuel, 80% petroleum-based diesel, by volume). This fuel, in general, requires no changes to engines to run effectively. The City of Keene, New Hampshire has been using B20 for multiple years in all of their municipal fleet and equipment, including police and fire trucks, construction equipment, and all vehicles with no problems,²¹ and Cape Elizabeth and Falmouth have recently started using B20 as well. L.L. Bean has been using B20 biodiesel in their fleets since 2003. A number of local businesses and municipalities are also experimenting with using a higher mix of biodiesel during the warmer months and B20 in the winter.

Workshops through Maine Clean Communities have provided the City with contacts from local biodiesel suppliers, who spoke to their production, availability, and potential contract potential for local fleets. Representatives from local Oakhurst Dairy and Casella/Pine Tree Waste, whose fleets both run on biodiesel, recommended its usage by other area fleets, and did not report any major issues. Casella’s fleets in Vermont are also using compressed natural gas (CNG) successfully.

(The ERC does recommend, however, that any shift to biodiesel should be using fuel for which the plant basis is a local Maine or New England source. This caveat is based on the enormous GHG emissions and costs of using plant-based sources that must be transported long distances to Maine for use.)

Action: Purchase, as they become available, systems that reduce the energy usage of add-on equipment vehicles such as police and fire vehicles without sacrificing operational efficiency.

Responsible Department	Police and fire departments.
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²¹ <http://www.ci.keene.nh.us/departments/public-works/fleet-services>

GHG Emissions Reduction	A reduction of five minutes of daily idling time for a single vehicle can save 250 pounds of CO _{2e} per year. ²²
Annual Cost Savings	Depends upon technologies that become available for purchase.
Challenges	Initial cost due to the size of the City's fleet. IdleRight2 Fuel Management Systems, for example, can cost upwards of \$550 per vehicle for purchase and installation. IdleRight2 systems are also best-suited for detail vehicles, not regular patrol cars, as they do not allow for heat and AC to remain on when the engine is off.
Benefits	Allows the engines of emergency vehicles to be turned off, while still maintaining battery power to operate lights.
Action Status	Ongoing. The City of Portland tested "IdleRight" System on police cars in 2011, and passed their findings on to South Portland. The system has been installed for a "trial-run" on one South Portland police detail vehicle, which is predominately used at construction sites.

The ERC recommends that the City investigate the purchase of a system that reduces the energy usage of add-on equipment vehicles like police, fire, and construction, without sacrificing operational efficiency such as the IdleRight™ system used in police cars in Portland and Falmouth.

IdleRight™ is compatible with virtually any vehicle with an automatic transmission and electronic fuel injection, and it allows a vehicle to be turned off while emergency lights are flashing without fear of killing the battery. Produced by Havis, Inc., it detects the voltage in the battery and automatically turns on the ignition when the battery needs to be charged. After the battery charges, the vehicle automatically turns off. Havis estimates fuel savings as high as 80% depending on the application and the efficiency of the emergency equipment. Havis offers a "Return on Investment" Calculator for its new "IdleRight2" system here: <http://idleright.havis.com/savings.html>. Newer IdleRight2 systems also track and report idling hours saved, providing an easy way for the City to track cost and energy savings associated with the technology. However, IdleRight2 systems require vehicles to have remote starters, which can increase the costs associated with installation by as much as \$400.

The City currently has one system installed and working successfully, but the Police Department lacks the funds to install the system in every vehicle.

Action: Strengthen and enforce existing City policy to reduce idling of both heavy and light duty vehicles.

Responsible Department	Public Works, Transit, Parks and Recreation, and Sewer Maintenance departments.
GHG Emissions Reduction	A reduction of five minutes of daily idling time for a single vehicle can save 250 pounds of CO _{2e} per year. ²³

²² Town of Falmouth Energy and Climate Protection Plan, p. 46.

²³ Town of Falmouth Energy and Climate Protection Plan, p. 46.

Annual Cost Savings	A vehicle idling gets zero miles per gallon.
Challenges	Enforcement and the number of exceptions (transit buses with passengers, emergency vehicles, and etc.) required.
Benefits	Improved air quality at City facilities, reduced consumption of diesel and gasoline by City vehicles, and a reduction in pounds of CO _{2e} .
Action Status	Ongoing. City policy is in place, but is not actively enforced at this time.

The City is required to use cars and trucks for the general conduct of government. However, opportunities exist to minimize emissions and gasoline consumption.

Idling vehicle engines contributes to greenhouse gas emissions and air pollution. Idling a single vehicle for 5 minutes a day contributes almost 250 pounds of CO_{2e} per year. The State of Maine passed a commercial vehicle “no idling” law in 2008. The City followed suit by adopting an amended “Anti-Idling Policy” effective August 1, 2008. This City policy prohibits unnecessary idling when the ambient temperature exceeds 35 degrees F; limits idling to under five minutes when the temperature is 32 to 35 degrees, and under ten minutes when the temperature is below 32 degrees to ensure the operator has a safe level of heat. All vehicles are limited to five minutes of idling time for air conditioning when the temperature exceeds 80 degrees F.

This City policy is not actively enforced by City staff. The ERC recommends that the City routinely remind employees to not idle vehicles unnecessarily, and encourage department heads to monitor vehicle operators to identify and correct violations of City policy.

The City of Burlington, Vermont has limited idling to three minutes per hour. The ERC strongly recommends that the City follow Burlington’s example and limit idling from five minutes to three in temperatures above freezing.²⁴

Renewable Energy Actions

As rebates and incentives become available at the municipal level, all opportunities to include renewable energy in the City’s energy portfolio will be considered.

Action: Power Purchase Agreements for the purchase and installation of solar panels for municipal buildings.

²⁴ <http://www.burlingtonfreepress.com/article/20100112/NEWS02/100111014/>.

Responsible Department	City Hall; Planning; School Department; Community Center
GHG Emissions Reduction	TBD; first project savings are being tracked by Planning Department.
Annual Cost Savings	Under the current Power Purchase Agreement, a savings to the City of \$0.02 for every kilowatt purchased from SoPo Solar.
Challenges	Suitability of buildings for solar installation; varied cost-savings associated with each project site.
Benefits	Zero-emission solar power is sold to the City at reduced cost. Panels can later be purchased by the City at a steep (75%) discount.
Action Status	Ongoing. The City Planning Office has installed solar panels, but some City buildings have been ruled out of the SoPo Solar program due to cost reasons. However, some buildings have installed solar panels, such as the new high school, to heat hot water systems, rather than for the purpose of electricity generation. Once these new panels are up and running, the City will be able to evaluate the cost/benefit of using panels for this purpose as well. The City's Wastewater Treatment Plant is also examining solar panels as an option for pre-heating makeup air for larger HVAC systems in the development of their facilities plan.

On November 5, 2012, the South Portland City Council passed Order #60-12/13, authorizing the City Manager to sign a Power Purchase Agreement (PPA) with SoPo Solar, LLC, a subsidiary of ReVision Energy, LLC. This agreement permitted ReVision Energy to construct, operate, and maintain a solar powered electric generation project at the Planning and Development Department on 496 Ocean Street, previously the site of Hamlin School.

This PPA authorized SoPo Solar to sell power that comes from solar panels on the current Planning Department building to the City. SoPo Solar was created to enable ReVision Energy to benefit from the Federal Investment Tax Credit, Renewable Energy Credits, and other State solar rebates and incentives. Power is to be sold to the City for two cents under current energy supply cost, and after seven years the City will have the option to buy the panels at approximately one-quarter of their original cost.

The solar orientation and resulting output is less favorable on City Hall than on the Hamlin School, causing the discount for installing solar panels on City Hall to be only one cent under supply cost. As such, the City Council does not currently believe that City Hall building should be included as a future five panel host site in the PPA.

The Community Center was also considered as a possible panel site, but due to the larger size of the facility reducing the rate paid for electricity, the savings would not be enough to justify a project. However, the old Hamlin School, being a relatively small electricity user, pays a higher rate and was found to expect more savings. The building was chosen due to the slope, orientation, and height (which affects installation costs) of the roof.

The impact of this project on greenhouse gases will be determined by Planning Officials, who are documenting energy use, respective savings, and monitoring performance of the solar panels over

time. The City hopes that by quantifying and documenting benefits and savings, local businesses and taxpayers will be more inclined to expand their renewable energy portfolios as well.

Action: Complete a feasibility analysis and construct a South Portland Landfill Solar Array.

Responsible Department	Executive & Planning Departments.
GHG Emissions Reduction	TBD by ReVision Energy Feasibility Study.
Annual Cost Savings	TBD by ReVision Energy Feasibility Study.
Challenges	Potential site limitations, financial feasibility.
Benefits	Energy production by solar array will produce emissions-free solar power on a capped landfill, which can be sold to the City and residents.
Action Status	The City Council has allocated \$12,500 for a solar farm feasibility study, expected spring 2014.

The City Executive and Planning Departments have requested a solar Site Feasibility Study²⁵ for the South Portland Landfill located off Highland Avenue. The City has asked ReVision Energy, LLC to propose a methodology to determine the feasibility of installing a utility scale solar array on top of the capped landfill—a “brightfield” project, as these projects have been coined.²⁶

According to ReVision’s proposal, this three-part study will determine the site feasibility of the project from an electrical engineering perspective, a solar suitability perspective, and a financial perspective. The electrical engineering study will determine the “feasibility of interconnecting a solar array to the utility grid, including an evaluation of the existing electrical infrastructure provided by the utility both on site and in the vicinity; to determine limitations of the existing electrical infrastructure, if any; to quantify service upgrades that may be required and the costs of such upgrades.”

The solar suitability study will determine the feasibility of designing a solar array that maximizes energy production, and will include an evaluation of the existing landfill site to determine any production or cost limitations.

The financial study will include an evaluation of ownership structure options, available state and federal incentives and energy off-taker options, and a discussion of the advantages and disadvantages of these various options.

²⁵ Proposal to Provide Services, City of South Portland, South Portland Landfill Solar Array Site Feasibility Study”, ReVision Energy, LLC. November. 22, 2013.

²⁶ “A Blue-Collar Town Goes Green”, Bloomberg Businessweek, Aug. 27-Sept. 2, 2012.

If the result of the initial three-part feasibility study by ReVision indicates that the landfill is a suitable site for a solar array, then the City will proceed with site-specific geotechnical analysis by a qualified engineering firm with related landfill experience in advance of any construction.

Category 3: Behavior Change and Policy Recommendations

The EPA recommends “supplemental load reductions” as a necessary step to reduce facility energy usage. Supplemental sources are building occupants and electronic equipment. The City and ERC recognize that policies in the workplace need to be established to reduce energy consumption. These policies cost nothing, however, they involve behavior changes at all levels of the City staff and reduce a significant amount of energy. In return, the amount of money saved can ultimately benefit the City and staff.

Action: Establish purchase and use policies to reduce solid waste.

Responsible Department	All City Departments.
GHG Emissions Reduction	TBD.
Annual Cost Savings	TBD.
Challenges	Competitive procurement is largely governed by price.
Benefits	Lower replacement and disposal costs for goods purchased by the City.
Action Status	To be implemented.

The ERC recommends that the City amend its purchasing policy to place emphasis on the durability of goods, and consider useful life along with cost. The City Sustainability Committee and Purchasing Department can work together to draft a new purchasing policy that includes language on the durability and lifespan of purchased goods.

Action: Establish and/or expand recycling at all facilities. Encourage employees to utilize the City’s single sort-recycling program.

Responsible Department	All City Departments.
GHG Emissions Reduction	Measuring waste prevention is difficult, but the US EPA offers a web program ²⁷ to track any reductions in waste disposal, and provides estimates for: <ol style="list-style-type: none"> 1) The quantity and composition of waste generated, 2) Waste removal costs avoided, 3) Waste prevention and recycling revenues, and 4) GHG emission reductions.

²⁷ <http://www.epa.gov/smm/wastewise/measure-progress.htm>.

	The City is also researching the ULI Greenprint software program, which generates reports for members that import their waste generation data.
Annual Cost Savings	TBD.
Challenges	Most buildings only have recycling bins by photocopiers, while trash cans exist at every employee desk. It is often more convenient to throw something away than to recycle it, and confusion does exist on what can or cannot be recycled.
Benefits	Increased recycling of waste paper and other recyclable materials that would otherwise be thrown away, saving waste disposal costs for the City.
Action Status	The City now provides recycling bins for paper next to all printers and photocopiers. The provision of more recycling bins at employee desks, break rooms, and in community centers for the public is now underway.

It is important to educate employees on what can be recycled and what must be thrown away in order to increase proper recycling and reduce waste.

The City now provides recycling bins for paper next to all printers and photocopiers, and endeavors to provide recycling bins next to every City trash can in the future. Savings associated with increased recycling and waste reduction can be tracked with the EPA's "Waste Reduction and Buy Recycled Tracking Sheet", or with the ULI Greenprint software.

The ERC recommends that the City follow the example of the University of Southern Maine, which has recently introduced the "Tiny Trash Reduction Initiative."²⁸ USM issued all staff and faculty members a small desktop trash can to replace any larger desk side trash cans. Recycling bins were placed next to every desk to encourage increased recycling. The ERC recommends the City adopt a similar policy, and remove large trash cans from under the desks of employees.

Action: Establish and encourage a "lights out" at night policy.

The City will encourage all employees to embrace a "lights out" at night policy. Lighting is usually the largest electricity user in City buildings. A "lights out at night" or "while not in use" policy is an effective and easy way to save electricity, reduce pollution and save municipal money.

The ERC recommends the City overcome barriers by providing education to all employees and by installing motion sensors in rooms, as mentioned in a prior action step. Sensors can save between 20%-50% of the lighting energy used.

Action: Establish and encourage the policy of turning off all office equipment at night and on weekends, and pursue new technologies which minimize electricity use by City equipment which must remain turned on or plugged in at night.

²⁸ <http://usm.maine.edu/sustainability/tiny-trash>

Encourage all employees to turn off all office equipment at night and on weekends where possible. Toasters, coffee makers, space heaters, and air conditioners should also remain unplugged when not in use. This benefits the City by reducing the electricity drawn by equipment that is not regularly in use.

Power management of computers and monitors can significantly reduce energy consumption and save electricity costs. Information Technology (IT) management and policies are a way to ensure computers, monitors, appliances, and lights are turned off or drawing minimal energy possible when not in use.

The City Information Technology (IT) Department is currently researching new technologies, such as those in place at Maine Medical Center, which allow for computers and other equipment to be turned off for most of the night, automatically powered on briefly for necessary security and software updates, then powered off again when not in use. The ERC recommends that the City IT Department and City Sustainability Committee actively pursue any new technologies which allow for effective management of electricity by all City electronic equipment.

Action: Promote car/van pooling, public transit, and bicycling as a means of transportation for employees.

Responsible Department	All municipal staff.
GHG Emissions Reduction	Roughly 12 tonnes of CO ₂ per year (0.25 tonnes per person per year) ²⁹ .
Annual Cost Savings	Roughly \$4,685/year.
Challenges	Behavioral change, convenience, ability of employees to respond to an emergency, coordination of commuters.
Benefits	Reduced congestion and reduced municipal parking needs.
Action Status	The City has installed bicycle racks at all staffed municipal buildings. City Hall and the South Portland Recreation Center have shower facilities and lockers available for staff use in order to promote more active lifestyles through walking/biking and reduce vehicular commuting.

In 2010, the City staff consisted on approximately 290 full and part-time people from 43 municipalities. If eventually 150 of these folks commute another way, including car pooling and bicycling, the impact on GHG emissions in the City and the surrounding area will be substantial, saving staff money.

²⁹ This estimate is based on the number of 2010 employees residing in Portland or South Portland. If 50 of these employees car-pooled to work there would be a significant reduction in GHG emissions and costs for the City employee. The example is based on the following parameters - \$ 3.60/gal; 15 mpg of vehicles removed from the highway; average one-way commute 8 miles.

Total estimated emissions from the transportation sector were 89,712 tonnes CO_{2e} in 2007. Gasoline-powered passenger cars and light trucks contributed 48.4% (43,456 tonnes CO_{2e}) and 35.5% (31,819 tonnes CO_{2e}), respectively, of total transportation emissions according to the 2007 Inventory Report.

A City/School car pooling program can set an example to the larger community about the City's commitment to reducing GHG emissions.

Initially, incentives may be needed to start this program. For example, Hillsborough County, FL offers a \$20 monthly subsidy to each vanpool rider and a 50 percent subsidy on bus passes to employees, resulting in 67,200 fewer miles being traveled by commuters.³⁰ South Portland could offer free bus passes to employees who live locally, and stipends for carpooling or choosing to ride a bicycle.

Eventually, incentives to employees who commute another way could be paid through charges for parking for staff that does not commute another way. However, this charge should be avoided if possible.

Action: Eliminate desktop printers.

Desktop printers are expensive to maintain and are not durable. Only a small few City positions need to retain a private printer.

To date, City Hall and the School Department have replaced most desktop printers with Department printers/copiers that are shared by all employees.

IMPLEMENTATION PLAN

Policy Implementation

The ERC recommends that the City begin to implement or complete the Action Steps outlined in this document: Phase 1 - Municipal Opportunities, immediately upon adoption by the City Council. The combined efforts of the City Sustainability Committee, citizen-staffed Energy and Recycling Committee, and a City Sustainability Coordinator will take this document from plan to reality, and establish the City of South Portland as a positive example of green leadership for the public, local businesses, and the region.

The Renewable Energy, Efficiency, and Transportation action items in this CAP will be addressed and implemented through the day-to-day functions of City staff. The behavioral items will require a new program designed to educate and motivate all employees to work towards sustainability goals.

³⁰ Hillsborough County, Florida vanpool program, http://www.gohart.org/ride_guide/vanpool/hart-vanpool.html.

As a fun jumpstart to this new initiative, employees could be presented with the current carbon footprint of their building from the GHG inventory. Next, employees can set a goal that they can all work at together so there is a measurable change so they are able to see the success they have created. This will create a team environment where workers can encourage each other to make behavioral changes that will help them reach a goal. This pilot plan was used in Portland, Oregon and garnered positive reviews. Portland called the program a “low carbon diet”, which functioned like a weight loss challenge. Many work places established “Eco-teams” and encouraged friendly competition between teams to increase the reduction in their carbon footprint. The University of Maine Orono has also established this same practice by creating dormitory “Eco Reps” and holding multiple competitions to reduce student electric use between dormitories.³¹

Webinars and educational meeting could be incorporated into the workday that educate employees how to reduce their carbon footprint. Selected individuals from the Eco-teams could be chosen to present ideas and encourage employees to make changes.

Ideas to support policy and change:

- Teaming up with other organizations and business that are encouraging sustainable practices;
- Making sure that management is trained and aware of the importance of encouraging sustainable practices in the workplace;
- Creating a life-long education program about sustainability in the workplace; and
- Using local, state, and national policies that encourage sustainable practices.

Behavioral changes can be difficult to accomplish because they require a change in existing, entrenched habits. However, with proper education from their supervisors, people can develop new habits that can make a difference to their workplace and community. Proper education includes awareness of need and benefits from the change, and encouragement/reward.

Municipal leaders and department managers should ask themselves:

- *“What can I do to make a difference?”*
- *“How can I help my staff follow examples?”* and
- *“How can our example as a municipality help the residents we serve?”*

City leaders should establish a program that encourages employees to commute to work in ways that create no or low carbon (walk, bike ride, carpool, bus, rideshare). Incentives could be established that encourage employees to change the way they get to work. Initial investment would be incredible small and has the ability to make a large difference in the carbon footprint.

1. Increase municipal employee bus ridership. Note: The case for this action is very similar to that of car/van pooling, especially for staff that live within the South Portland and Metro systems’ area.

³¹ <http://umaine.edu/news/blog/2011/08/02/princeton-review-fiske-guides-list-umaine-among-nations-best-university-named-to-green-honor-roll/>

2. In this case, there are greater savings because a larger number of vehicles are removed from the road with the full use of each municipal bus.
3. In addition, as there is more usage of the existing transit system, investments in additional routes or more buses on existing routes can be justified.

The City's in-house Sustainability Committee will be instrumental in the implementation of Phase 1. The action items specifically outlined in this plan have been restricted to those which are attainable and realistic, and will help the City achieve its goal of 17% emissions reductions by 2017. However, there are many additional items that have been identified that are also being pursued by City staff. The ERC recommends incorporating new items into this living document as they become feasible and cost-effective.

PHASE 1 CONCLUSION

Phase 1 of the City's Climate Action Plan is an ambitious endeavor to meet a lofty goal: 17% emissions reduction by 2017. However, the ERC believes strongly that through both large and small City actions, that goal can be met or even surpassed.

Phase 1 identifies work being done by the South Portland municipal government. It is the firm belief of the ERC that these proposed actions—many of which are currently in progress, or soon to be adopted by City departments—will establish a solid foundation for future energy use reductions.

APPENDICES

APPENDIX A

SOUTH PORTLAND SUSTAINABILITY RESOLVE

City of South Portland Sustainability Resolve
IN CITY COUNCIL
RESOLVE #1-10/11

WHEREAS, the Council for the City of South Portland has expressed a desire to lead by supporting initiatives that reinforce the goal of creating a sustainable South Portland that benefits all people in the City through energy savings, cost benefits, and improving the health and welfare of the employees and people of the City; and

WHEREAS, the City of South Portland signed the U.S. Mayors' Climate Protection Agreement in 2007 that calls for focusing on "reducing global warming pollutants through programs that provide economic and quality of life benefits such as reduced energy bills [in residential, commercial and public buildings], green space preservation, air quality improvements, reduced traffic congestion, improved transportation choices, and economic development and job creation through energy conservation and new energy technologies"; and

WHEREAS, following the Council's guidance in passing the Resolve #3-07/08 in 2007 that resulted in the signing of the U.S. Mayors' Climate Protection Agreement, the City Manager and City staff, in conjunction with citizen committees, have begun work on framing the tenets of sustainability as they can be applied in South Portland; and

WHEREAS, the City of South Portland, as a member of the Greater Portland Council of Governments, strongly endorses the Sustainability Principles adopted in 2008 by the GPCOG Executive Committee; and WHEREAS, buildings are the major source of demand for energy and materials that produce by-product greenhouse gases (GHG), slowing the growth rate of GHG emissions and then reversing it over the next ten years is the key to keeping global warming under one degree centigrade (°C) above today's level; and

WHEREAS, the City recognizes and celebrates the initiatives that have already occurred that raise the level of awareness throughout the City for a sustainable approach to improving the quality of life for all of our citizens, while encouraging continued business vitality and economic development; and

WHEREAS, the Planning Department, in collaboration with a citizen committee, is in the process of updating the 1992 Comprehensive Plan, which will provide an opportunity for the City to incorporate and embed sustainable principles into an action plan for the City for the next five to ten years and beyond.

WHEREAS, the Executive Department initiated a department wide strategic planning process that includes sustainability principles and action steps; and

WHEREAS, City staff is working with the School Department on a sustainable procurement policy that will govern all purchases of supplies and equipment for the City. The City of South Portland is committed to policies that are fiscally sustainable for the City; and

WHEREAS, through a U.S. Department of Energy grant, the City has hired an Energy and Sustainability Coordinator to help move the City towards its sustainability goals. The City recognizes that the organizational commitment to more complex steps toward the evolution

of a sustainable City requires the focus of a dedicated position or office and will seek funding to continue support of this process; and

WHEREAS, the City has engaged the services of an Energy Service Company first to perform a baseline audit of a number of municipal buildings, and then to make recommendations for energy improvements to reduce greenhouse gas emissions, to reduce energy usage, and to avoid additional expenditures from the General Fund, all of which will inform decisions on City facility planning; and

WHEREAS, a citizen-based Energy and Recycling Committee has begun a green house gas inventory that will form the basis for a Climate Action Plan that can be integrated into the Comprehensive Plan; and

WHEREAS, the Economic Development office, through a public/private partnership, is seeking to develop combined heat and power facilities in a number of locations that would reduce energy use and costs; and

WHEREAS, the Mill Creek Transit Hub project and associated planned Transit Tax Increment Financing district illustrate the use of a creative multiple stakeholder process that is the foundation of achieving a sustainable transportation system in the City. This project is emblematic of the kind of efficiency of operations, incorporation of low impact stormwater design features, efficient energy use through realignment of transit schedules and routes to encourage greater use, and provide the public with an example of municipal leadership through accomplishment of cross-organizational goals; and

WHEREAS, in advance of the development of a PACE (Property Assessed Clean Energy) Program, staff has begun discussion with the Efficiency Maine Trust, to develop a plan that will provide property owners with access to low-interest loans to allow residential and business energy upgrades; and

WHEREAS, the South Portland Bus Service has negotiated an agreement with Southern Maine Community College that will provide incentives for students during the 2010-2011 school year to ride public transportation. This goals of this program are to reduce vehicle emissions with fewer single occupancy vehicles, reduce congestion on Broadway and other roadways, and increase ridership on public transportation; and

WHEREAS, automated curbside recycling, for residential solid waste customers, begun in 2008, in South Portland and now accounts for approximately 28% of residential waste. The Energy and Recycling committee is currently working on steps to move the recycling program to the next level. Recycling and Waste Reduction will also be part of the Climate Action Plan; and a goal will be set as part of the plan; and

WHEREAS, the City of South Portland has implemented various other initiatives throughout the City to reduce costs and to demonstrate the City's commitment to sustainability, such as, for example, replacing standard bulbs with 8,800 LED Christmas lights, installing LED lights in City traffic signals, redesigning motors and equipment at the wastewater treatment plant and pump stations to run more efficiently, thereby reducing the energy load from 2.7 million KWh/year to 1.9 million KWh/year; and

WHEREAS, the LEED (Leadership in Energy and Environmental Design) rating systems, developed by the U.S. Green Building Council to encourage market transformation of the process for building design and construction, are not intended for use as a municipal code, and there are also numerous standards, usually in the form of allied building codes that, if they are added to existing codes, can result in confusion and conflicts, adding to the complexity of meeting the goals and metrics to reduce Greenhouse Gases, energy consumption, and reliance on fossil fuels. The City will continue to explore ways to encourage and support the use of LEED criteria in renovation and construction of both municipal and private sector projects.

NOW THEREFORE BE IT RESOLVED, that the City Council, City Manager, Staff and stakeholders of the City of South Portland pledge themselves to complete the implementation of policies and actions that will meet the goals for greenhouse gas reduction initially set by the U.S. Mayors' Climate Protection Agreement and the completed South Portland Climate Action Plan; and

BE IT FURTHER RESOLVED, that an in-house team, consisting of at least one City Counselor, representatives of City Departments, in conjunction with established municipal committees, shall serve as the municipal sustainability champions to develop and implement policies for all City projects; and

BE IT FURTHER RESOLVED, that the City will develop stakeholders' groups of residents, business owners, school officials, and other interested parties to implement the action agenda provided by the Climate Action Plan in the following building sectors – municipal, schools, residential, commercial, and industrial; and

BE IT FURTHER RESOLVED, that once the Climate Action Plan is completed, steps will be taken by the In-house Team and stakeholders' groups to develop implementation strategies to meet the goals recommended in the Climate Action Plan, in conjunction with the ongoing Comprehensive Plan process, in the following areas – Land Use, Transportation Planning, Renewable Energy, Energy Efficiency, Sustainable Building Practices, Water and Wastewater Management, Recycling and Waste Reduction, and Education and Outreach; and

BE IT FURTHER RESOLVED, that by the time the current City electrical supply contracts begin to expire in 2012, the City will have in place the legal and operational framework for a nonprofit Municipal energy supply company or an equivalent vehicle. The goals of this action are to reduce the power costs for the residents, businesses, and the municipality, and to provide funding outside of the General Fund for future municipal projects; and

BE IT FURTHER RESOLVED, that education of the citizens of the City is a critical component of the increasingly complex actions that will be necessary to keep moving toward a sustainable and resilient South Portland. After providing education in the techniques of sustainable thinking with municipal staff and departments, the City will expand the education process to the residents and business owners to ensure the public is receiving sufficient information, guidance, and support to provide the incentives for all to act with a sustainable intent. Over time the goal is that citizens will educate each other about the latest thinking and the effect of the myriad decisions that we each make in our lives; and

BE IT FURTHER RESOLVED, the City of South Portland will accomplish the aforesaid goals according to the following schedule.

- Late Fall, 2010 – Implement an Environmentally Preferable Purchasing Policy for all City departments.
- Fall, 2010 –Establish the In-house team with the charge of achieving three interdepartmental projects by the middle of 2012, in addition to the Environmentally Preferable Purchasing Policy, that are outside the scope of the Energy Services company audit and Climate Action Plan, but are creative solutions to existing issues in the City that inhibit the City's ability to move in sustainable directions.
- Late Fall, 2010 – Energy Services Company audit completed to provide the basis for prioritization of projects in City buildings.
- Spring, 2011 – Prioritize and begin implementation of the projects that have been identified through the audit by the Energy Services Company.
- Spring, 2011 – Completion of the first phase (i.e. municipal buildings, infrastructure and fleets) of the Climate Action Plan for the City. Once this plan is completed, the stakeholder groups will be activated to assist the City in the implementation of the initial action steps. This will include a timeline for implementing or achieving the steps.

- Fall, 2011 – Implement a plan, developed by the City staff (the In-house team and others), and led by the City Council members and executive staff, to provide incentives for all City employees to commute another way at least two days per week, as an example of the City’s commitment to reducing single occupant vehicles on South Portland roads. The plan will be based on the assumption that with creative, sustainable thinking, ways to accomplish this goal can be found.
- Spring, 2012 – Develop procedures and parameters for on-going data collection to evaluate the success of the program and policies and to develop the next set of action items as an ongoing process to keep moving South Portland to an ever more sustainable level of operation. This will be the work of the City Council, the Energy and Recycling Committee, the In-house team and the stakeholder groups; and

BE IT FURTHER RESOLVED, that the City Manager or his/her designee shall prepare quarterly/semi-annual progress reports for City Council. These reports will identify project implementation and emission reductions.

APPENDIX B

2007 CITY OF SOUTH PORTLAND EMISSIONS INVENTORY

See digital attachment.

APPENDIX C

SIEMENS YEAR 1 PERFORMANCE REPORT

See digital attachment.