

Item No. 3 (ii)

Halifax Regional Council
November 27, 2007
December 4, 2007
Committee of the Whole

TO: Mayor Kelly and Members of Halifax Regional Council



SUBMITTED BY:

Dan English, Chief Administrative Officer



Wayne Anstey, Deputy Chief Administrative Officer - Operations

DATE: November 21, 2007

SUBJECT: **HRM Community Energy Plan**

ORIGIN

- June 27, 2006 - Regional Council approval of the 25 Year Regional Plan
- August 26, 2006 - Provincial approval of the Regional Plan
- November 28, 2006 - Regional Council approval of RFP 06-125, HRM Community Energy Plan (Functional Plan of the Regional Plan)
- February 16, 2007 - Presentation (project update) to the Energy and Underground Services Committee of Council
- May 18, 2007 Presentation to Energy and Underground Services Committee - Support in principle of the concept and general evaluation criteria for the Community Energy Plan
- October 24, 2007, Presentation to the Regional Plan Advisory Committee
- October 26, 2007, Presentation to the Energy and Underground Services Committee of Council
- November 21, 2007, Presentation to the Regional Plan Advisory Committee

RECOMMENDATIONS ON NEXT PAGE. . .

Table of Contents

Setting The Context	1
The Challenge	1
HRM’s Response	1
CEP Deliverables	2
CEP Expected Outcomes	2
Executive Summary.....	3
The Challenge Before Us.....	3
Charting our Course.....	3
Key Learning Along the Way.....	4
Our CEP Vision, Goals and Decision-making Criteria.....	6
Actions that Matter	7
1 Introduction and Background.....	10
THE FOCUS	
2 Task 4: Implementation Plan.....	14
SUPPORTING REPORTS	
3 Task 1: Review of Existing Resources	30
3.1 Review of Existing Emissions Inventory for the Municipality.....	30
3.2 Analysis of Inventory Cost Estimates.....	31
3.2.1 Direct Energy Costs Estimates	32
3.3 Review of Renewable Energy Sources in HRM.....	33
3.4 Review of Existing Programs and Regulations.....	34
4 Task 2: Consultation Program	35
5 Task 3: Future Demand and Supply Assessments	38
5.1 Past Trends and Future Energy Requirements.....	38
5.2 Energy Price Forecast - General	41
5.3 The Nova Scotia Electricity Market	42
5.3.1 The General Market Background	42
5.3.2 The Existing Electricity Systems in the Maritimes	43
5.3.3 Overview of Electricity Purchases	44
5.4 Energy Supply Risk Review	44
6 Task 5: Education and Awareness Program	46
7 Task 6: Monitoring Program	48

7.1	Approach.....	48
7.2	Monitoring Activities.....	49
8	Summary Comments.....	51

List of Figures

Figure 1.	Summary of the 2002 GHG Emissions in Tonnes and the Relative Community Sector GHG Contributions.....	31
Figure 2.	HRM Community Non-Electrical Energy Requirements (GJ).....	39
Figure 3.	HRM Community Electrical Energy Requirements by Sector	40
Figure 4.	Total Energy Use Profile and Future Demand for Combined Corporate and Community HRM	40
Figure 5.	Logic Model to CEP implementation	49

List of Tables

Table 1.	2002 in Corporate HRM by Sector	30
Table 2.	2002 HRM Community Energy Use, GHG Emissions and Cost	31
Table 3.	2002 Estimates of Direct Energy Costs in Entire HRM	32
Table 4.	2007 Projected Combined HRM Energy Costs by Energy Type.....	32
Table 5.	2007 Estimate of Pollution Costs in HRM Community by Pollutant Type.....	33
Table 6.	HRM Community Electrical Energy Usage and Future Requirements (GJ)	39
Table 7.	5-Year Electrical Demand and Energy Use Data for HRM.....	41
Table 8.	NSPI’s Forecast of Annual % Growth Rates in Electrical Energy Requirements in NS..	41
Table 9.	U.S. Energy Prices: Short Term Base Case	42
Table 10.	NBSO Interconnections Ratings in MW.....	43
Table 11.	Rates for Service under Northeast Open Access Transmission Tariffs	43
Table 12.	Summary of Energy Supply Risk Factors.....	44

SETTING THE CONTEXT

The Challenge

- .1 HRM's Corporate Spending on energy has increased by over 60% in the past 5 years, and now exceeds \$20 million per year.
- .2 Energy costs in the entire HRM have increased by over 40% in the same time period and now exceed \$1.3 billion per year.
- .3 Energy costs have been increasing faster than the growth in energy consumption for both HRM Corporate and Community.
- .4 GHG emissions for HRM Corporate have increased by 12% in the past 5 years and by approximately 9% in the HRM Community.
- .5 HRM's obligation under the Partners for Climate Protection Program is to reduce emissions below the 2002 levels by 20% both corporately and in the Community by 2012.
- .6 Supplies of conventional energy sources are declining, leading to increased energy prices and increased concern over long term supply availability of energy.
- .7 HRM is highly reliant on imported energy to meet the majority of its energy needs.
- .8 Climate change impacts are increasing.

HRM's Response

- .1 HRM's Corporate them of Healthy, Sustainable, Vibrant Community supports Community Energy Planning.
- .2 The 25-Year Regional Plan outlined the vision of a sustainable environment through sustainable land use planning.
- .3 The Community Energy Plan has been identified as a key Functional Plan of the Regional Plan.
- .4 HRM, along with NRCan, developed the terms of reference for this CEP, which is to be a template for other municipalities across Canada.
- .5 The CEP has eight main goals as follows:
 - Improve the energy efficiency of buildings;

- Increase transportation choice and efficiency;
- Increase industrial energy efficiency;
- Encourage energy efficient land use planning and neighbourhood site planning;
- Increase efficiency of infrastructure;
- Increase energy security and diversify energy supply;
- Educate and engage residents and businesses; and
- Demonstrate local government leadership.

CEP Deliverables

The CEP is comprised of seven key tasks, each one represented by a deliverable as follows:

- Task 1: Review of Existing Resources;
- Task 2: Stakeholder and public consultation program;
- Task 3: Future Energy Demand and Supply Assessment;
- Task 4: Implementation Plan;
- Task 5: Education and Awareness Program;
- Task 6: Monitoring Program; and
- Task 7: Final Summary Report.

CEP Expected Outcomes

- Greater awareness and appreciation of energy by HRM staff and the public;
- Greater participation and partnering among HRM, other levels of government, and private industry to reduce energy consumption;
- Greater energy efficiency in new and existing buildings;
- Greater demand for energy efficient products; and
- Reduced need for private vehicle trips, improved access to public transit.
- Improved energy efficiency in HRM transportation fleet.
- Improved energy efficiency in public infrastructure.

EXECUTIVE SUMMARY

The Challenge Before Us

Our world is facing unparalleled economic, environmental and societal challenges which are largely the result of human actions. Probably foremost among them is global climate change which will affect everyone and particularly coastal communities including Halifax Regional Municipality and Nova Scotia. These atmospheric changes are caused by many factors but the enormous amounts of energy modern societies use (by any historical standard) and the ways we produce and use it are by far, the biggest causes of the problem - the growing accumulation of greenhouse gases in our atmosphere. In addition, our energy use plays a part in other environmental and health hazards from pollution of air, ground and waters - damaging animal and plant life, and of course humans. The economic cost of excess energy use is also substantial, especially when we consider all the other worthwhile areas we could be investing in for community improvement. Overall, energy sustainability (supply, cost and efficiency) is also of long term importance for the economic health and social progress of our community. Therefore while energy use is essential in everyday life, in light of all these factors, there is every reason to use energy as little and as efficiently as we can, and to obtain our energy from the least polluting sources possible.

Local residents have a strong and deeply rooted tradition of caring – for each other, for our community and for the wellbeing of the world we live in. We're prepared to work hard for things that matter. In that spirit we have worked together for many years to improve our region's environmental, economic, social, and cultural qualities, now known as the four pillars or legs of sustainability. As an important part of this effort, HRM has been working towards what Regional Council has termed our strategy for a 'Healthy, Sustainable, and Vibrant Community'. HRM has taken an integrated systems approach to clean air, land, water and energy. Within that, deciding on and achieving our best energy future has been an important priority. The Halifax Community Energy Plan (CEP) process is the way HRM has focused the issues, building on a sound basis in data and engaged citizens (both individuals and organizations) to chart the way forward to that essential goal.

Charting our Course

In 2006, HRM, in partnership with Natural Resources Canada, developed a national template for Community Energy Plans. HRM's plan pilots this template.

The resulting CEP is the result of more than ten months of effort involving a broad cross section of our municipality – citizens, community groups, businesses, municipal staff and specialized expert consultants. We came together and shared our best ideas and knowledge to define a vision, set of goals and practical, functional plans that can guide and inspire HRM's energy transformation over the next twenty years. The CEP proposes a holistic view of how we can meet our true energy needs, but in the cleanest, leanest and greenest ways possible meaning cleaner, less polluting energy, energy efficiency and renewable energy sources. In essence, this involves getting our own HRM corporate 'house in order' and championing the community wide vision.

The CEP is based on the premise that energy use, supply and demand are all affected by community design and development, and ultimately the collaborative actions of citizens, businesses, institutions and the municipality itself. This includes efficiency in land use, transportation, site planning, building design, retrofits, infrastructure design and maintenance and operations, and development of renewable energy sources. To begin to develop a plan we first needed to know where and how the energy is being used in HRM, where it comes from, and then look at the widest variety of ideas about what we can do to reduce and optimize its use. The CEP process therefore was a staged effort, beginning with a review of existing energy use and resources, and a study of future demand and supply options. Then, in conjunction with community-wide communication to enhance education and awareness, a planning process was undertaken in close consultation with a wide range of stakeholders that:

- Developed a vision and eight overall goals for the CEP;
- Generated creative ideas for a ‘long list’ of well more than 150 potential actions drawing on stakeholder knowledge, ingenuity and inspiration, best practices from other municipalities, and discussions with HRM staff;
- Fashioned and applied criteria for evaluating and winnowing these ideas down to a more focused ‘short list’ of actions;
- Undertook a more comprehensive evaluation to test these actions’ value and feasibility; and
- Produced a grounded, practical and phased implementation plan proposing required leadership, responsibilities, outcomes, performance indicators, timeframes, and monetary and personnel resources.

A few key highlights merit further mention. In the first stage, our consultant experts reviewed and analyzed the most recent information on the energy resources being used within HRM so that we had a full and detailed picture of recent and likely future energy consumption including supply and demand based on types of fuel consumed. This Energy Resource Assessment included a look at information on atmospheric emissions, an emissions inventory that was compiled in 2004 by the International Council for Local Environmental Initiatives (ICLEI). This report showed a steady increase in energy consumption and an even greater increase in energy cost over the past ten (10) years. This was not a surprise since most energy in HRM is produced from fossil fuels (almost entirely coal burned to create electricity and fuel oil or gas used to heat our buildings and drive our cars and other vehicles). We are all aware of the increasing cost of fuels as the global demand increases just as supply options are decreasing.

We also assessed the resources amassed to date as part of various ongoing and completed HRM initiatives that could assist with the development of subsequent phases of the CEP. These included the status of renewable energy sources such as wind, solar, biomass, hydroelectric, earth energy, natural gas and waste heat energy recovery. It also covered a review of existing programs and regulations within HRM, at the provincial and federal levels and in the private sector.

Key Learning Along the Way

A few key facts became clear in our research.

- HRM's Corporate Spending on energy has increased by over 60% in the past 5 years, and now exceeds \$20 million per year.
- Energy costs in the entire HRM have increased by over 40% in the same time period and now exceed \$1.3 billion per year.
- Energy costs have been increasing faster than the growth in energy consumption for both HRM Corporate and Community.
- GHG emissions for HRM Corporate have increased by 12% in the past 5 years and by approximately 9% in the HRM Community.
- Supplies of conventional energy sources are declining, leading to increased energy prices and increased concern over long term supply availability of energy.
- HRM is highly reliant on imported energy to meet the majority of its energy needs.

If we don't change this picture things will only get more challenging as energy will consume an increasingly large portion of HRM's available financial resources. The same is also true for the impact energy will have on the financial resources of our commercial and residential taxpayers. At the same time, our research identified positive steps already underway by HRM that provide the foundation for major improvements:

- Green energy projects such as a wind energy master plan, landfill methane gas power generation and exploration of future green power purchasing options;
- Lean energy projects such as energy performance contracting for some buildings, the Alderney 5 energy project, energy benchmarking, management and control systems for buildings, waste heat capture from sewage treatment plants and a transition to LED traffic and street lighting;
- Clean energy projects such as exploration of district heating on parts of Halifax peninsula, biodiesel introduction for Metro Transit and some building heating retrofits;
- Energy strategy projects such as the Greenhouse Gas Emission Reduction Plan, the 'Climate SMART' mitigation components, and now the CEP process; and
- Development of an organizational structure that supports the integration of sustainability concepts in infrastructure planning. HRM Regional Council has also created a governance structure that recognizes and promotes energy and environmental sustainability endeavours through its Energy and Underground Services Committee.

Other public and private sector initiatives are also contributing to our energy future. Examples include:

- The HRM Economic Development Strategy and especially its focus on "HRM's Urban Heart";
- A new provincial Energy Strategy and programs from Conserve Nova Scotia;
- The soon to be approved Demand Side Management program, a system wide program to reduce consumer demand;
- Heritage Gas' program to bring natural gas to major institutional users on Halifax peninsula;
- A variety of promising initiatives from sectors within the renewable energy industry including wind, solar, biomass and tidal technologies; and
- The federal government, which has committed resources to demand management, fuel substitution, education and awareness, and renewable energy programs.

Our early studies projected energy consumption into the future (to 2026) based upon the pattern of increase established over the past ten (10) years including a pessimistic business as usual growth scenario and more optimistic forecasts based upon CEP outcomes. We also verified the security of our current energy supply, noting the potential impacts of global price fluctuations and concluding that the addition of alternative and renewable energy sources such as natural gas, wind generation, and in-stream tidal generation can only improve future energy security.

Our CEP Vision, Goals and Decision-making Criteria

The CEP includes the following elements:

Vision: 'In partnership with other agencies, HRM intends to achieve the most significant improvement to energy sustainability, security, renewable technology, and environmental emissions among similar sized cities in Canada over the next 10 years.'

Eight main goals (for the purpose of developing an implementation plan):

- Improve the energy efficiency of buildings;
- Increase transportation choice and efficiency;
- Increase industrial energy efficiency;
- Encourage energy efficient land use planning and neighbourhood site planning;
- Increase efficiency of infrastructure;
- Increase energy security and diversify energy supply;
- Educate and engage residents and businesses; and
- Demonstrate local government leadership.

Many of these goals have a direct linkage and impact on both environmental improvement and on the local economy.

A set of evaluation criteria (to objectively rate the long list actions agreed upon by HRM staff and the consultant team and endorsed by the Energy and Underground Services Sub-Committee of Regional Council):

- GHG reduction potential;
- Health benefits;
- Cost effectiveness;
- Feasibility;
- Local job creation;
- Positive visibility; and
- Action is within HRM's influence or control.

Actions that Matter

The evaluation process and follow-up stakeholder consultation eventually led to a short list of prospective actions. Each action was further analysed to determine the desired outcome, timeframe, who the lead agency or group should be, what indicators could be used to measure performance, and the monetary and personnel resources required for completion – the CEP implementation plan. The consulting team, working collaboratively with HRM staff, was also cognizant of the need to carefully consider the need to phase programs and stage improvements over time. In order for an evolutionary process of change to succeed it needs to be integrated with existing priorities, commitments and resource constraints. Where front-end investments may be substantial it was essential to evaluate relative costs and benefits in a lifecycle context and against the setting of other Council and municipal plans and objectives. Several of the actions, including the most costly ones, have previously been approved by Council as part of previous functional plans but are not yet funded. Various elements will be brought forward in future business planning cycles. The Regional Plan, Community Vision Plans, Active Transportation Plan and the Community Energy Plan are all examples of frameworks that will guide future budget and business planning decisions for the municipality.

Other potentially costly actions would be led by the private sector and require minimal expenditure by HRM. The total estimated new capital expenditures associated with the implementation plan is approximately \$12,000,000 plus approximately \$200,000 per year in program maintenance. Personnel resources required for actions not previously approved amount to approximately ten (10) person years. Sustainability will not come without a financial cost, but the cost of failing to take action for future residents will far exceed the cost to us today and expose HRM to risks associated with access to energy. At the same time, this program of actions must be defensible and pragmatic, in terms of both cost and benefits, both each action itself, and as part of the overall integrated fulfillment of the CEP's objectives. Therefore, the approach taken has been to evaluate and weigh the merits of implementation options with close attention to phased approaches that view each action as the next purposeful stage in a progressive program. For this plan to be compelling and motivating within the community, stakeholders of every type must be inspired but also accept the logic, both theoretically and practically. Community leadership is fundamentally about choices. The CEP proposes the reasonable basis to make sound but catalytic decisions. The recommended short list of action items that follows includes both corporate actions, indicated by a & bullet, and community actions, indicated by a • bullet.

- & Retrofit existing HRM buildings for energy efficiency improvements and the use of renewable energy technologies such as solar water heating.
- & Require higher standards of energy efficiency and environmental design in new HRM buildings.
- Support existing programs to increase energy efficiency and consumption reduction in the residential sector.
- Adjust the building permit fee structure to provide incentives for new high efficiency homes based on achieving an EnerGuide 77 and/or R-2000 standard.
- Promote incentives currently available to support energy efficiency in buildings.
- Use municipal code by-law changes as lever to require EnerGuide ratings on all existing homes, at time of sale, with involvement from the realtors association and the Province.

- & Right-size the municipal fleet, assign vehicle use appropriately and designate more vehicles for multi-use.
- & Continue and support HRM's Commuter Trip Reduction program.
- & Implement driver training for HRM's fleet drivers.
- & Purchase and showcase alternative fuel vehicles, e.g. CNG, Propane, Electric or Hybrid.
 - Expand public transit services.
 - Encourage implementation of the Active Transportation Plan.
 - Look into the possibility of restructuring HRM's taxi zoning for greater efficiency (e.g. fewer taxi's having to leave the airport without passengers).
 - Encourage industrial process heat recovery in industries such as breweries, dairies and others.
 - Encourage activities to focus improvement on efficiencies in HRM based industrial processes, and for businesses in partnership with organizations such as the Eco-efficiency Centre and CIPEC.
 - Conduct an inventory of sources of industrial waste heat that can be used by others (e.g. cooling water from Tuft's Cove).
 - Include energy considerations in the Urban Design Guidelines as a mechanism for leading development within the Capital District toward more sustainable models.
 - Influence the community visioning exercises and the resulting guidelines for community development to include energy considerations.
 - Provide an inventory and plan for opportunity sites within HRM including brownfields and under-utilized areas within Business Parks.
 - Provide opportunities for local food production and small scale food retail through urban agriculture and preservation of agricultural land within rural areas of HRM.
- & Create a Street Lights Efficiency Strategy including standards, inventory, energy reduction action plan, and partnerships. Work toward bringing all streetlights in HRM under municipal control.
- & Restore the commitment to LED Traffic Signals Program and set a program completion date.
- & Ensure implementation of the greenhouse gas emission reduction plan for pumping stations including items such as energy consumption monitoring, regularly scheduled maintenance, end of life motor upgrades to high efficiency units, and variable frequency drives on pumps with high flow variability.
- & Explore options to encourage additional water conservation among water consumers.
- & Participate in expanding natural gas availability in HRM.
- & Pursue Green Power Purchasing opportunities for HRM.
- & Assess the risk of setting up a municipally owned energy utility with authority over power generation and/or energy purchase.
- & Consider co-sponsoring renewable energy projects with other NS Municipalities that have better access to renewable resource (e.g. tidal projects in West Hants, Kings, and Colchester).
 - Biomass or MSW residuals for cogeneration plants or district heating.
 - Anaerobic digester (AD) plant for processing of organic ICI and septage waste.
 - Utility size wind turbines independently or in cluster approach – and continue with the Wind Energy Master Plan process.
 - Encourage installation of solar panels to heat process water in industrial processes such as breweries and dairies.
 - Assess feasibility for mini (run-of-the-river) hydroelectric plants on Musquodoboit River at Crawford Falls, Middle and Upper Musquodoboit, Sheet Harbour River at Malay Falls, Half Way Brook and Little West River.

- Encourage natural gas conversion of industrial boiler plants including Capital District Health Authority, Dalhousie, SMU, DND, and Olands.
 - Assess potential for Harbour water cooling for buildings near the harbour.
 - Increase the allowable NSPI net-metering limit to 800kW.
 - Create recognition of the CEP.
 - Work with the development and construction sectors to identify target markets for new education programs.
 - Work with local industrial and institutional large consumers of energy to expand their commitment to reduce energy use.
 - Work with local NGOs in promoting their educational programs, especially within schools.
- & Implement all other Corporate Actions under the previous 7 goals to clearly demonstrate HRM’s commitment to “walk the talk”.
- & Use HRM’s influence to lobby for all legislative priorities identified in the shortlist of actions, thus getting “our own house in order”.
- & Push for the municipal voice at the table in formulating Nova Scotia’s Energy Strategy, particularly the formation of an Energy Advisory Committee.

The CEP positions HRM to achieve its progressive energy vision, through the collaborative actions of the community as a whole and HRM itself as an exemplary leader. Leadership is particularly necessary and possible in areas where HRM exercises direct or partial control – its’ facilities and infrastructure, services delivered and spheres of municipal regulatory jurisdiction such as land use planning, zoning and neighbourhood site planning. This leadership includes meeting or exceeding Council’s previously stated goal to reduce HRM’s corporate greenhouse gas emissions by 20% by 2012 and if the pace of implementation is rapid, the parallel goal to reduce community emissions by 20%. Even beyond the boundaries of its control, HRM believes it can play a pivotal role by virtue of its demonstrated leadership, and as a proactive agent and facilitator of change. This will take the concerted effort of all community sectors building upon the positive collaborative foundation established during the CEP process.

1 INTRODUCTION AND BACKGROUND

The Halifax Community Energy Plan (CEP) is a core element towards fulfilling HRM's vision for the future: "to maintain and enhance our quality of life by fostering the growth of healthy and vibrant communities, a strong and diverse economy, and sustainable environment". Additionally, the CEP exemplifies HRM's commitment to fulfilling its shared responsibility for the unparalleled environmental challenges facing all modern societies. These difficulties are closely linked to a variety of economic and social pressures, all exacerbated by short sighted human actions. Among these challenges, the issue of global climate change has risen to the top of the public and policy agenda. Climate change is now recognized as an overarching global problem, some would say crisis, a phenomena that is likely to impact people and communities around the globe. This could dramatically affect coastal regions including Halifax Regional Municipality.

These atmospheric changes are caused by many factors but the enormous amounts of energy used by societies in developed countries (by any historical standard) and the ways we produce and use it are by far, the biggest causes of the problem - the growing accumulation of greenhouse gases in our atmosphere. In addition, our energy use plays a part in other environmental and health hazards from pollution of air, soil and water - damaging animal and plant life, and of course humans. The economic cost of excess energy use is also substantial, especially when we consider all the other worthwhile areas we could be investing in for community improvement. Finally, we have come to appreciate the benefits and importance of local energy self-sufficiency, freeing us from dependency on uncertain foreign energy sources and optimizing the cost and environmental efficiencies possible through development of shorter local or Canadian energy delivery channels. Therefore while energy use is essential in everyday life, in light of all these factors, there is every reason to use energy as efficiently as we can, and to obtain our energy from the least polluting sources possible. In recognition of the environmental and socio-economic challenges posed by climate change, citizens, communities and societies must all realign priorities and actions in accord with integrated and systemic means of synchronizing environmental, economic, social and cultural factors, now known as the four pillars or legs of sustainability. Halifax's future vision recognizes and intends to orient this region towards these highest aspirations for our future and the CEP is a tool which will help us evolve towards sustainability.

As with many other challenges we have had to face, the global and local climate change predicament has called upon all segments of our community to translate our concerns into action in the context of this broad vision we hold for best future. Halifax's vision expresses our local residents' strong and deeply rooted tradition of caring – for each other, for our community and for the wellbeing of the world we live in. We're prepared to work diligently together for things that will meaningfully move us forward. In that spirit we have worked together for many years to improve our region's attributes, entirely consistent with these pillars of sustainability. As an important part of this effort, HRM has been working towards an overall Regional Plan, a 25-year process approved by Council in 2006. It includes the following vision statement: "HRM's vision for the future is to maintain and enhance our quality of life by fostering the growth of healthy and vibrant communities, a strong and diverse economy, and sustainable environment".

In this strategy for a ‘Healthy, Sustainable, and Vibrant Community’, HRM has taken an integrated systems approach to clean air, land, water and energy. Within that, deciding on and achieving our best energy future has been an important priority. The Halifax Community Energy Plan (CEP) process is the way HRM has focused the issues, building on a sound basis in data and engaged citizens (both individuals and organizations) to chart the way forward to that essential goal. The CEP is a key functional plan of the overall Regional Plan.

This approach to integrated community planning towards our sustainable future is not however new with the CEP. Consistent with this approach, HRM has been undertaking a variety of initiatives for many years. HRM was one of the first large urban municipalities in Canada to conduct an emissions inventory and was an early member of the Partners for Climate Protection (PCP) program of the Federation of Canadian Municipalities. HRM's leading approach to solid waste management, cosmetic pesticides, the Harbour Solutions Project, wind energy and the Naturally Green newsletters distributed to all households in HRM are but a few examples of important steps toward sustainability pursued by HRM.

The specific approach and template for the CEP arose from another pioneering HRM initiative. In 2006, HRM, in partnership with Natural Resources Canada, developed a national template for Community Energy Plans. HRM's plan pilots this template. It now provides the basis for other municipalities of similar size and nature to follow our lead, learn from our experience and further develop the CEP framework template.

The tasks conducted as part of the CEP build on previous and ongoing initiatives in HRM to enhance sustainability. Some of these initiatives include:

- 25-Year Regional Plan;
- Land Use and Planning Strategies;
- Regional Transportation Plan;
- Active Transportation Plan;
- Corporate and Community Emission Reduction Plans;
- Clean Air Strategy;
- Climate Smart Program;
- Wind Energy Master Plan;
- HRM by Design; and
- Community Visioning Program

Many of these initiatives have included public and stakeholder consultations, resulting in a large amount of available information on the opinions of the HRM community on many issues around sustainability. This information was used by the CEP team to conduct a more targeted consultation program to gather information specific to the requirements of the CEP.

The resulting CEP is the result of more than ten months of effort involving a broad cross section of our municipality – citizens, community groups, businesses, municipal staff and specialized expert consultants. We came together and shared our best ideas and knowledge to define a vision, set of goals and practical, functional plans that can guide and inspire HRM's energy transformation over the next twenty years. The

CEP proposes a holistic view of how we can meet our true energy needs, but in the cleanest, leanest and greenest ways possible meaning cleaner, less polluting energy, energy efficiency and renewable energy sources. In essence, this involves getting our own HRM corporate 'house in order' and championing the community wide vision.

The CEP is based on the premise that energy use, supply and demand are all affected by community design and development, and ultimately the collaborative actions of citizens, businesses, institutions and the municipality itself. This includes efficiency in land use, transportation, site planning, building design, retrofits, infrastructure design and maintenance and operations, and development of renewable energy sources. To begin to develop a plan we first needed to know where and how the energy is being used in HRM, where it comes from, and then look at the widest variety of ideas about what we can do to reduce and optimize its use. The CEP process therefore was a staged effort, beginning with a review of existing energy use and resources, and a study of future demand and supply options. Then, in conjunction with community-wide communication to enhance education and awareness, a planning process was undertaken in close consultation with a wide range of stakeholders that:

- Developed a vision and eight overall goals for the CEP;
- Generated creative ideas for a 'long list' of well more than 150 potential actions drawing on stakeholder knowledge, ingenuity and inspiration, best practices from other municipalities, and discussions with HRM staff;
- Fashioned and applied criteria for evaluating and winnowing these ideas down to a more focused 'short list' of actions;
- Undertook a more comprehensive evaluation to test these actions' value and feasibility; and
- Produced a grounded implementation plan proposing required leadership, responsibilities, outcomes, performance indicators, timeframes, and monetary and personnel resources.

The vision and eight subsidiary goals emerged from the consultation process and were refined through collaborative discussions between the project team and HRM key staff. The ultimate formulation of the Vision is: *'In partnership with other agencies, HRM intends to achieve the most significant improvement to energy sustainability, security, renewable technology, and environmental emissions among similar sized cities in Canada over the next 10 years.'*

Eight main goals (for the purpose of developing an implementation plan) are:

- Improve the energy efficiency of buildings;
- Increase transportation choice and efficiency;
- Increase industrial energy efficiency;
- Encourage energy efficient land use planning and neighbourhood site planning;
- Increase efficiency of infrastructure;
- Increase energy security and diversify energy supply;
- Educate and engage residents and businesses; and
- Demonstrate local government leadership.

Many of these goals have a direct linkage and impact on both environmental improvement and on the local economy. The resulting CEP both developed and reflects this Vision and Goals and is composed of six main sections, referred to here as tasks. Each task represents a specific component of the CEP that, taken together, provides a complete and unified plan. The scope, objectives, and activities associated with each task are summarized in this report.

The CEP positions HRM to achieve its progressive energy vision. This vision points to what needs to be done but also to the leadership role HRM can and should play in achieving it. HRM believes that it should lead by example. This is particularly possible and necessary in the areas where HRM exercises direct or partial control – particularly in the use of HRM facilities and infrastructure (such as buildings, street lighting, traffic controls and all other types of properties), services delivered (such as transit, waste management and street maintenance) and regulatory areas (such land use planning, zoning and neighbourhood site planning). In these areas the CEP identifies a number of significant opportunities. In many other spheres, HRM exercises little or no control including areas of government jurisdiction at other levels, regarding various private sectors and public institutional sectors (such as hospitals, schools, universities and military installations). But even with regard to these diverse areas, HRM believes it has a role to play, through its demonstrated leadership example but perhaps more importantly through its ability to be an active proponent of change, a convenor of dialogue, and a bridge between various actors. The CEP process is an important means to become more effective and focused in all these areas. HRM believes that the CEP will become an important vehicle to advance its ability to play its most constructive role in the ongoing evolution of Nova Scotia's and even Canada's energy sustainability, and overall sustainability future.

While the information and analysis developed during the course of the CEP development will have multiple uses, the most important outcome is the development of a grounded implementation plan that includes a number of key elements. For each proposed action, the implementation framework includes the identification of required leadership, responsibilities, outcomes, performance indicators, timeframes and monetary and personnel resources. These elements provide the basis for sound decision-making and prioritization by Council and HRM staff, and then for practical, effective follow through towards significant objectives and ultimately the overall CEP and HRM visions. These include meeting or exceeding Council's previously stated goal to reduce HRM's corporate greenhouse gas emissions by 20% by 2012 and if the pace of implementation is rapid, the parallel goal to reduce community emissions by 20%. This will take the concerted effort of all community sectors building upon the positive collaborative foundation established during the CEP process.

THE FOCUS

2 TASK 4: IMPLEMENTATION PLAN

The entire CEP process pointed towards the Implementation Plan, the crux of initiative containing the recommendations for future action - the key initiatives around which HRM can realize its energy Vision and Objectives. Task 4, developing the Implementation Plan, therefore was the stage at which all the previous inputs and knowledge were distilled, analyzed and prioritized with a focus on action oriented and change-making outcomes. Throughout the process the project team was guided by the instruction from HRM to identify at least a few compelling actions, capable of galvanizing the community towards the degree of substantial transformational change necessary to reach the CEP Vision. Therefore considerable effort was spent analyzing and assessing the efficacy and impact of various actions, realizing that while virtually all the Long List actions had merit, only a much smaller and focused list of actions would be doable and could be lynchpins within a realistic CEP implementation.

In Task 4, potential goals that were generated as a result of the outcome of assessments in Task 3, and based on the findings from the consultative processes in Task 2, were examined further for potential inclusion in the final goals. These would form the context for the evaluation of potential actions in this implementation planning phase. The goals were evaluated in light of HRM's broad Corporate Theme and Mission Statement to ensure synchronicity and compatibility. The energy supply goals also considered the emissions projections determined in Task 1. and the energy demand and price trends expected in the future as projected in Task 3. In sum, the final energy supply goals proposed during this task attempted to ensure that HRM would evolve purposefully, to become a community that could prosper from increased economic activity, fuelled by efficient utilization of adequate and uninterrupted energy supplies, while also striving to become the most "Naturally Green" municipality in Canada. In short, the eight goals ultimately proposed position HRM to become a leader in sustainable energy usage, optimizing quality of life while conserving the precious resources associated with energy access and use.

In considering the Implementation Plan options it is also necessary to appreciate the roles HRM can play and cannot play in the sphere of energy. HRM can and must lead by example. This will be accomplished by taking responsibility for 'cleaning its' house' and becoming an exemplar of progressive action in areas under its direct jurisdiction and within its corporate footprint. In each of the goal areas there are actions HRM can take that speak to this priority. Additionally there are a range of aspects that HRM either does not control due to lack of jurisdiction or control, many of which bear on regulatory frameworks and private or public sector interests beyond the municipal level. But in some of these arenas, HRM can exercise influence, either directly when it has a legitimate 'seat at the table' or less directly through moral suasion and advocacy. In this regard HRM sees itself as a proponent for change, within and even beyond the narrow bounds of its community. This will partly be accomplished by its positive example but also by its active leadership engagement with citizens and stakeholders that have a role in HRM's energy sustainability future. Further, HRM is interested in exploring any available and feasible means of playing a proactive role in the demand side management component of the equation, willing to take on more responsibility and looking at creative options to access the funding and mandate to do so.

With this perspective as background these eight main goals (for the purpose of developing an implementation plan) were selected:

- Improve the energy efficiency of buildings;
- Increase transportation choice and efficiency;
- Increase industrial energy efficiency;
- Encourage energy efficient land use planning and neighbourhood site planning;
- Increase efficiency of infrastructure;
- Increase energy security and diversify energy supply;
- Educate and engage residents and businesses; and
- Demonstrate local government leadership.

Many prospective actions of varying impact and nature were generated under each of these goals, many of which were suggested by stakeholders and citizens throughout the consultation process. Over time most of these actions offer practical benefits and will merit attention and introduction. Nonetheless, strategic and practical implementation of the CEP requires choices and priorities. To reduce the original Long List of more than 150 actions, to a manageable and practical high-impact list of action items, a set of evaluation criteria was developed against which all actions, programs and initiatives under all goals were evaluated. Here again a lengthy list of potential evaluation criteria was initially identified. In meetings between the consultant team and senior HRM staff it was decided that this list needed to be winnowed down to a significantly smaller list that would be much more manageable within CEP project constraints for the step of screening and evaluation of potential actions. At the same time it was gauged to be essential that these final criteria serve as effective indicators of overall performance beyond energy conservation and efficiency from the holistic perspective of sustainability principles and overall HRM goals and objectives. The following criteria values that were ultimately employed were agreed upon by HRM staff and the consultant team during a collaborative meeting:

- GHG reduction;
- Health benefits;
- Cost effectiveness;
- Feasibility;
- Local job creation;
- Positive visibility; and
- That actions were adequately within HRM's sphere of influence/control.

This list was also presented to and approved in principal by the EUGS committee.

Over a number of days, expert members of the consulting team conducted an extensive evaluation and scoring using a consistent methodology. After scoring the Long List items against these evaluation criteria, the following Short List of Corporate and Community actions withstood the screening and were therefore considered for implementation:

Goal 1: Improve the Energy Efficiency of Buildings

Legislative Priorities:

- .1 Modifications to the Provincial Building Code, including EnerGuide building energy efficiency requirements for new construction.
- .2 Remove provincial financial ceiling for allowable spending by municipalities, regardless of size.
- .3 Introduction of a provincial rebate on a portion of the HST, based on energy efficiency in buildings.

Corporate Actions

<p>Action 1: Retrofit existing HRM buildings for energy efficiency improvements and the use of renewable energy technologies such as solar water heating. Focus on large energy users: arenas, community centres, libraries, etc.:</p> <ul style="list-style-type: none"> • Utilize demand side management (DSM) programs as a resource tool to reducing energy consumption • Create a capital reserve fund for energy efficiency projects, replenished by part of savings from retrofit projects. 		Lean and Green
<p>Action 2: Require higher standards of energy efficiency and environmental design in new HRM buildings:</p> <ul style="list-style-type: none"> • Make LEED Silver the standard for new HRM buildings by 2010, and LEED Gold by 2020. • Encourage innovative and visible technologies such as green roofs and solar demonstration projects on new HRM buildings. 		Lean and/or Green

Community Actions

<p>Action 1: Support existing programs to increase energy efficiency and consumption reduction in the residential sector:</p> <ul style="list-style-type: none"> • EnerGuide for Houses. • R-2000 Home by NS Home Builders Association. 		Lean
<p>Action 2: Adjust the building permit fee structure to provide incentives for new high efficiency homes based on achieving an EnerGuide 77 and/or R-2000 standard.</p>		Lean
<p>Action 3: Promote incentives currently available to support energy efficiency in buildings, in particular:</p> <ul style="list-style-type: none"> • DOE's 10% rebate on solar water heating systems. • CMHC's 10% premium refund on its mortgage loan insurance premiums. • Federal Eco Energy Retrofit Program and the associated provincial program. • Utilize existing Conserve Nova Scotia energy efficiency programs. 		Lean or Green
<p>Action 4: Use municipal code by-law changes as lever to require EnerGuide ratings on all existing homes, at time of sale, with involvement from the realtors association and the Province.</p>		Lean

Goal 2: Increase Transportation Choice and Efficiency

Legislative Priorities:

- .1 Provincial emissions legislation.
- .2 Changes to the standards for Provincial roadways, to include for example active transportation capacity.

Corporate Actions

Action 1: Right-size the municipal fleet, assign vehicle use appropriately and designate more vehicles for multi-use.		Lean
Action 2: Continue and support HRM's Commuter Trip Reduction program.		Lean
Action 3: Implement driver training for HRM's fleet drivers.		Lean
Action 4: Purchase and showcase alternative fuel vehicles, e.g. CNG, Propane, Electric or Hybrid.		Green and/or Clean

Community Actions (*In the PCP framework, Transportation falls under Community*)

Action 1: Expand public transit services, in particular: <ul style="list-style-type: none"> • Ferry service to Bedford. • Rapid bus transit to suburban areas. • Neighbourhood shuttle buses connecting to rapid transit network. 	Regional Plan	Lean
Action 2: Encourage implementation of the Active Transportation Plan.	Regional Plan	Lean
Action 3: Look into the possibility of restructuring HRM's taxi zoning for greater efficiency (e.g. fewer taxi's having to leave the airport without passengers).		Lean

Goal 3: Increase Industrial Energy Efficiency

Legislative Priorities:

- .1 Federal Industrial Emission Management Regulations and Enforcement.
- .2 Federal Emissions Caps for Large Final Emitters.
- .3 Provincial comprehensive airshed management approach.
- .4 Provincial independent, third party qualified energy efficiency utility.

Community Actions

Action 1: Encourage industrial process heat recovery in industries such as breweries, dairies and others.		Clean
Action 2: Encourage activities to focus improvement on efficiencies in HRM based industrial processes, and for businesses in partnership with organizations such as the Eco-efficiency Centre and CIPEC.		Lean
Action 3: Conduct an inventory of sources of industrial waste heat that can be used by others (e.g. cooling water from Tuft's Cove). <ul style="list-style-type: none"> • Encourage the development of new buildings that can be heated using low grade thermal energy. • Explore feasibility for district cooling opportunities 		Clean

Goal 4: Encourage Energy Efficient Land Use Planning and Neighbourhood Site Planning		
Community Actions		
Action 1: Include energy considerations in the Urban Design Guidelines as a mechanism for leading development within the Capital District toward more sustainable models.	Regional Plan	Green
Action 2: Influence the community visioning exercises and the resulting guidelines for community development to include energy considerations.		Lean, Green or Clean
Action 3: Provide an inventory and plan for opportunity sites within HRM including brownfields and under-utilized areas within Business Parks.		Lean
Action 4: Provide opportunities for local food production and small scale food retail through urban agriculture and preservation of agricultural land within rural areas of HRM.		Lean, Green or Clean
Goal 5: Increase Efficiency of Infrastructure		
Legislative Priorities:		
<ol style="list-style-type: none"> .1 Municipal eco-procurement policy. .2 Provincial street lighting standards. .3 Municipal street lighting standard. 		
Corporate Actions		
Action 1: Create a Street Lights Efficiency Strategy including standards, inventory, energy reduction action plan, and partnerships. Work toward bringing all streetlights in HRM under municipal control.		Lean
Action 2: Restore the commitment to LED Traffic Signals Program and set a program completion date.		Lean
Action 3: Ensure implementation of the greenhouse gas emission reduction plan for pumping stations including items such as energy consumption monitoring, regularly scheduled maintenance, end of life motor upgrades to high efficiency units, and variable frequency drives on pumps with high flow variability.		Lean
Action 4: Explore options to encourage additional water conservation among water consumers.		Lean
Goal 6: Increase Energy Security and Diversify Energy Supply		
Legislative Priorities:		
<ol style="list-style-type: none"> .1 An open access electricity market including renewables. .2 An enhanced robust integrated regional electrical grid and selling/purchasing opportunities from other Atlantic provinces. .3 Federal LFE emission caps. 		

Corporate Actions		
Action 1: Participate in expanding natural gas availability in HRM.		Green
Action 2: Pursue Green Power Purchasing opportunities for HRM.		Clean
Action 3: Assess the risk of setting up a municipally owned energy utility with authority over power generation and/or energy purchase.		Green
Action 4: Consider co-sponsoring renewable energy projects with other NS Municipalities that have better access to renewable resource (e.g. tidal projects in West Hants, Kings, and Colchester).		Green or Clean
Community Actions		
Action 1: Biomass or MSW residuals for cogeneration plants or district heating.		Green
Action 2: Anaerobic digester (AD) plant for processing of organic ICI and septage waste.		Clean
Action 3: Utility size wind turbines independently or in cluster approach – and continue with the Wind Energy Master Plan process.	Wind Energy Master Plan	Green
Action 4: Encourage installation of solar panels to heat process water in industrial processes such as breweries and dairies.		Green
Action 5: Assess feasibility for mini (run-of-the-river) hydroelectric plants on Musquodoboit River at Crawford Falls, Middle and Upper Musquodoboit, Sheet Harbour River at Malay Falls, Half Way Brook and Little West River.		Green
Action 6: Encourage natural gas conversion of industrial boiler plants including Capital District Health Authority, Dalhousie, SMU, DND, and Olands.		Clean
Action 7: Assess potential for Harbour water cooling for buildings near the harbour.		Clean
Action 8: Increase the allowable NSPI net-metering limit to 800kW.		Green or Clean
Goal 7: Educate and Engage the Community		
Community Actions		
Action 1: Create recognition of the CEP by: <ul style="list-style-type: none"> Well planned and timed launch campaign, website and opportunities for engagement throughout the process. Maintaining the CEP brand in future energy programs resulting from the CEP. Promoting the CEP and its concepts to NS at large. Continuing support and promotion of the Naturally Green campaign. 		Lean, Green, Clean
Action 2: Work with the development and construction sectors to identify target markets for new education programs.		Lean, Green, Clean

<p>Action 3: Work with local industrial and institutional large consumers of energy to expand their commitment to reduce energy use, for example through:</p> <ul style="list-style-type: none"> • An industrial energy conservation pledge • A coalition-building session organized by the Mayor and involving CEOs and top managers 		Lean, Green, Clean
<p>Action 4: Work with local NGOs in promoting their educational programs, especially within schools.</p>		Lean, Green, Clean
<p>Action 5: Encourage implementation of public awareness programs using creative strategies such as:</p> <ul style="list-style-type: none"> • Displaying the “carbon footprint” of moving treated water to the users on their civic water bills. • Neighbourhood canvassing program to promote EnerGuide. • A large ad campaign on carpooling. 		Lean, Green, Clean
<p>Goal 8: Demonstrate Local Government Leadership</p>		
<p>Corporate Actions</p>		
<p>Action 1: Implement all other Corporate Actions under the previous 7 goals to clearly demonstrate HRM’s commitment to “walk the talk”.</p>		Lean, Green, Clean
<p>Action 2: Use HRM’s influence to lobby for all legislative priorities identified in the shortlist of actions, thus getting “our own house in order”.</p>		Lean, Green, Clean
<p>Action 3: Push for the municipal voice at the table in formulating Nova Scotia’s Energy Strategy, particularly the formation of an Energy Advisory Committee.</p>		Lean, Green, Clean

The Task 4 report then analyzed each action to determine its expected outcomes, required inputs, budget and resource requirements. Actions that embodied work previously approved by council were also identified in order to separate out previously approved projects and identify the costs solely for new actions in this plan. A summary of that analysis is presented here. This analysis is in essence a ‘snap shot’ – a high level overview of the more complete and substantive analysis contained in the Implementation Plan Report (Task 4 Report). It is meant to present in capsule tabular form the pith of the outcomes drawn from that analysis:

Corporate Actions	Type & Scale	Budget/Staff Resources	Time Frame	Previous Council Support
Goal 1: Improve the Energy Efficiency of Buildings				
<p>Action 1: Retrofit existing HRM buildings for energy efficiency improvements and the use of renewable energy technologies such as solar water heating. Focus on large energy users: arenas, community centres, libraries, etc.:</p> <ul style="list-style-type: none"> Utilize demand side management (DSM) programs as a resource tool to reducing energy consumption Create a capital reserve fund for energy efficiency projects, replenished by part of savings from retrofit projects. 	- Project All existing major energy consuming Municipal buildings	\$5,000,000/ 6 months FTE	5 years	Alderney 5 project.
<p>Action 2: Require higher standards of energy efficiency and environmental design in new HRM buildings:</p> <ul style="list-style-type: none"> Make LEED Silver the standard for new HRM buildings by 2010, and LEED Gold by 2020. Encourage innovative and visible technologies such as green roofs and solar demonstration projects on new HRM buildings. 	- Policy For new HRM buildings	\$50,000/ 6 months FTE	6 to 12 months	Current standard is to build new facilities to a sustainable standard. New Fall River rec center is intended to be LEED silver.
Community Actions				
<p>Action 1: Support existing programs to increase energy efficiency and consumption reduction in the residential sector:</p> <ul style="list-style-type: none"> EnerGuide for Houses. R-2000 Home by NS Home Builders Association. 	- Policy Residential sector	\$10,000/ 1 month FTE	6 months	
<p>Action 2: Adjust the building permit fee structure to provide incentives for new high efficiency homes based on achieving an EnerGuide 77 and/or R-2000 standard.</p>	- Program Homes achieving EnerGuide 77 or R-2000 Std	\$25,000/ 3 months FTE	1 year	

Corporate Actions	Type & Scale	Budget/Staff Resources	Time Frame	Previous Council Support
<p>Action 3: Promote incentives currently available to support energy efficiency in buildings, in particular:</p> <ul style="list-style-type: none"> • DOE's 10% rebate on solar water heating systems. • CMHC's 10% premium refund on its mortgage loan insurance premiums. • Federal Eco Energy Retrofit Program and the associated provincial program. • Utilize existing Conserve Nova Scotia energy efficiency programs. 	- Program Buildings across community sectors, including industrial	\$20,000/ 2 months FTE	6 months	
<p>Action 4: Use municipal code by-law changes as lever to require EnerGuide ratings on all existing homes, at time of sale, with involvement from the realtors association and the province.</p>	- Policy Residential homes	\$40,000/ 3 months FTE	12 to 18 months	
Goal 2: Increase Transportation Choice and Efficiency				
Corporate Actions				
<p>Action 1: Right-size the municipal fleet, assign vehicle use appropriately and designate more vehicles for multi-use.</p>	- Policy Across Municipal vehicle fleet	\$50,000/ 1 month FTE	3 months	New policy on vehicle management and coordination is being developed.
<p>Action 2: Continue and support HRM's Commuter Trip Reduction program.</p>	Support	\$15,000/ 2 months FTE	ongoing	
<p>Action 3: Implement driver training for HRM's fleet drivers.</p>	Policy	\$40,000/ 4 months FTE	12 months	
<p>Action 4: Purchase and showcase alternative fuel vehicles, e.g. CNG, Propane, Electric or Hybrid.</p>	- Program	\$50,000 Initial capital for vehicle purchase/ 2 weeks FTE	6 months	

Corporate Actions	Type & Scale	Budget/Staff Resources	Time Frame	Previous Council Support
Community Actions				
Action 1: Expand public transit services, in particular: <ul style="list-style-type: none"> Ferry service to Bedford. Rapid bus transit to suburban areas. Neighbourhood shuttle buses connecting to rapid transit network. 	- Program Public transport on land and sea	\$30,000,000/ 3 – 4 FTE for each new bus, 8 – 10 FTE for new ferry.	24 to 30 months	New rapid transit system. Council has approved a plan to expand public transit.
Action 2: Encourage implementation of the Active Transportation Plan.	Policy	- \$100,000,000 over 20 years/ 2 FTE	20 years	Council has approved this plan.
Action 3: Look into the possibility of restructuring HRM's taxi zoning for greater efficiency (e.g. fewer taxi's having to leave the airport without passengers).	Policy	\$30,000/ 6 months FTE	12 months	
Goal 3: Increase Industrial Energy Efficiency				
Community Actions				
Action 1: Initiate industrial process heat recovery in industries such as breweries, dairies and others.	Project	- \$10,000/ 1 month FTE	18 to 21 months	
Action 2: Initiate activities and action to focus improvement on efficiencies in HRM based industrial processes, and businesses in partnership with organizations such as the Eco-efficiency centre and CIPEC.	- Studies and Project	\$20,000/ 3 months FTE	3 to 12 months	
Action 3: Conduct an inventory of sources of industrial waste heat that can be used by others (e.g. cooling water from Tuft's Cove). <ul style="list-style-type: none"> Encourage the development of new buildings that can be heated using low grade thermal energy. Explore feasibility for district cooling opportunities. 	- Project Industrial sector	\$5,000/ 1 month FTE	12 months	

Corporate Actions	Type & Scale	Budget/Staff Resources	Time Frame	Previous Council Support
Goal 4: Encourage Energy Efficient Land Use Planning and Neighbourhood Site Planning				
Community Actions				
Action 1: Include energy considerations in the Urban Design Guidelines as a mechanism for leading development within the Capital District toward more sustainable models.	- Policy	\$3,000/ 1 month FTE	6 months	
Action 2: Influence the community visioning exercises and the resulting guidelines for community development to include energy considerations.	- Policy	\$3,000/ 1 month FTE	Pending results and directive from the Visioning Program	
Action 3: Provide an inventory and plan for opportunity sites within HRM including brownfields and under-utilized areas within Business Parks.	- Program	\$30,000/ no additional resources required	Pending HRM by Design recommendations	
Action 4: Provide opportunities for local food production and small scale food retail through urban agriculture and preservation of agricultural land within rural areas of HRM.	- Program	\$40,000/ 1 year FTE	Over 10 years	
Goal 5: Increase Efficiency of Infrastructure				
Corporate Actions				
Action 1: Create a Street Lights Efficiency Strategy including Standards, inventory, energy reduction action plan, and partnerships. Work toward bringing all streetlights in HRM under municipal control.	- Policy	- \$30,000/ 6 months FTE	3 – 5 years	
Action 2: Restore the commitment to LED Traffic Signals Program and set a program completion date.	- Program	\$850,000/ 5 years FTE	2 years	Council has approved this program

Corporate Actions	Type & Scale	Budget/Staff Resources	Time Frame	Previous Council Support
Action 3: Ensure implementation of the greenhouse gas emission reduction plan for pumping stations including items such as energy consumption monitoring, regularly scheduled maintenance, end of life motor upgrades to high efficiency units, and variable frequency drives on pumps with high flow variability.	- Policy	\$1,000,000/ 5 months FTE	1 year	
Action 4: Explore options to encourage additional water conservation among water consumers.	- Policy	\$100,000/ 6 months FTE	18 months	
Goal 6: Increase Energy Security and Diversify Energy Supply				
Corporate Actions				
Action 1: Participate in expanding natural gas availability in HRM.	- Policy	\$25,000/ 4 months FTE	Over the next 3 to 5 years. Was expected to be widely available in the peninsula by end of 2007.	
Action 2: Pursue Green Power Purchasing opportunities for HRM.	- Policy	\$50,000/ 6 months FTE	2 – 5 years	Council previously approved this concept.
Action 3: Assess the risk of setting up a municipally owned energy utility with authority over power generation and/or energy purchase.	- Project	\$100,000/ 3 months FTE	6 months	

Corporate Actions	Type & Scale	Budget/Staff Resources	Time Frame	Previous Council Support
Action 4: Consider co-sponsoring renewable energy projects with other NS Municipalities that have better access to renewable resource (e.g. tidal projects in West Hants, Kings, Colchester).	- Policy	\$25,000/ 6 months FTE	3 to 6 yrs for studies and development	
Community Actions				
Action 1: Biomass or MSW residuals for cogeneration plants or district heating.	- Policy	\$5,000/ 6 months FTE	2 years	
Action 2: Anaerobic digester (AD) plant for processing of organic ICI and septage waste.	- Project	\$6,000,000/ 8 months FTE	24 to 36 months for approval, design and construction	
Action 3: Utility size wind turbines independently or in cluster approach – continue with the Wind Energy Master Plan process.	- Policy	\$25,000/ 6 months FTE	1 to 2 years	Council has approved this process.
Action 4: Encourage installation of solar panels to heat process water in industrial processes such as breweries and dairies.	- Project	\$10,000/ 1 month FTE	7 to 14 months	
Action 5: Assess feasibility for mini (run-of-the-river) hydroelectric plants on Musquodoboit River at Crawford Falls, Middle and Upper Musquodoboit, Sheet Harbour River at Malay Falls, Half Way Brook and Little West River.	- Project	\$0/ 0 FTE	- 18 months for pre and feasibility studies - 18 to 24 months for permitting and construction process	

Corporate Actions	Type & Scale	Budget/Staff Resources	Time Frame	Previous Council Support
Action 6: Encourage natural gas conversion of industrial boiler plants including Capital District Health Authority, Dalhousie, SMU, DND, and Olands.	- Policy	\$0/ 2 weeks FTE	12 to 18 months	
Action 7: Assess potential for Harbour water cooling for buildings near the harbour.	- Project	\$0/ 0 FTE	- 12 to 18 months for design and permitting - 24 months for construction	
Action 8: Increase the allowable NSPI net-metering limit to 800kW.	- Policy	\$0/ 0 FTE	6 to 12 months for UARB approval	
Goal 7: Educate and Engage the Community				
Community Actions				
Action 1: Create recognition of the CEP by: <ul style="list-style-type: none"> Well planned and timed launch campaign, website and opportunities for engagement throughout the process. Maintaining the CEP brand in future energy programs resulting from the CEP. Promoting the CEP and its concepts to NS at large. Continued support and promotion of the Naturally Green campaign. 	- Program	\$10,000/ 6 weeks FTE	4 to 6 weeks	
Action 2: Work with the development and construction sectors to identify target markets for new education programs.	- Program	\$0/ 0 FTE	As part of ongoing Development Services	

Corporate Actions	Type & Scale	Budget/Staff Resources	Time Frame	Previous Council Support
Action 3: Work with local industrial and institutional large consumers of energy to expand their commitment to reduce energy use, for example through: <ul style="list-style-type: none"> An industrial energy conservation pledge. A coalition-building session organized by the Mayor and involving CEOs and top managers. 	- Program	\$10,000/ 3 months FTE	3 to 6 months	
Action 4: Work with local NGOs in promoting their educational programs, especially within schools.	- Program	\$10,000/ 2 months FTE	3 to 6 months	
Action 5: Encourage implementation of public awareness programs using creative strategies such as: <ul style="list-style-type: none"> Displaying the “carbon footprint” of moving treated water to the users on their civic water bills. Neighbourhood canvassing program to promote EnerGuide. A large ad campaign on carpooling. 	- Activity	\$30,000/ 4 months FTE	6 months	

Summary Totals

Previously Approved Actions – \$130,875,000

Previously Approved Actions staff resources – 306 months FTE

New Actions – \$12,871,000 capital costs

New Actions staff resources – 117.5 months FTE

This is the most essential output of the CEP process and all readers are asked to review it thoughtfully. The Implementation Plan embodied in the Short List actions is the bottom line heart of the initiative. At the same time, it is not suggested that these actions are all that are going to be taken or that plans are static – quite to the contrary. The CEP must be understood to be a dynamic document. It represents our best suggested plan in the setting of current circumstances, resources and needs and with particular focus on the actions that will drive transformation. As an active, living process the plan can and should evolve in light of changing conditions. It will therefore be reviewed and assessed periodically. The entire current Long List of prospective actions as well as new ideas will be viewed as essential resources for future planning and adjustment and revisited regularly. Some of these items may come back into higher priority for implementation.

If HRM is going to fulfill its aspirations and potential around a sustainable energy future within its broader sustainability and municipal objectives, this is the game plan – the key actions around which we will mobilize all sectors of the community towards aligned action.

SUPPORTING REPORTS

3 TASK 1: REVIEW OF EXISTING RESOURCES

In this Task, previous energy-related studies, programs and policy/bylaw changes that had any substantive bearing on energy use in HRM were reviewed and their relevance to and impact on the CEP assessed. This was important in order to ensure that the CEP was built with reference to the best and most complete array of information, analysis and background. The CEP process did not include design and undertaking new research so Task 1 was critical in establishing the most reliable and fulsome basis in knowledge for subsequent tasks. To complete the mandate of Task 1, the following specific sub-tasks were carried out:

3.1 Review of Existing Emissions Inventory for the Municipality

The International Council for Local Environmental Initiatives (ICLEI) study was reviewed to establish latest quantities of greenhouse gas (GHG) emissions which had been compiled for the base year 2002. Energy source and quantity estimates were made for the same year on the basis of the inventoried emissions. Where necessary and available, more recent information was used to update the 2002 inventory.

Tables 1 and 2 below summarize adjusted findings that incorporate information from the HRM Finance Department, Nova Scotia Power and the ICLEI Report on corporate and community HRM.

Table 1. 2002 in Corporate HRM by Sector

	Sector	2002		
		Energy (GJ)	GHG (tonnes)	Cost(\$)
Corporate	Buildings	420,093	55,511	4,889,799
	Vehicle	123,053	8,533	3,397,568*
	Streetlights	48,933	10,371	2,557,275
	Water/Sewage	138,059	20,511	1,850,500
	Total	730,138	94,926	12,695,142

Note: Information in this table has been updated in light of recently received information from NSPI, therefore will differ from that released earlier in Task 1 of this CEP.

Table 2. 2002 HRM Community Energy Use, GHG Emissions and Cost

Community	Sector	2002 Energy Use (Based on ICLEI Only)		2002 Energy Cost (Adjusted ICLEI and NSPI Estimates)	
		Energy (GJ)	GHG (t)	Energy Type	Cost (\$)
		Residential	12,322,120	1,694,518	Electricity
Commercial	14,413,803	1,624,525	Light Oil	192,245,789	
Institutional	4,820,580	607,715	Heavy Oil	17,166,424	
Industrial	9,745,471	1,606,160	Diesel	143,661,278	
Transportation	12,865,735	885,826	Propane	37,628,802	
Waste	0	262,884	Gasoline	192,277,936	
Total	54,167,709	6,681,628	Total	964,497,967	

The GHG emission levels shown in the Tables 1 and 2, are further summarized in Figure 1, by showing the approximate relative GHG contribution of each sector in the community to the right as follows:

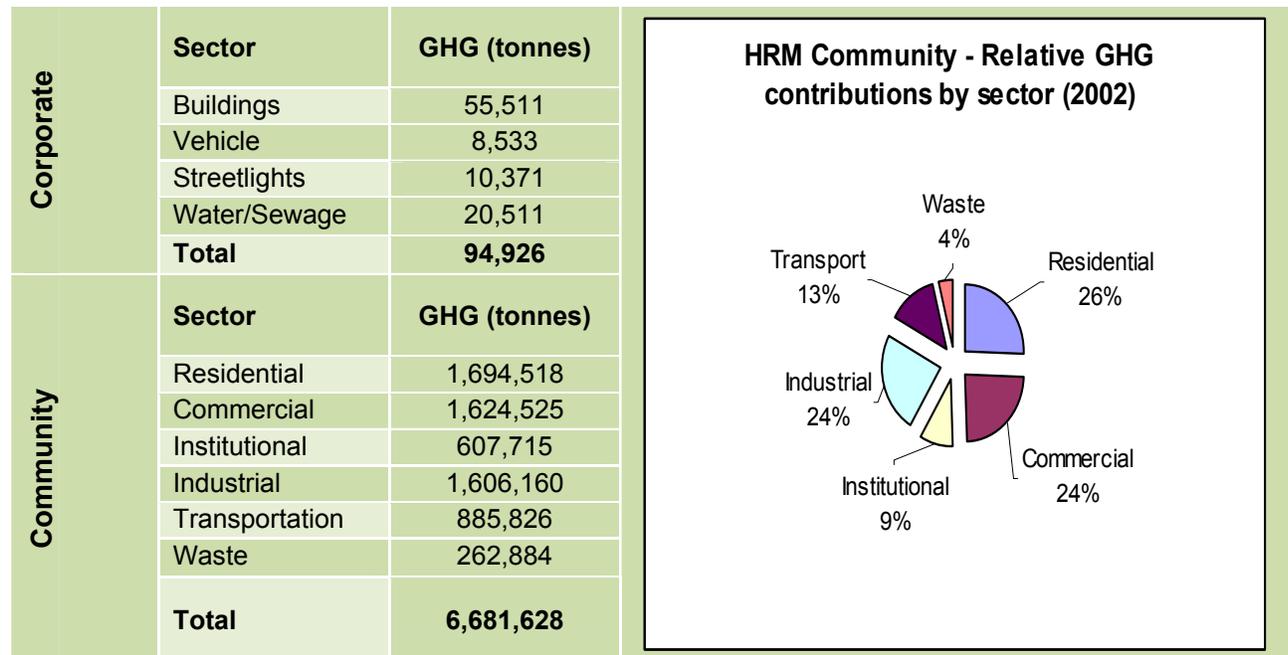


Figure 1. Summary of the 2002 GHG Emissions in Tonnes and the Relative Community Sector GHG Contributions

3.2 Analysis of Inventory Cost Estimates

Review of the inventory estimates from the ICLEI Report allowed the project team to make relevant and well-founded assumptions as the basis from which to execute calculations for energy cost estimates to HRM residents. These calculations considered procurement and use of energy in its available forms, and resultant emissions from energy use. The costs were broken down into the “Direct Energy Costs” which highlighted the financial impact of energy acquisition to the final energy user; and the “True costs of emissions” to the HRM community, which was the evaluation of pollution costs to the energy user, costs

which are not factored into the financial models for energy acquisition and utilization. The findings are summarized in the following sections:

3.2.1 Direct Energy Costs Estimates

Table 3. 2002 Estimates of Direct Energy Costs in Entire HRM

Category	Energy (GJ)	Energy (L)	Cost (\$)
Electricity	13,989,600*	-	392,022,167
Fuel Oil	14,190,675	360,532,445	194,418,315
Heavy Oil	3,109,860	74,480,000	17,130,400
Diesel	8,128,677	212,792,591	147,890,851
Propane	1,376,652	53,697,150	37,659,052
Gasoline	9,313,443	269,174,653	195,151,624
Total			984,272,409

* The Task 1 Report data was based on ICLEI's findings, which differs in electricity consumption from that received from NSPI after completion and publication of the Task 1 Report.

Based on observed energy price changes and energy use trends in the business as usual (BAU) setting, a forecast was made for anticipated HRM total energy cost for the end of 2007 based on the 2002 findings (illustrated in Table 4).

Table 4. 2007 Projected Combined HRM Energy Costs by Energy Type

Category	Energy (GJ)	Energy (L)	Cost (\$)
Electricity	14,827,536	-	539,989,206
Fuel Oil	14,190,675	360,532,445	249,816,447
Heavy Oil	3,109,860	74,480,000	28,852,746
Diesel	8,128,677	212,792,591	200,502,446
Propane	1,376,652	53,697,150	57,340,920
Gasoline	9,313,443	269,174,653	281,804,261
Natural Gas	1,200,00	-	18,396,000
Total Cost			1,376,702,026

Note: HRM Corporate Energy Costs for 2007 are approximately \$20.7 M or roughly 1.5% of the total community energy cost.

The analysis demonstrated that in energy acquisition, distribution and utilization, there are other costs which are considered implicit and usually not discussed or accounted for in energy transactions, also referred to as the cost of pollution damage. Table 12 in the Task 1 Report was based on the findings from GPI Atlantic Energy Accounts studies (2005), and served to highlight some of the known and quantifiable emissions impacts from energy utilization. The list includes SO_x, NO_x, VOCs, Ash, particulate matter (PM), Radon and radioactive materials. These findings point to some of the broader effects of our lifecycle patterns of energy use on our community and ecosystem.

The established cost estimate per unit of pollution as per the referenced GPI Atlantic findings led to an estimate of what HRM would incur as part of the life cycle costs, excluding the direct costs discussed earlier. These costs are tabulated for the “high” and “low” per tonne cost estimate as follows.

Table 5. 2007 Estimate of Pollution Costs in HRM Community by Pollutant Type

Pollutant Type	Pollution (tonnes)	\$C2007/tonne (LOW)	Damage Cost (LOW)	\$C2007/tonne (HIGH)	Damage Cost (HIGH)
CO	113,989	\$2.34	\$266,735.35	\$7.02	\$800,206.05
GHGs (C.eq)	6,777,000	\$7.34	\$49,715,394.30	\$42.76	\$289,808,239.50
TPM	6,596	\$2,480.40	\$16,360,667.12	\$6,060.60	\$39,975,592.31
S0x	60,212	\$1,614.60	\$97,218,976.29	\$12,285.00	\$739,709,602.24
N0x	26,739	\$1,649.70	\$44,110,690.88	\$14,566.50	\$389,488,015.25
VOCs	13,513	\$2,340.00	\$31,619,856.22	\$9,640.80	\$130,273,807.63
Hg	0.108	\$9,571,068.00	\$1,031,191.81	\$13,480,155.00	\$1,452,358.86
Total	6,998,049		\$240,323,512		\$1,591,507,822

3.3 Review of Renewable Energy Sources in HRM

The energy impact and cost reviews discussed above revealed that there was a strong relationship between the energy portfolio mix, emissions level and true costs of emissions. This relationship highlighted the relatively high emissions associated with conventional fossil-based energy sources when compared with the array of alternative and renewable energy options. Simply put, in the face of increasing energy demand, the lower the level of utilization of renewable and alternative energy sources as part of the energy mix, the higher the overall emissions, and the higher the cost of emissions to society. Although at the Task 1 level the exploration was limited only to what renewable and alternative sources were available to HRM, further analysis would be required to confirm feasibility, longevity, and economic viability of these resources. Renewable energy sources reviewed under this task are listed below, and discussions on their potential and viability for HRM are discussed in detail in Section 4 of the Task 1 Report:

- Biomass;
- Liquid biofuels and other forms of biogas (including methane capture);
- Wind;
- Solar;
- Small hydroelectric generation;
- Earth energy (i.e. Geothermal and Hydrothermal);
- Waste heat energy recovery;
- Natural gas (alternative); and
- Municipal solid waste energy recovery.

3.4 Review of Existing Programs and Regulations

HRM understands the substantial commitment embodied in the CEP Vision Statement to “...achieve the most significant improvement to energy sustainability, security, renewable technology, and environmental emissions among similarly sized cities in Canada over the next 10 years.”

To that end, the CEP further examined what programs, regulations, and other legislative instruments could best serve as the enabling mechanisms for achieving a productive CEP implementation plan and execution. It is essential that the CEP is able to fulfill its potential through meaningful action and it's therefore recognized that the regulatory and programmatic context is critical. If the selected goals and targets are going to be reached, these mechanisms must be focused and effective to incent and facilitate desired behaviour and changes. Some of the current regulatory and ongoing programs were found to be inadequate and therefore potentially inhibiting progress; other desirable bylaws and enabling policy-driven conditions were found to be missing as well. Examination of systems and approaches in other similarly-sized and equally ambitious municipalities and regions was completed to see which aspects of such jurisdictional initiatives could provide direction and add motivation to HRM. It is also important however to note that energy is not presently a sphere with substantial municipally mandated jurisdiction. However, HRM and Council would like to exert their influence in shaping a positive culture and attitude toward energy use, emissions reduction, affordable energy prices, and addressing security of energy supply and distribution to the citizens. Section 5 of the Task 1 Report examined the following:

- HRM Planning Strategies and Programs;
- HRM Bylaws;
- Provincial Government Energy Policies and Programs;
- Federal Government Energy Policies; and
- NSPI Demand Side Management Programs.

4 TASK 2: CONSULTATION PROGRAM

Task 2 concentrated on consultative and educational processes. Meaningful public engagement is a cornerstone principle within HRM, both generally and specifically with regard to the CEP. It was clearly understood and mandated from the outset that an interactive public and stakeholder consultation process would contribute to the formulation and ultimate success of the CEP. It would help enhance awareness, understanding and participation by the HRM community at large on important issues relating to energy utilization in all community sectors including residential, commercial, industrial, transportation; as well as at the municipal corporate level. Early and ongoing stakeholder engagement was a key building block in gathering important knowledge and perspectives towards the best and most creative outcomes possible. Going into the process the project team carefully resisted coming to early fixed opinions, realizing that the most compelling and useful plan would grow from the combination of diverse perspectives, sound background research and application of thoughtful criteria. At the same time, the mandated project scope determined that consultation had to be tightly focused and could not include a broad and lengthy public consultation outreach. The focus was therefore pointed at key stakeholders and interest groups who either were engaged directly or through collaborative meetings or workshops. In addition there was invitation for the entire community to interact and participate through web enabled tools and a community open house.

Invitations were sent to energy, property, and equipment owners; key stakeholders on both the supply and demand side of the energy value chain; the energy regulatory authorities; and interest and focus groups including non-governmental and industry related. Workshops, seminars, meetings, and discussions were held in different places and at different times within HRM. These activities offered platforms upon which information, perspectives, ideas, observations, criticism and recommendations were shared and captured. These were then further assessed, integrated and balanced in shaping the CEP to be truly responsive to the HRM community's energy needs and concerns across all sectors. It should be noted however that in some cases, divergent views and strategies could not be reconciled. The proposed actions and plan considered these views and sought to identify outcomes that most effectively addressed the underlying needs and voices within the community, seeking optimal outcomes to the common benefit. In summary, the main focus of this consultative approach in Task 2 was to:

- Confirm and update information bearing on current and future energy production (acquisition), distribution and consumption in HRM, related both to the direct activities of the stakeholders and within the municipality generally; and
- Gather stakeholder input and ideas regarding potential initiatives in fulfilment of the CEP's overarching objectives.

Effective consultation was viewed as a collaborative opportunity within sectors, sub-communities and the public with the following objectives to:

- Share information and build awareness;
- Draw on knowledge and stakeholder resources to validate and refine data;
- Leverage diverse, broad experience and wisdom towards the most effective and realistic plans;

- Test and refine ideas;
- Continuously build confidence, buy-in and support of the initiative; and
- Prepare the community for the successful implementation phase.

Apart from workshops and open house, in depth interviews were scheduled and conducted with direct stakeholders. This group of stakeholders consists of those individuals or organizations with more direct involvement in the supply, distribution, regulation, and pricing of energy; or in some case, large energy consumers such as major institutions. Fourteen such one-on-one interviews were conducted with key personnel from the following groups and organizations:

- Energy and Underground Services Committee (EUGS) of Council;
- Dalhousie Energy Research Group;
- Halifax Chamber of Commerce Energy Security Committee;
- Heritage Gas;
- HRM Infrastructure and Asset Management;
- HRM Community Development;
- Conserve Nova Scotia;
- HRM Finance;
- HRM Legal Services;
- HRM Regional Planning;
- HRM Transportation and Public Works;
- Natural Resources Canada;
- Nova Scotia Home Builders Association;
- Nova Scotia Power Inc.;
- NS Department of Energy;
- Union of Nova Scotia Municipalities Sustainability Office; and
- Halifax Water.

Early in the process, the project established a CEP website as part of HRM's overall web presence. This site provided briefing information on the initiative and invited citizens to provide input either electronically, at the open house, or through other contact points.

In addition a few meetings were held with groups of stakeholders early in the process. Subsequently, after a 'long list' of potential options was identified, an all-day workshop with approximately forty (40) diverse stakeholders was held to test assumptions and gain feedback on options. At this stakeholder workshop on June 11, 2007, participants discussed issues around what would be the most practical ways to successfully implement actions on the short list. During break-out sessions, participants went on to discuss the following key implementation questions:

- .1 How will success be measured (indicators)?
- .2 Who should be involved in the implementation (lead, staff, partners)?
- .3 What are the risks/critical success factors?
- .4 What are the best tools?
- .5 What is the funding source for the program?

- .6 How will the program be phased in?
- .7 What ongoing resources and support are needed?

Responses to these questions were considered to revise some of the shortlist implementation strategies. Furthermore, feedback was used to re-craft key inputs as now shown in the implementation approach summarized in the Task 4 Report.

Overall, the consultation process was a key element in the process. The inputs received were of inestimable value in contributing to the CEP. The interest and support shown for the values and objectives underlying the CEP was impressive and widespread across sectors. In order to continue this interactive communication and consultation the CEP website described above is being maintained and updated. It's an ongoing tool to keep citizens and stakeholders aware of progress and a platform on which develop other outreach and consultative mechanisms in the future. It is judged that the knowledge, familiarity, engagement and alignment developed through this process is a harbinger of active community involvement in the implementation phases and will be an important ingredient in CEP success.

5 TASK 3: FUTURE DEMAND AND SUPPLY ASSESSMENTS

5.1 Past Trends and Future Energy Requirements

Task 3 of the CEP set out to review, understand and attempt to address issues arising from analysis of data and inputs acquired in Task 1 and Task 2. Through understanding historic energy portfolio mix, energy costs, distribution infrastructure, legislative constraints and enablers, Task 3 produced an in-depth review of existing and potential energy supply risk factors. This review help link the past, the present and the future through careful study of trends in energy consumption and demand changes, energy price changes, ongoing efforts to curb emissions and energy supply issues that pose potential risks to energy supply chains in the future. This analysis was also cognizant of lessons learned by HRM through its own recent initiatives, most importantly highlighting the challenges inherent in complex multi-jurisdictional relationships with other orders of government, and with public, private and institutional sector partners or players. The current HRM corporate setting, including existing or projected facilities, services, obligations and expectations was also noted. The overall goal of this task was to ensure that the energy future targeted in the CEP, and considering possible future influences and factors, would be stable, secure and reliable.

The outcome of this level of assessment was a generation of goals for future energy supply that would be consistent with projected future demand for energy even in the worst case scenario's HRM could face and should be prepared for.

The main activities in Task 3 could be summarized as follows:

- Establishing projections for HRM energy demand and needs into 2026 inclusive;
- Examination of past energy prices and assessment of anticipated future trends;
- Assessment of potential energy supply risks for HRM; and
- Generating goals for future energy supply in concert with HRM's projected future demand/needs under several likely scenarios.

Developing and using past trends in energy use, rate of development and growth in all sectors of HRM community, several projections were undertaken to estimate where the region would be in terms of energy requirements and usage levels in the future. Projections were made for electrical energy and other forms of energy utilized in the region. Figure 2 summarizes the community non-electrical energy use profile from the past, while also making future projections up to year 2026 under the Business as Usual (BAU) scenario. The BAU is the base case that presumes that current patterns continue largely unaltered as energy demand increases. Please note that the bottom axis of the graph is not a linear projection and should be used for comparative purposes only and not for scaling.

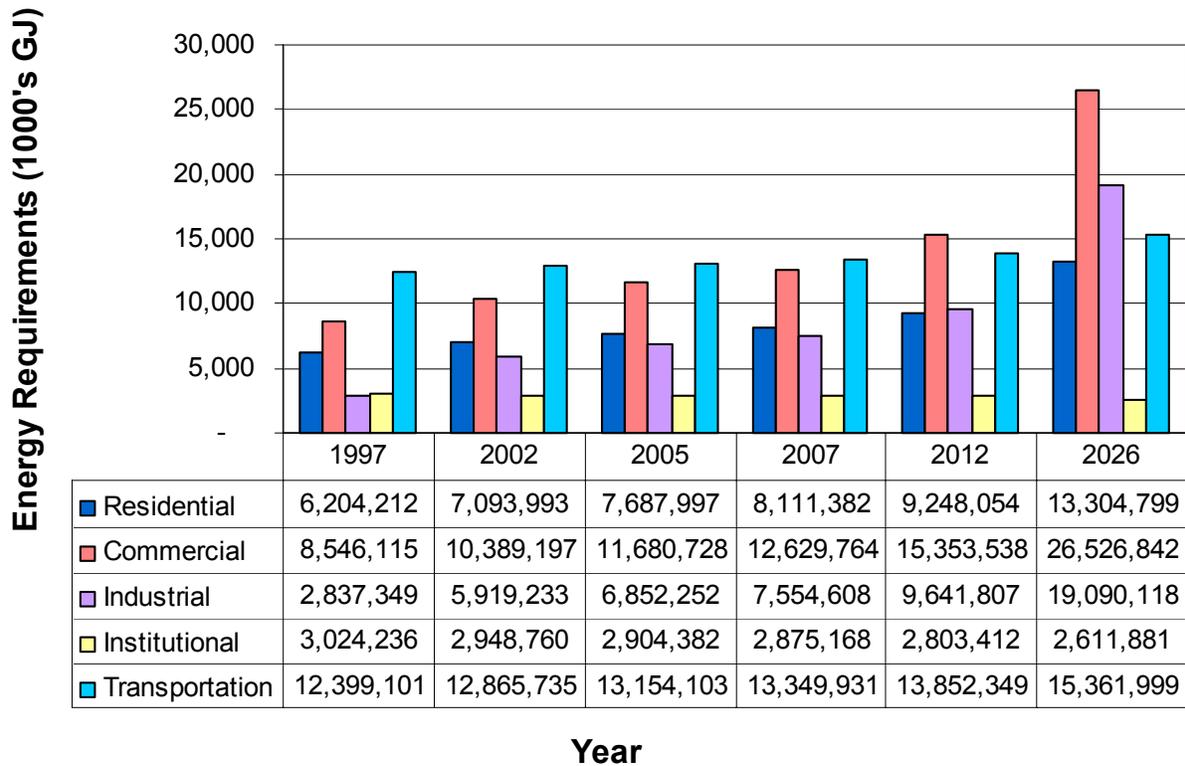


Figure 2. HRM Community Non-Electrical Energy Requirements (GJ)

Table 6 and Figure 3 below summarize community electrical energy use trends over the periods 1997 to 2005, and projected energy requirements up to year 2026.

Table 6. HRM Community Electrical Energy Usage and Future Requirements (GJ)

Sector	Past Consumption			Future Projections		
	1997	2002	2005	2007	2012	2026
Residential	4,833,077	5,228,127	5,478,367	5,744,484	6,109,834	7,599,516
Commercial	3,892,636	4,024,606	4,217,240	4,387,617	4,844,284	6,391,929
Industrial	3,604,702	3,826,238	4,009,378	4,106,180	4,358,535	5,150,718
Other (unmetered, municipal)	841,149	910,629	954,215	984,994	1,066,356	1,331,724
TOTAL	13,171,564	13,989,600	14,659,200	15,223,275	16,379,008	20,473,886

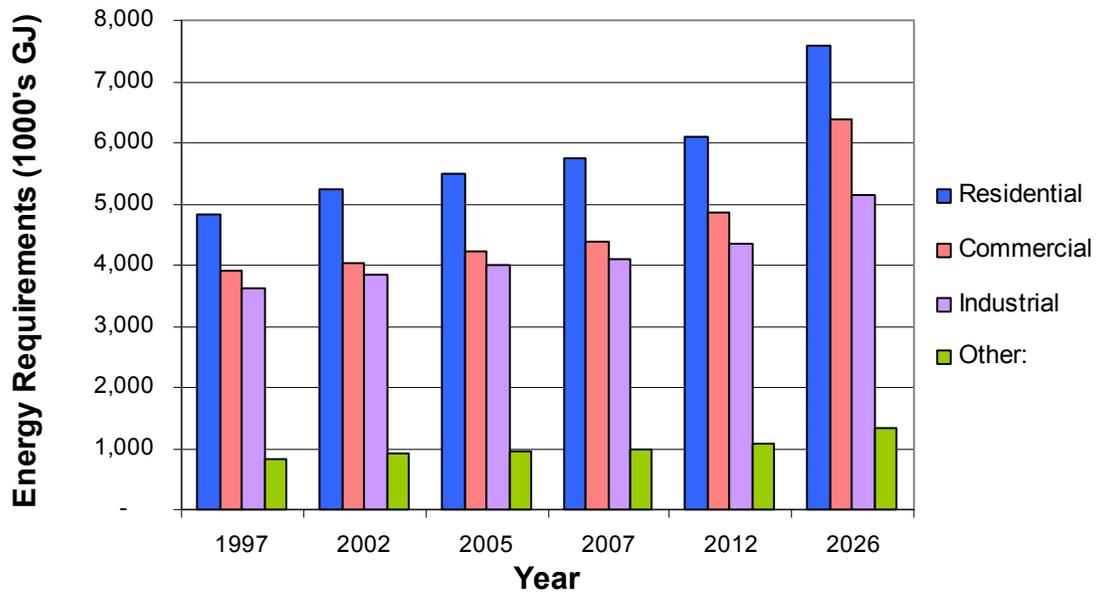


Figure 3. HRM Community Electrical Energy Requirements by Sector

Ultimately, forecasts for the entire HRM community and corporate were presented in million gigajoules as illustrated in Figure 4. Please note that the bottom axis is not to scale and is not a linear progression.

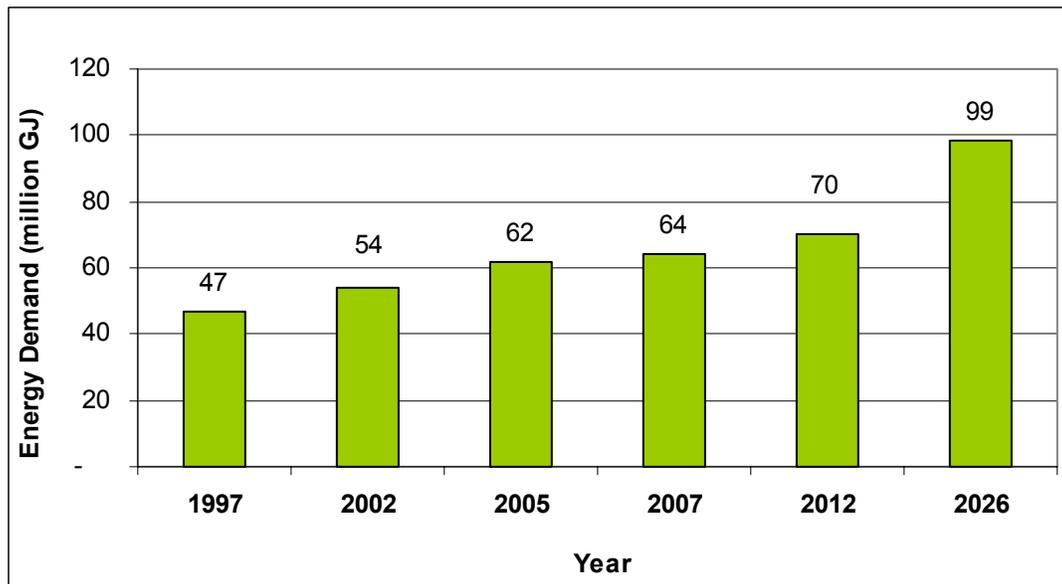


Figure 4. Total Energy Use Profile and Future Demand for Combined Corporate and Community HRM

Furthermore, Nova Scotia Power Inc. (NSPI) issued region-specific 5-year energy demand and energy usage estimates from their SCADA archive system as summarized in Table 7.

Table 7. 5-Year Electrical Demand and Energy Use Data for HRM

Year	Peak Demand (MW)	Annual Energy (GWh)
2002	751	3,886
2003	833	4,033
2004	858	4,142
2005	808	4,072
2006	752	4,038

Source: Courtesy of NSPI, Conservation and Energy Efficiency Management Office, 2007.

The NSPI rationale for lack of growth in peak demand in HRM over the past 5 years is the fact that the vast majority of the peak demand in HRM is associated with residential heating loads which are significantly impacted by the weather. Recent mild winters in HRM are therefore reflected in the peak demand figures above.

In addition to these aggregate forecasts which are specific to HRM, NSPI developed its own estimates of what are expected to be the electrical energy demand trends in Nova Scotia by sector. Average annual growth rate estimates were forecast and modified for presentation as follows.

Table 8. NSPI's Forecast of Annual % Growth Rates in Electrical Energy Requirements in NS

Year	Residential	Commercial	Other
2007	2.9	2.1	1.9
2008	3.2	2.3	1.9
2009	2.7	2.3	1.9
2010	2.6	2.2	1.9
2011	2.3	2.1	1.9
2012	2.2	2	1.9
2013	2	1.9	1.9
2014	2.1	1.8	1.9
2015	2.3	1.8	1.9

5.2 Energy Price Forecast - General

Increasing demand for all forms of energy in China, India and Southeast Asia, geopolitical concerns about events in Iran, Iraq and Nigeria, hurricane damage in the Gulf of Mexico and continuing demands in the “developed” parts of the world are all factors contributing to uncertainties and price increases. The prices of oil and sea borne coal are set in world markets, whereas gas prices are set in the North American markets. These commodities trade in US dollars. For Canadian buyers, the forecast of foreign exchange is an additional significant factor in attempting to forecast future prices. The prices referred to in this section are in US dollars, unless otherwise noted.

Crude oil and other energy prices continue to be volatile and uncertain and will persistently affect go-forward projections and planning. Today, with the price of crude oil at about \$US 95/bbl, there are large differences even in short term forecasts, with analysts predicting prices to the end of 2007 ranging from \$US 80/bbl to \$US 100/bbl. Natural gas (gas) prices rose from \$US 2.00/MMBtu in 2003 to \$US 12.00/MMBtu in 2005, a price increase that was not forecast by anyone at all. Appalachia Coal prices increased significantly from \$US 35/tonne in 2003 to over \$US 65/tonne in 2004. It was still in the \$US 55/tonne range at the beginning of 2007.

Forecasting the price of electricity generated from fossil fuels can be at least as difficult as forecasting the price of fossil fuels. In the Maritimes and New England, fossil fuels are used to provide the largest percentage of electricity, and are on the margin virtually all of the time. Over time, electricity prices can be expected to track the movements in fossil fuel prices.

Table 9 summarizes selected data from the “US Energy Prices: Base Case” of the EIA Report “Energy Information Administration Short-Term Energy Outlook” dated March 2006.

Table 9. U.S. Energy Prices: Short Term Base Case

Fuel	2005	2006	2007
Imported Crude Average (\$US/bbl)	48.95	56.76	80.60
West Texas Intermediate (\$US/bbl)	56.49	63.74	86.30
Wholesale Heating Fuel (LFO) (\$US/Litre)	0.43	0.46	0.72
No. 6 HFO (\$US/Litre)	0.28	0.31	0.42
Henry Hub (NYMEX) Gas (\$US/MMBtu)	8.98	8.11	8.74

5.3 The Nova Scotia Electricity Market

5.3.1 The General Market Background

Currently in Nova Scotia, retail electricity consumers have the following basic options:

- Buy from NSPI;
- Self generate with back up from NSPI; and
- Improve energy efficiency.

Wholesale purchasers of electricity (to date only the Municipal Utilities (Munis) qualify), in addition to the above, have the option of buying from other sources than NSPI. Independent Power Producers (IPPs) selling to the Munis, or to the export market outside Nova Scotia, need to use NSPI’s Open Access Transmission Tariff (OATT).

The issues become more complex as the market moves from one supplier to many suppliers. Future direct sales to retail customers further increase the complexity, and will require more regulation and oversight

by government and, presumably, the Utility and Review Board (UARB). Accountability and reliability are the likely major issues.

5.3.2 The Existing Electricity Systems in the Maritimes

The primary facts developed in the course of this study are:

- The Maritimes Interconnected system has a peak demand of some 5,700 MW and annual energy production of 30,000 GWh;
- It is noted that fossil fuels are the "margin" in all jurisdictions in the Northeast (i.e., they drive costs and prices); in general, over time, electricity prices in this region will follow fossil fuel prices and costs of environmental protection under BAU;
- The potential sources of out of province electricity purchases are New Brunswick, Quebec and New England, all of which require access to the NB Power system (with the potential exception of a direct energy route from the Lower Churchill project from Labrador through Newfoundland and then via sub-sea cable); and
- The New Brunswick System Operator (NBSO) is the lead operator for The Maritimes and Northern Maine. New Brunswick has interconnections with neighbouring systems and OATTs exist in all jurisdictions “within reach” of Nova Scotia, so theoretically, customers in NS could purchase from outside the province.

The Maritimes transmission interconnections and costs are summarized in Tables 10 and 11 below. There are various conditions attached to the ratings at any particular time, depending on system configuration; “normal” conditions are assumed in Table 10.

Table 10. NBSO Interconnections Ratings in MW

	Existing		with 2 nd NB-NE Tie Line	
	Export	Import	Export	Import
Quebec	800	1,200	800	1,200
New England	700	100	1,000	400
Nova Scotia	300	350	300	350
PEI	200	200	200	200

Table 11. Rates for Service under Northeast Open Access Transmission Tariffs

Network Service Tariffs \$/MW/mo			
	Price	Status	Losses
New Brunswick	≈ \$30,000	approved	3.3%
Quebec	≈ \$73,000	approved	5.2%
New England	≈ US \$18,000 – \$27,000	approved	
Nova Scotia	≈ \$47,000	approved	3.2%
PEI	NA	NA	

5.3.3 Overview of Electricity Purchases

Fossil fuels are commodities. The prices are set in world markets (oil and coal) and North American (N.A.) markets (gas, but as/if LNG reliance increases, world prices might very well influence N.A. gas prices). Except for transportation differences, the wholesale costs are the same everywhere. Fuel transportation aside, the marginal costs of energy for each source are virtually the same across N.A. and, except for modest efficiencies in economies of scale, for a given fuel, the costs of electricity from new plants will be similar. Regional differences might arise from different environmental and operational regulations and from installed generation mix.

The unattractiveness of external purchases, in the absence of environmental emissions constraints, is reasonably reflected in the relatively small quantities and relatively high costs of recent purchases by NSPI and New Brunswick Power (NBP). NSPI purchases from the grid when the purchase price is lower than the cost of self-generation, or when due to outages, short term purchases are required to maintain a secure electricity supply for the province.

5.4 Energy Supply Risk Review

Principal risk factors in HRM's energy supply system were identified and analyzed. These were listed and defined as follows:

Table 12. Summary of Energy Supply Risk Factors

Risk Description	Definition
Electricity security	The criteria related to security of electricity supply, particularly at the generation and bulk transmission level, is the ability to continuously supply HRM's peak load requirements during a single major system failure, such as a failure of a single transmission circuit, loss of a single generating unit, etc. This is the condition imposed by the Northeast Power Co-ordination Council's (NPCC) "n-1" criteria, that a power system be sufficiently secure to withstand a single contingency occurrence, i.e. a single major problem can occur without loss of power to any part of the system.
Electricity adequacy	This risk factor interlocks significantly with the previous one, but focuses more on risk from a technology and generating plant infrastructure perspective; therefore, a separate review of this risk factor was performed. It basically addresses the capability of the technical resources available within the province's electrical system to meet the forecasted energy supply and peak demand needs, on a continuous basis. It addresses load versus generation, and the resultant ability to be able to supply the firm (non-interruptible) load of the province.
Other energy dependability	Relative to natural gas, only a slight risk is driven by the lack of Nova Scotia based gas supply back-up at this time due to the ability to supply gas from Western Canada via existing pipeline infrastructure when disruptions in the supply from offshore Nova Scotia occur. There is only a single main pipeline, a single lateral to HRM, and there will be only a single pipeline across the harbour to peninsula Halifax later this year. A significant problem causing a failure of any one of these lines would disrupt gas supply to all or part of HRM although that is considered highly unlikely given the service record of other pipeline infrastructure in North America.

Risk Description	Definition
Transmission and transportation	This risk component refers to the ability to plan for, operate and maintain the delivery systems for HFO, LFO, propane, motive fuels, i.e. all energy sources with the exception of electricity and gas which have been previously discussed. It considers on time delivery to all customers, but particularly to all critical facilities.
Environment	Air emissions (GHGs, SO ₂ , NO _x , PM); noise (from gas turbines, wind turbines, etc.); aesthetics (related to new plants, wind turbines, etc.); discharges to surrounding environment (from industry, e.g. Tuft's Cove Generating Station, Imperial Oil, new IPP generating stations, from commercial and institution space heating plants, etc.); industrial and commercial oil spills; residential oil spills from leaking oil tanks; environmental impacts related to the construction of new power plants.
Monetary	<p>Monetary risk has two components: cost and price. Cost refers to the capital cost to construct new infrastructure and the O&M costs during operation.</p> <p>Price is what NSPI, Heritage Gas, MNP, IPPs, and fuel wholesalers and retailers, among others, charge their customers.</p>
Regulatory	The risk will evolve from the future partial or full deregulation of the market, which, in one sense, will be favourable to HRM because it will allow HRM to purchase "green" energy directly from renewable energy IPPs, and in another, may not be as favourable, as it may eventually cause the price of electricity to increase, as previously discussed.

Analyses and conclusions on this section are discussed in Section 5 of the Task 3 Report, while Section 6 summarizes energy related initiatives and actions, some of which became part of the Long List of potential actions. Overall, it is notable that these conclusions on energy supply security and risks point to concerns that go well beyond matters of convenience or potential disruption, but also to substantive economic implications. The surety, quality, environmental performance and adequacy of energy supply underlie the economic basis of our community and therefore our social expectations. As progressive approaches to gauging societies' progress indicate (e.g. Note recent reports and studies undertaken by both GPI Atlantic and the Atlantic Provinces Economic Council), the measures of genuine progress are holistic and integrated, and therefore in this case, energy supply should be legitimately viewed in the context of its intertwined relationship to economic, environmental and social factors.

6 TASK 5: EDUCATION AND AWARENESS PROGRAM

The activities of Task 5 almost exclusively went hand-in-hand with those in Task 2. This was due to the fact that workshops and forums scheduled during consultations in Task 2 naturally created opportunities to disseminate information on energy use and a variety of educational and awareness packages to stakeholders and the public.

Education and awareness are important steps to ensuring the successful implementation of the CEP because completion of these steps ensures that the plan is understood and eventually adopted by the community. In collaboration with the HRM, the Project Team implemented a two-phase initiative to educate and build awareness of the CEP. This initiative was conducted concurrently with the development of the CEP and complemented the on-going stakeholder consultations.

The first phase of this process was modest in scope, and focused largely on creating awareness of the CEP's processes and objectives within the HRM. The second phase focused on educating the public on the CEP through the development and maintenance of a website:

<http://www.halifax.ca/environment/energyplan/>

Interviews with senior staff within the HRM provided the Project Team with the opportunity to solicit the opinions of individuals who had expertise and knowledge on energy issues. Moreover, presentations to internal staff allowed the Project Team to build awareness on the CEP and offered HRM staff the opportunity to provide input on how the project could be beneficial and relevant to the work within their respective departments.

Linked from the HRM website, the CEP website is particularly beneficial as it charts the progress of the plan from the start of the project. It also provides up-to-date information on each of the deliverables, and ensures that the public has the opportunity to get informed. The CEP website also encourages the public to submit comments and provide feedback on the options considered. This feedback helps the Project Team refine the options and ensure that a diverse range of opinions is reflected.

The two-phase initiative and the public consultations have helped build awareness on the project, but a more aggressive campaign is recommended to successfully implement the CEP and to ensure buy-in from the public. A public outreach campaign that focuses on media awareness and influencing public attitudes and habits should be implemented. With an aggressive media awareness campaign in effect, the HRM can educate the public on not only the benefits of the CEP, but also on how the public can help to build a community based on sustainable environmental practices.

Key observations from this task included the fact that education became a two-way flow of facts and information where the educators also received new, and highly grass-roots pieces of useful information. Over time it is important not to underestimate the importance of ongoing education and awareness across the municipality. This will serve to inform citizens and stakeholders so that they can participate knowledgeably and understand why this process is important. If people are going to adjust their actions

and habits it is essential that they are motivated by compelling knowledge of the benefits and urgent reasons. We have lived for many decades in a world where consumption patterns were allowed to grow without care or consideration for consequences. In the sphere of energy this has led to expectations of easy and cheap access to unlimited energy and in parallel, little care to reduce excess use. We now know that this must change urgently at the local, regional, national and international level. It is critical that we recognize the important changes that can be energized at the local level. This is where a different approach begins. This is where we can realize what is now recognized as the greatest and least costly means of achieving energy efficiency – personal, community and business use reduction. But change at the local level, the HRM level, must be built on the firm foundation of education and awareness – of the need, the opportunities and the benefits that far outweigh the costs.

During the upcoming implementation phase of the CEP education and awareness will become even more important as we create the means of activating the potential and getting every stakeholder to do their part towards the solution. Consultation will also continue to be important especially to understand community perspectives and ensure that plans reflect the wisdom and interests embodied in the community and that must be aligned and activated.

7 TASK 6: MONITORING PROGRAM

7.1 Approach

The main focus of Task 6 was to ensure that implemented actions translate into measurable and meaningful outcomes in energy savings, improved air quality and GHG emissions reductions, which is ultimately fundamental to the success of this plan. To assist HRM evaluate the success of the overall program and individual initiatives, it was recommended that a monitoring program be established to provide an ongoing status of program activity, successes and challenges. Monitoring activities should provide a feedback loop to program administrators as a means to support continuous improvement activities and may be used to support multiple objectives of the HRM. Energy savings may be measured to establish the cost effectiveness of initiatives in order to provide a basis for ongoing program funding.

Where regulations and standards are used to achieve energy savings, monitoring activities may be integrated with enforcement and compliance activities, to eliminate duplication of efforts. Furthermore, the CEP is a living document that will be adjusted and updated continually to ensure that HRM is continuing to pursue an optimum path to attainment of its energy, emissions reduction and environmental sustainability goals. To provide a framework for this dynamic monitoring activity, a Matrix of Monitoring Activities has been developed and is included with the Task 6 report This summarizes a program of commitments and approaches to monitoring that are designed to ensure that the objectives of the program are being realized in accord with expectations.

To highlight how this would work, a logic model for the CEP implementation and monitoring activities was illustrated as in <http://www.uwex.edu/ces/pdande/evaluation/evallogicmodel.html>. Key to the success of implementation is defining indicators and targets for critical components of inputs, outputs and outcomes.

Program Action – Logic Model

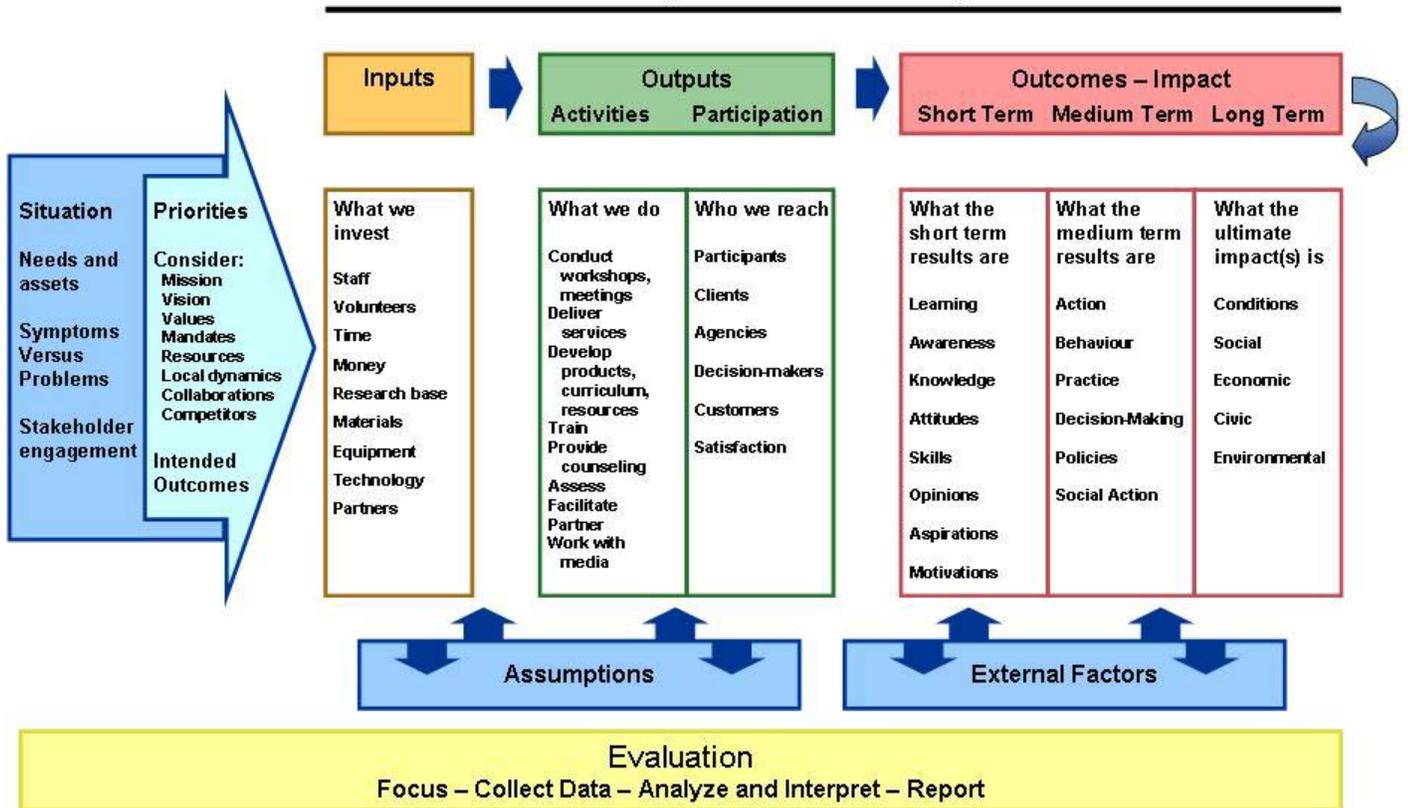


Figure 5. Logic Model to CEP implementation¹

This model would be applied to each of the actions on the shortlist. The demonstration below serves to summarize application of the logic model based on one specific implementation action under Goal 5.

Goal 5 – Increase Efficiency of Infrastructure

Corporate Action 3: Create a greenhouse gas emission reduction plan for pumping stations.

Target Outcomes: Reduced energy consumption.

Indicator: Reduced energy consumption from pumping stations.

Data Source and Frequency of Data Collection: Corporate energy bills analysed yearly – as well as before and after specific retrofits.

7.2 Monitoring Activities

Designing a monitoring program required answering the following questions:

- .1 What do you want to know?
- .2 Indicator- How will you know it?
- .3 Timing - When to collect data?

¹ Source: <http://www.uwex.edu/ces/pdande/evaluation/evallogicmodel.html>

.4 Data collection – Who has the information/methods for gathering the information?

Monitoring should require an assessment of both the inputs into a program or policy as well as the direct outputs and outcomes. Monitoring of inputs may include:

- Staff resource time;
- Number of partnerships formed or ongoing;
- Financial resource allocation; and
- Financial leverage ratio between HRM funds and external funds.

Monitoring of outputs may include:

- Delivery of programs, such as the number of the CEP actions that have been initiated and their status;
- Number of energy audits or building retrofits resulting from the CEP;
- Amount of educational materials produced; and
- Number of participants in programs.

8 SUMMARY COMMENTS

The CEP is an innovative and progressive step for HRM, its citizens, business and institutions and is merely the next in HRM's ongoing commitment to become truly sustainable – environmentally, economically and socially. Implementation of HRM's Community Energy Plan will help further and support some of the objectives of HRM's Economic Strategy and the Province of Nova Scotia's economic growth strategy "Opportunities for Sustainable Prosperity". Energy security, affordability, and the environmental impacts of energy will be increasingly important factors in future decisions impacting what our communities look like, where people live, what new infrastructure is built, how it is built, how we transport people and goods, what goods we buy, how we operate and maintain infrastructure, equipment, and the common energy consuming tools of modern day life. In addition to all the compelling environmental reasons there are many substantive economic implications associated with energy security, energy production and energy efficiency that make implementation of the CEP an important initiative for HRM.

At the same time, the CEP recognizes that our municipality lives in a world of constraints and necessary prioritization. Therefore the proposed CEP is designed to present a pragmatic program, featuring phased approaches tied in with the diverse range of other municipal programs and priorities. It is particularly aware of HRM's overall infrastructure planning and multi-year capital budgets. Each program and phase was considered in terms of its own costs and benefits and its contribution to the whole, especially its ability to incent transformational change, building blocks in a staged process of continual advancement. It is designed to be practical, doable and integrated into the holistic municipal campaign to achieve its full sustainability vision and service objectives.

These stages build on our wealth of natural attributes by instituting the plans, procedures, actions, frameworks and incentives that will energize our evolution towards the forefront of the sustainability movement where municipalities must play a critical role. By engaging every element in the community, knowledgeably and with resolve, we can reach important goals and accomplish our objectives. It is necessary for every community to articulate its aspirations. It is however perhaps more important to translate aspirations into practical and doable plans that everyone can take part in. The HRM CEP is put forward in that spirit, calling upon all members of this community to take ownership in its fulfillment. It responds to the fundamental need to become energy clean, green and lean for the sake of current and future residents, and as responsible members of modern society. It is, as has been said, a 'work in progress'. It will and must evolve over time, and as a dynamic plan, adjust to the best insights of our citizens and changing circumstances. All members of the region are called to embrace and embody the 'community' aspect of Community Energy Plan – our means of becoming the best Halifax our energy, in all forms, can create.