LOCAL ACTION PLAN

Local Action Plan to Reduce Greenhouse Gas Emissions – **FINAL REPORT**

Report Prepared for:
Town of Bouctouche
211 Irving Boulevard
Bouctouche, NB E4S 3K6

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1.0 INTRODUCTION

On March 11, 2010, the Town of Bouctouche (the Town) initiated a Local Action Planning (LAP) project during a meeting with project partners. The primary goal of the LAP project is to create a bilingual document that will provide guidance and firm commitments to lead to lower greenhouse gas (GHG) emissions in Town operations and in the community. Development of the LAP was accomplished through meaningful dialogue, partnering with provincial and local stakeholders, community engagement, by completing an asset inventory, and by connecting existing environmental plans with an overarching LAP that sets short, medium, and long-term goals.

This project is a reflection of the Town's commitment to the Partners for Climate Protection (PCP) Program, which is a framework, developed by the Federation of Canadian Municipalities (FCM), for use by municipal governments to undertake initiatives that reduce GHG emissions.

Section 1.0 of this report includes a summary of the PCP program and introduction to the Town. Section 2.0 includes a summary of community consultations and engagement. Section 3.0 includes a summary of the Town's GHG emissions inventory, forecast, and reduction targets. Section 4.0 includes the LAP framework as well as goal and action statements. Section 5.0 includes a detailed implementation plan, which is accompanied by a monitoring plan in Section 6.0. Sections 7.0, 8.0, and 9.0 include a council adoption statement, references, and appendices respectively.

Throughout the project scoping exercises, the Town identified the completion of a preliminary energy asset exploration as a priority (see Appendix A). The goal of the exploration was to provide structure and to educate LAP participants on possible options that could be integrated into the LAP. Additionally, the exploration was used to stimulate conversations with focus groups and to integrate existing studies previously completed but relevant to this plan into the LAP.

An Inventory of Town assets is included in Appendix B. This inventory was developed to ensure a complete understanding of existing Town operations and community assets.

The Town is pleased to acknowledge the financial support provided through the Environmental Trust Fund administered by the Province of New Brunswick, and the FCM Green Municipal Fund. Without their support, the development and implementation of this LAP would not be possible.

Taking Action
Bouctouche Potential Renewable Energy Sources Report

In the Bouctouche Potential Renewable Energy Sources report produced by the KC Irving Chair in Sustainable Development at the Université de Moncton, heat pump technologies, photo-voltaic panels, and Town electrical needs were explored and a variety of advantages and disadvantages of renewable energy technologies were listed. Overall conclusions included:

- Heat pumps can be used in municipal infrastructure. Economic considerations present the greatest (if not the only) limitation.
- The costs to purchase, install, and maintain solar panels would likely be much greater than the cost to purchase electricity.
- Although obtaining an adequate and reliable source may be very difficult, the use of biomass may be a possibility.
- Preliminary information suggests that Bouctouche may be in a suitable location for a wind farm. The next steps would be to collect and analyze meteorological data.

1.1 COMMUNITY PROFILE

Located at the mouth of the Bouctouche River, along the shores of the Northumberland Straight, the Town of Bouctouche, New Brunswick is a thriving and dynamic town of approximately 2,380 people. Bouctouche is renowned for its natural features, including 'la Dune de Bouctouche', a natural sand dune stretching 12 km into Bouctouche Bay.

The economy of Bouctouche is driven primarily by tourism and service industries, modular home manufacturing, seafood processing and many small businesses that have been established by local entrepreneurs. Le Pays de la Sagouine celebrates Acadian history and culture and attracts thousands of visitors each year. The Irving Eco-Centre: La dune de Bouctouche was established to protect the ecosystems of the town's approximately 2,000 year old sand dune. The dune is a popular eco-tourism destination.

1.2 THE PCP PROGRAM

The PCP program is a voluntary municipal program, and members commit to the program by resolution of council. The program has a five milestone framework to help municipalities reduce Town operations and community GHG emissions, as follows (FCM 2010):

- **Milestone One**: Creating a Greenhouse Gas Emissions Inventory and Forecast. Complete GHG and energy use inventories and forecasts for both municipal operations and the community as a whole (FCM 2010).
- **Milestone Two**: Setting an Emissions Reduction Target. Suggested targets are a 20 % reduction in GHG emissions from municipal operations, and a minimum 6% reduction for the community, both within 10 years of making the commitment (FCM 2010).
- **Milestone Three**: Developing a Local Action Plan. Develop a plan that sets out how emissions and energy use in municipal operations and the community will be reduced (FCM 2010).
- **Milestone Four**: Implementing the Local Action Plan. Create a strong collaboration between the municipal government and community partners to carry through on commitments, and maximize benefits from greenhouse gas reductions (FCM 2010).
- **Milestone Five**: Monitoring Progress and Reporting Results. Maintain support by monitoring, verifying, and reporting greenhouse gas reductions (FCM 2010).

The Town of Bouctouche recently completed Milestone 1 and a portion of Milestone 2 in 2008. As part of this project, the Town is completing Milestone 2 (includes the establishment of a community emission reduction target) and Milestone 3 (the development of a plan to reduce GHG emissions).

1.3 GREENHOUSE GASES AND CLIMATE CHANGE

The sun emits radiation in all wavelengths, including high energy short-wave radiation. When short-wave radiation reaches the Earth's surface, it is absorbed and converted to heat. The Earth then re-radiates this heat in the form of long wave radiation back into the atmosphere. Once in the atmosphere, long wave infrared radiation is absorbed by a suite of gases (referred to as greenhouse gases) that, to varying degrees, retain the heat in the atmosphere. This naturally occurring phenomenon, known as the greenhouse effect, insulates the Earth from heat loss. Without the natural greenhouse effect, the average temperature of Earth's surface would be much colder.

Naturally occurring GHGs include water vapour, carbon dioxide, ozone, methane, and nitrous oxides. Human activities are increasing the concentration of these naturally occurring GHGs to an extent where the Earth's climate system can no longer maintain the balance achieved by natural processes. As well, human ingenuity has created new GHGs that are synthetic (human-made) such as hydrofluorocarbons (HFC), sulphur hexafluoride (SF_6) and perfluorocarbons (PFC). These GHGs are far more potent in their ability to affect warming than any naturally occurring GHG. The quantity, as well as potency of the GHGs that humans are collectively emitting to the atmosphere is thought to be disrupting global climate patterns and has inspired international efforts to shift to more sustainable behavior.

While there are many GHGs that absorb long-wave radiation in the atmosphere, there are six categories of GHG which represent the bulk of emissions resulting from human activities. Carbon dioxide (CO_2) is by far the largest contributor to climate change to date. The emphasis on reducing CO_2 is therefore justified. However, there are also non-CO_2 GHGs emitted from human activities that, kilogram for kilogram, have a greater global warming potential (GWP)than CO_2 over the course of their lifetime. The non-CO_2 GHG include methane (CH4), nitrous oxide (N_2O), PFCs, HFCs and SF_z. These non-CO_2 GHGs, when combined with the chlorofluorocarbons (CFCs) that were emitted to the atmosphere before they were banned, have collectively influenced global climate patterns over the past century.

Taking Action
Wind Resources
Data Collection from Meteorological Tower

Wind resources in the industrial park of the Town of Bouctouche were evaluated by the KC Irving Chair in Sustainable Development at the Université de Moncton, using data collected from a meteorological tower between July 2008 and June 2009. The average wind speed at 80 m above ground was determined to be approximately 6.60 m/s. Following data collection on the wind resources, an estimate on the possible revenues was developed.

Through programs like the PCP, municipalities are moving proactively to measure and manage their GHG emissions to demonstrate social responsibility and to manage risk. Forward thinking communities have developed LAPs that go a step further, taking a strategic management approach to managing and reducing GHG emissions.

2.0 COMMUNITY ENGAGEMENT

Stakeholder engagement played an integral role in shaping the LAP. The Town secured the participation of key stakeholders (collectively called the Action Team) in a series of workshops to begin to identify areas of focus within the plan, develop goals and actions, and to validate the LAP.

The following sub-sections describe the Action Team's role in the development of the LAP, and briefly describe community consultations.

2.1 ACTION TEAM

The Town has assembled a team comprised of specific individuals with energy and climate change expertise in the province. This group, in partnership with the Town, was responsible for the creation of a mission statement for inclusion in the LAP, for reviewing deliverables associated with the LAP and for supporting the implementation of the LAP actions. The action team includes representatives from:

- The Town of Bouctouche;
- Efficiency New Brunswick;
- NB Power;
- The K.C. Irving Chair of Sustainable Development at l'Université de Moncton;
- Kent County Solid Waste Commission; and
- Commission d'aménagement du district de Kent;

2.2 COMMUNITY CONSULTATION SESSIONS

A variety of community consultation sessions were held throughout the project, which included Province Wide focus group meetings, and community participation to validate the draft LAP.

2.2.1 Province Wide Focus Group Meetings

The objective of the focus groups was to introduce the project to meeting participants and collect sufficient feedback from subject matter experts to develop future goals and/or project level activities to include in the LAP.

In preparation for focus group meetings, each group prepared an introduction to their organization and shared any past reporting, figures, drawings, mapping, or other documentation submitted to the Town to assist with Stantec's understanding of the organization's relationship with the Town.

Each focus group was provided with an introduction to the LAP, and an opportunity to introduce their organization and role. Next, the mission statement developed by the steering committee was shared with the focus groups and the process associated with developing goals to reduce energy consumption and GHG emissions in the Town was discussed. A Stantec led, iterative planning exercise followed with participation from meeting participants to identify goals and actions for the plan. At the conclusion of each focus group meeting, goals and actions were distributed to focus group participants for validation and distributed to the steering committee. Feedback was considered and integrated to produce the final LAP.

Focus group participants included a cross section of groups representing a variety of interests and subject matter experts throughout the Province including:

- The Action Team;
- Representatives from the Biomass Community;
- The K.C. Irving Chair of Sustainable Development at l'Université de Moncton;
- Crandall Engineering;
- NB Power;
- The Conservation Council of New Brunswick;
- Alternahome - a local home builder and developer of sustainable communities;
- Efficiency New Brunswick; and
- The Kent County Solid Waste Commission.

In many cases, focus group participants were identified as being responsible in part for enabling or implementing actions in partnership with the Town.

2.2.2 Community Participation to Validate the Local Action Plan

To validate that the LAP appropriately addressed Bouctouche residents' concerns, a bilingual public meeting was facilitated by the Town and Stantec to share the results of the exercise and to collect feedback on potential modifications to the LAP. This was accomplished by conducting facilitated sessions using a hybrid of world café and open space facilitation techniques. Feedback received by residents was incorporated into the final document presented to Council for adoption.

3.0 EMISSIONS INVENTORY, FORECAST, AND REDUCTION TARGETS

The following section includes a summary of the 2007 baseline level of GHG emissions associated with Town operations and the community , a forecast of GHG emissions 10 years out from the baseline year to 2017, and a specification of the GHG reduction targets committed to by town operations and town council. Much of this information was retrieved from the results of a study completed by Stantec for the Town and submitted to FCM in 2008. The Town also completed energy audits on Town buildings in 2008 as part of this exercise and the results of the energy audits are used in the forecast in section 3.1.2.

The Town has updated their Corporate and Community emissions inventories for 2008, 2009, and 2010 and the results of these inventories are summarized and compared to the targets specified.

To simplify the reporting of GHG emissions, GHG's are normalized and reported as metric tonnes of carbon dioxide equivalents (t CO_2e). This simplifies emission reporting with CO_2e representing the sum of the individual GHGs weighted to represent the atmospheric effects of CO_2, the most abundant GHG, relative to individual Global Warming Potentials (GWP). The GWP is a measure of the warming effect that a particular GHG will have on the atmosphere relative to the impact of CO_2. The amount of each GHG emitted from a source is multiplied by the appropriate GWP to estimate CO_2e emissions.

Taking Action
Energy Audits on 6 Town Buildings

Energy audits were completed on 6 Town owned and operated facilities during 2007, and the potential energy and emissions savings were previously calculated in detail for these facilities (see Table A.1 in Appendix A). Energy savings resulting from these energy efficiency actions were translated into avoided GHG emissions using the FCM quantification spreadsheet.

3.1 CORPORATE EMISSIONS

3.1.1 Baseline Inventory

The 2007 Corporate GHG emissions inventory for the Town is summarized in Table 3.1.

Table 3.1 Baseline (2007) Corporate GHG Emissions Summary

Sector	Total Emissions (t CO_2e)
Buildings	584
Vehicle Fleet	43
Street, Traffic and Area Lights	105
Water and Wastewater Systems	379
Corporate Solid Waste	28
Total	1,140

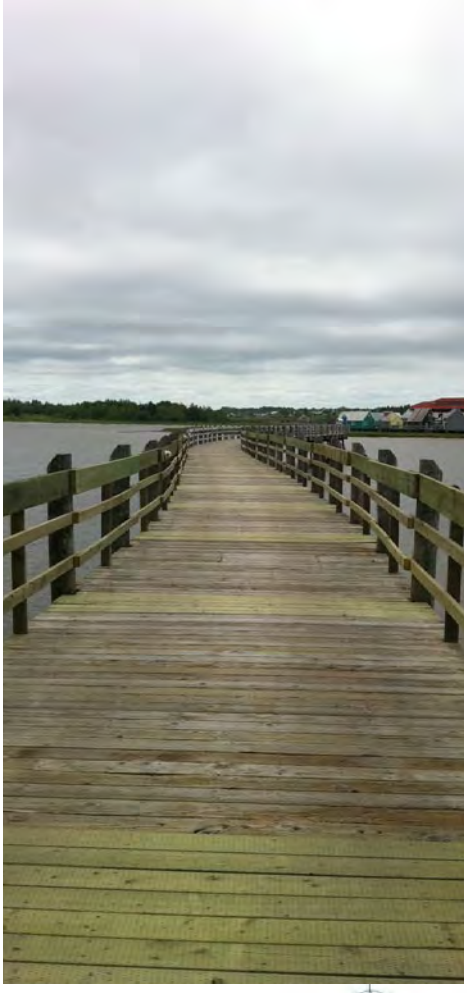

Figure 3.1 summarizes the corporate GHG emissions by source.

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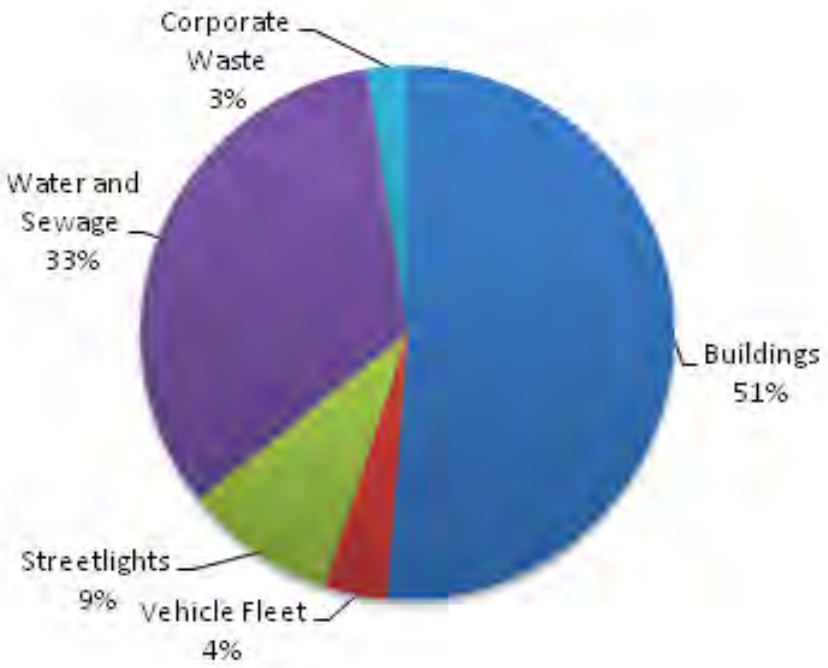


Based on the above information, it is clear that the major contributors to GHG emissions result from energy consumption at municipal buildings and at water distribution and wastewater collection and treatment facilities.

3.1.2 Forecast

A summary of the predicted 2017 corporate GHG emissions is provided in Table 3.2. This information is a 'business-as-usual' projection to 2017, and within the calculations it is assumed that at a minimum, the Town implemented energy efficiency measures as outlined in the energy audit report provided to the town. The forecast was retrieved from the Town baseline report, and assumes the GHG emission intensity associated with NB Power generation remains at 2007 values.

Table 3.2 2017 Corporate GHG Emissions Summary

Sector	Total 2007 Emissions (t CO_2e)	Total 2017 Emissions (t CO_2e)	Predicted Reductions (t CO_2e)	Predicted Reductions (%)
Buildings	584.4	524.9	59.5	11
Vehicle Fleet	43.2	43.2	0	0
Street, Traffic and Area Lights	105.3	105.3	0	0
Water and Wastewater Systems	379.3	374.1	5.2	2
Corporate Solid Waste	28.1	28.1	0	0
Total	1,140	1,076	65	6

Based on the information presented in Table 3.2, the Town would reduce corporate GHG emissions by 6% by implementing all of the recommended energy efficiency measures provided in the energy audit reports that the Town commissioned simultaneously with the GHG inventory study.

3.1.3 Reduction Targets

The Town has adopted the FCM recommended corporate target of a 20% reduction below 2007 GHG emissions for municipal operations within 10 years (i.e.,, 2017). As participation in PCP is voluntary, the Town may choose to revise its target as new information becomes available and as it implements the LAP.

3.1.4 Emission Comparison

The Town of Bouctouche updates the emission inventory on an annual basis. In Table 3.3, emission levels are compared for the Town from 2007 to 2010.

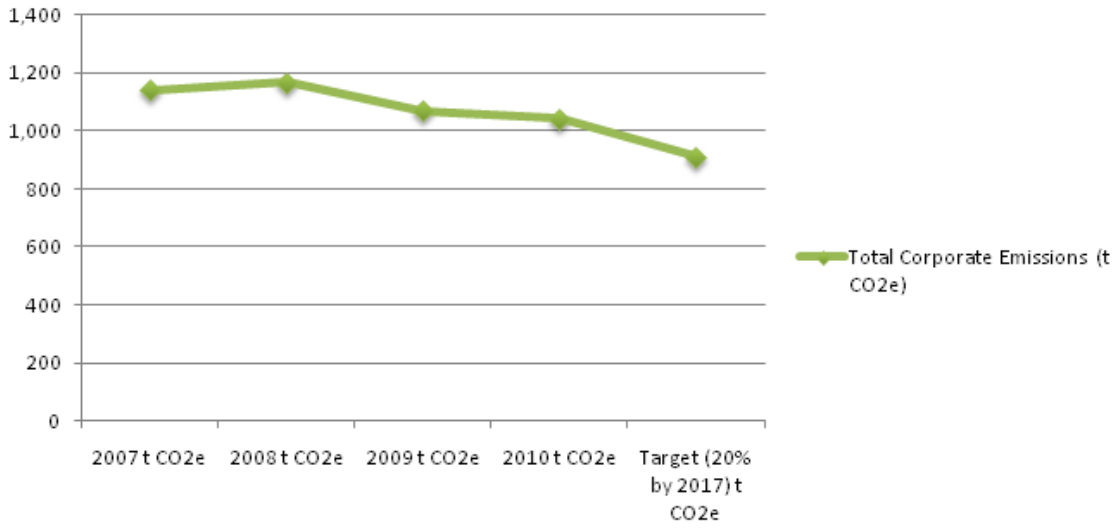
Table 3.3 Corporate GHG Emissions Comparison (2007 – 2010)

Sector	Total Emissions (t CO_2e)				
	2007	2008	2009	2010	20% Below Baseline Levels by 2017
Buildings	584	546	499	483	-
Vehicle Fleet	43	70	57	50	-
Street, Traffic and Area Lights	105	97	97	97	-
Water and Wastewater Systems	379	435	383	393	-
Corporate Solid Waste	28	20	33	18	-
Total	1,140	1,167	1,069	1,041	912

Corporate GHG emissions have decreased since the 2007 baseline year from 1,140 t CO_2e to 1,041 t CO_2e which corresponds to an 8.6% (or 100 t CO_2e) reduction in emissions over 4 years.

To meet the corporate target (20% below baseline levels by 2017), the Town would be required to reduce emissions further by 129 t CO_2e from 1,041 t CO_2e to 912 t CO_2e. In Figure 3.2, Corporate GHG emissions from 2007 to 2010 are compared to the Town's reduction target.

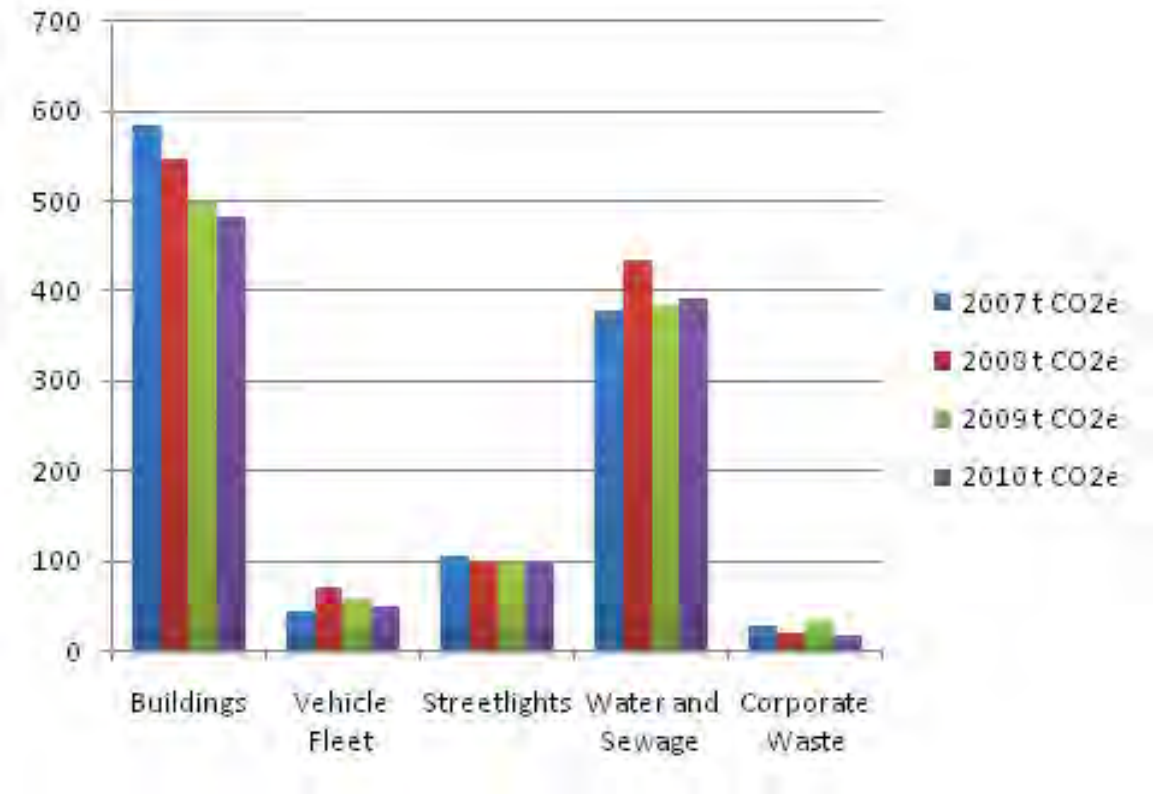
Figure 3.2 Corporate GHG Emissions Trends



As indicated in Figure 3.2, the overall emission trend form 2007 to 2010 is showing a steady reduction in GHG emissions. However, to meet the 2017 target, more improvements must be implemented as noted throughout this report.

Figure 3.3 presents the GHG emissions, by source, from 2007 forward.

Figure 3.3 Corporate GHG Emissions Trends by Source



As indicated in Figure 3.3, the buildings source has significantly reduced its emission by 17% between years 2007 to 2010. The largest contributors to this reduction included energy efficiency measures in the Town Hall/Fire Hall, the Forum Arena and the Public Works Garage. In this 4 year period, these buildings reduced their energy consumption by 31,520kWh, 18,720kWh and 15,900kWh, respectively. This represents emission reductions of, 27%, 3% and 36% respectively.

Taking Action
Feasibility Study of Commercial Recycling Program

An initiative to explore recycling as a waste management strategy in Bouctouche was originally contained in the Town of Bouctouche Green Plan that was adopted in 2006. The Town's transfer site (where waste is transferred from the Kent County Solid Waste Commission to the Westmorland-Albert Commission) cannot manage garbage and compost separately because of global economic conditions. The report concluded that the Town does not have sufficient human and financial resources to implement a commercial recycling program at the present time however; the Town has addressed the issue in this LAP.

The Vehicle Fleet sector has increased its emissions from 2007 to 2010 by 16. However, as presented in Figure 3.4, these emissions have decreased over time after a spike in emissions in 2008 due to increased fuel consumption.

The emissions contributed from streetlights have remained relatively stable since 2007.

Water and sewage emissions have increased from 2007 to 2010. On the whole, the energy consumption has increased by 95,869 kWh (or 13%) from 2007 to 2010. This increase could be attributed to the addition of a sewage lift station in 2009 and the UV Light Treatment at the Lagune 2 facility in 2010.

Corporate waste does not constitute a large of a portion of the Town's GHG emissions and has remained relatively stable since 2007.

3.2 COMMUNITY EMISSIONS

3.2.1 Baseline Inventory

The 2007 Community GHG emissions are summarized in Table 3.4.

Table 3.4 2007 Community GHG Emissions Summary

Sector	Total Emissions ($t\ CO_2e$)
Residential	10,660
Commercial	10,782
Small Industrial	4,607
Transportation	12,432
Community Solid Waste	351
Total	38,831

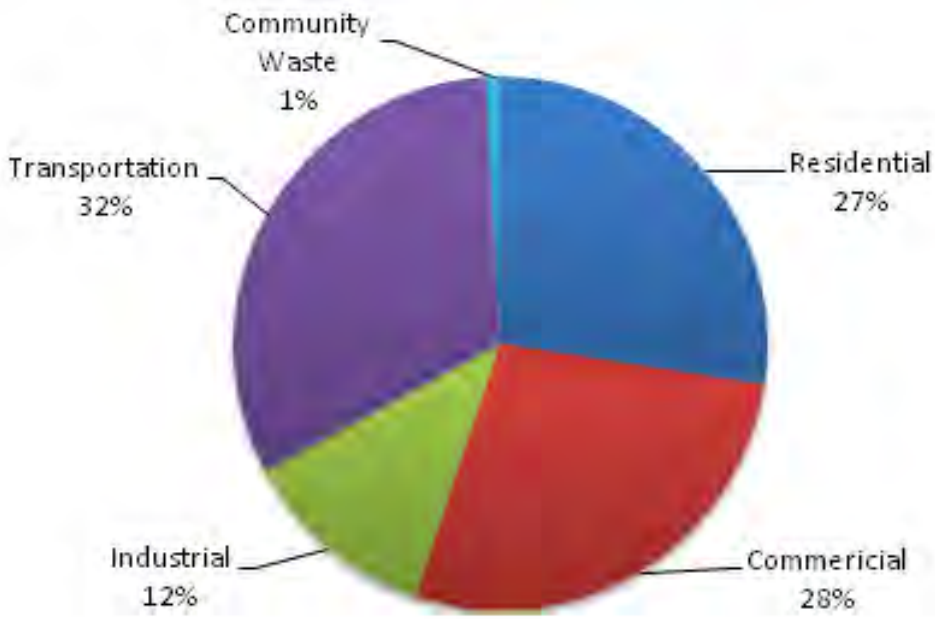
In 2007, the corporate GHG emissions represented approximately 3% of the total community GHG emissions. While emission reductions by the Town are of themselves important in terms of the environment and cost savings, the influence of action by the Town to save energy has the potential to be very much magnified in terms of leadership to influence potential emis-

Taking Action
Inventory of Ecosystems in the Town of Bouctouche

This report compares the Town's ecosystems and boundaries of the ecosystems in 1996 (based on orthophotography) to those in 2009. The areas occupied by both ecosystems for these years were determined, and the percent change presented. For example,forested areas decreased by from 47.7% to 46.5%, urban lands increased from 21.7% to 24.7%, grassy lands increased from 12.7% to 14.3%, and agricultural lands decreased from 11.9% to 9.4%. Although urban lands increased during this time, the population decreased. The report provides various ecosystem and zoning maps.

sions reductions along with energy and cost savings across the larger community. Figure 3.4 presentes the percentage of GHG emissions by each sector within the community.

Figure 3.4 2007 Community GHG Emissions Summary



3.2.2 Forecast

An estimate of the Town's 2017 community GHG emissions is provided in Table 3.5. In this forecast, it was assumed that NB Power would be successful in meeting the proposed 29% intensity reductions required for electricity providers in the proposed regulatory framework, Turning the Corner, from the federal government, which has subsequently been abandoned. A separate forecast has not been prepared; however, the Town has investigated trends in electricity consumption from 2007 to 2010 to aid in the development of a community target.

Table 3.5 2017 Community GHG Emissions Summary

Sector	Total 2007 Emissions (t CO_2e)	Total 2017 Emissions (t CO_2e)	Predicted Reductions (t CO_2e)	Predicted Reductions (%)
Residential	10,660	7,820	2840	36
Commercial	10,782	8,454	2328	28
Industrial	4,607	3,634	973	27
Transportation	12,432	12,432	0	0
Community Solid Waste	351	351	0	0
Total	38,831	32,690	6141	19

3.2.3 Reduction Targets

As of 2010, the Town exceeded the suggested FCM recommended community target (6% reduction for the community within 10 years). As such, the Town's has decided to use a more aggressive community target of 10% below 2007 for the community by 2017. As participation in PCP is voluntary, the Town may choose to revise its target as new information becomes available and as the LAP is implemented.

3.2.4 Emission Comparison

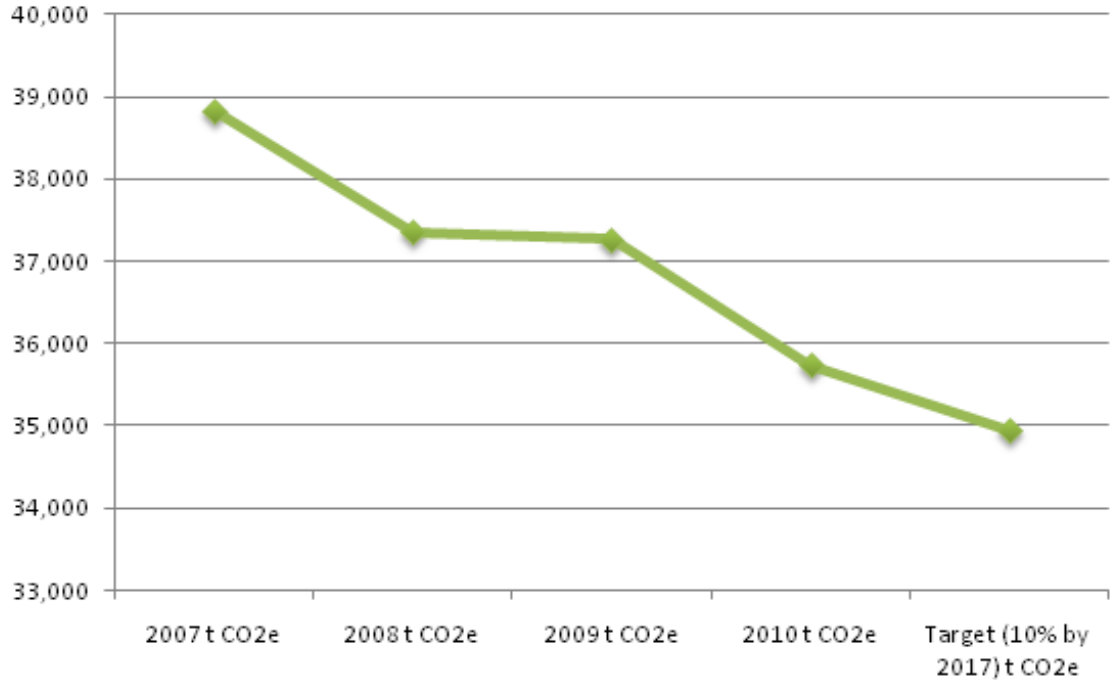
The Town updates the emission inventory on an annual basis. In Table 3.6, community GHG emissions are compared from 2007 to 2010 and compared to the Town's community GHG emission reduction target of 10% below baseline levels by 2017.

Table 3.6 Community GHG Emissions Comparison (2007 – 2010)

Sector	2007 (t CO_2e)	2008 (t CO_2e)	2009 (t CO_2e)	2010 (t CO_2e)	20% Below Baseline Levels by 2017
Buildings	10,660	10,573	10,598	9,376	-
Vehicle Fleet	10,782	10,221	10,056	9,705	-
Street, Traffic and Area Lights	4,607	4,089	3,759	3,794	-
Water and Wastewater Systems	12,432	12,086	12,477	12,477	-
Corporate Solid Waste	351	379	378	389	-
Total	38,831	37,349	37,267	35,742	34,948

Community GHG emissions have decreased since the 2007 year from 38,831 t CO_2e to 35,742 t CO_2e, representing a 6% decrease (or 2,330 t CO_2e) in emissions over 4 years. To meet the community target of 10% below 2007 levels by 2017, the community would be required to reduce emissions further by 794 t CO_2e from 35,742 t CO_2e to 34,948 t CO_2e. In Figure 3.5, community GHG emissions from 2007 to 2010 are compared to the reduction target of 10% below baseline levels by 2017.

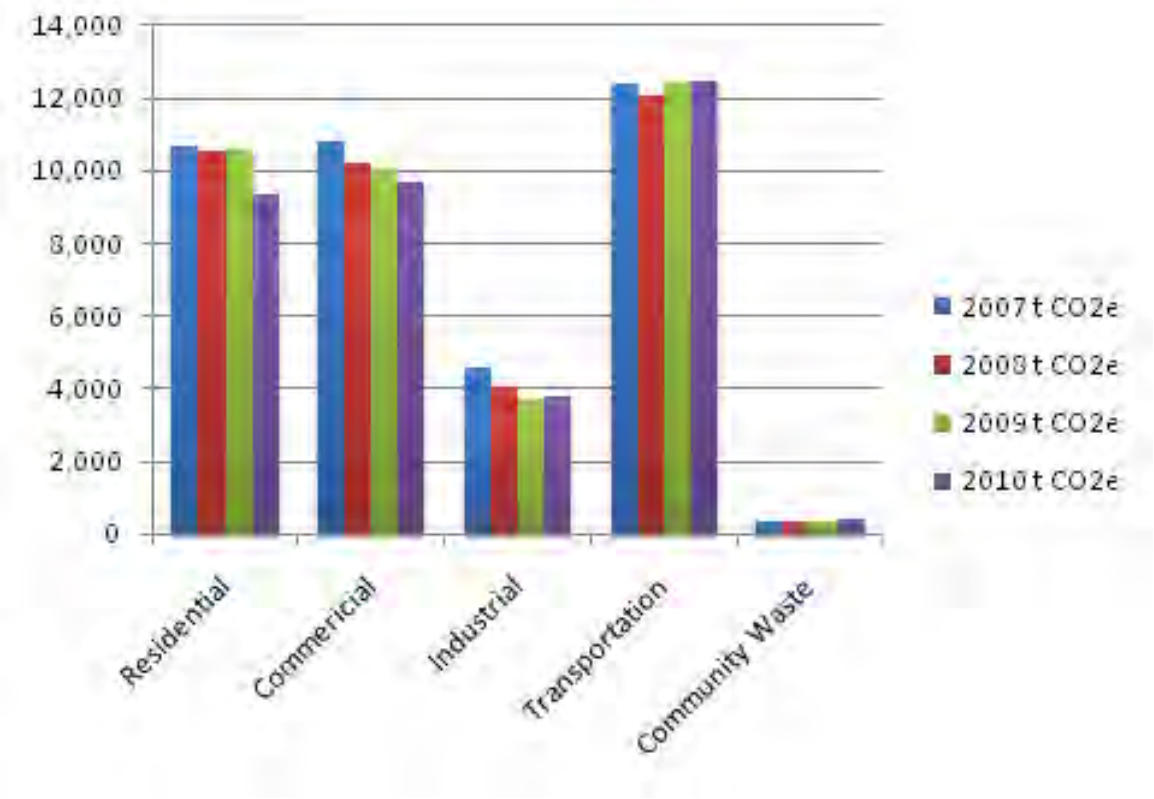
Figure 3.5 Community GHG Emissions Trends



As indicated in Figure 3.5, the overall emission trend from 2007 to 2010 shows a reduction in GHG emissions. To meet the intended reduction target of 10%, more improvements must be implemented, as noted throughout this report.

Each sector of the community contributes to the total community emissions. Figure 3.6 presents the GHG emissions by category for each subsequent year.

Figure 3.6 Community GHG Emission Trends by Emission Category



As indicated in Figure 3.6, the residential sector emissions were reduced by 12% between years 2007 to 2010. Fuel oil consumption slightly decreased during this time while propane consumption increased. This sector saw a decrease in energy consumption by 1,009,695 kWh (approximately 6%). The commercial sector emissions were also reduced by 10% between 2007 and 2010 with a resulting electricity consumption decrease of 705,404 kWh (or 5%) for the commercial sector. The industrial sector reduced GHG emissions by 17% and reduced energy consumption by 494,120 kWh (or 8%) over the 4 year period. The transportation and community waste sectors both remained relatively stable in their emissions over the 4 year period.

Taking Action
Community Action Plan
(2009 – 2012)

The Bouctouche Community Action Plan outlines the planning process, the vision, values, and socio-economic profile of the municipality. It identifies challenges, strengths, weaknesses, opportunities and threats of the town. Five strategic directions are identified, including tourism and economic development, heritage and cultural development, community development, marketing and communication, and the environment and sustainable development. Priorities and implementation ideas within each of these directions are identified.

4.0 LOCAL ACTION PLAN FRAMEWORK

The LAP Framework includes emission reduction targets, a mission statement, goals, and actions. The corresponding content for each element of the Framework is included in this section. Each element of the plan can be defined as follows:

- **Emission Reduction Targets**: Specific, time bound GHG reduction targets for Town operations and the community, set relative to a baseline.
- **Mission Statement**: A short, memorable statement to guide municipal and political officials. It defines the fundamental role of Town operations and politicians within the context of the stated emission reduction targets.
- **Goals**: Precise and realistic elements for moving towards a goal.
- **Actions**: Specific, high priority strategic initiatives required to achieve stated objectives. Stated actions are further clarified in an action plan containing time bound expectations, and assignments of responsibility.

In the following sections, the emission reduction targets are specified and the goals/actions that will form the implementation plan are articulated.

4.1 EMISSION REDUCTION TARGETS

The Town of Bouctouche has adopted the FCM recommended corporate target and developed a unique community target as follows:

- 20% reduction below 2007 GHG emissions for municipal operations by 2017;
- A 10% reduction below 2007 GHG emissions for the community by 2017.

4.2 MISSION STATEMENT

The following mission statement was developed by the action team and validated by residents within the Town of Bouctouche. Its purpose is to define the role of Town operations and politicians, within the context of the stated emission reduction targets:

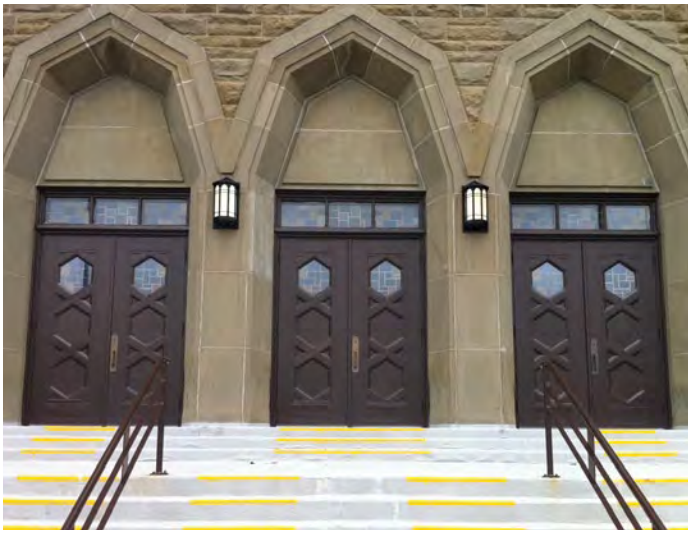
- Reduce greenhouse gas emissions by transforming our service delivery while educating and engaging our community about Climate Change.

4.3 GOALS AND ACTIONS

This LAP is organized around a set of goals and actions. The 11 goals and 19 actions cover a broad spectrum of considerations and connect with each corporate and community emission category, including buildings, water and wastewater, vehicles, streetlights, waste, residential, commercial, industrial, community transportation, and community waste.

The goals were identified as the key focus areas for the Town through stakeholder consultation. For each action associated with a goal, a specific timeframe and representatives responsible for implementation were identified (see Section 5.0).

Additionally, the possible impact associated with implementation of the action within town operations and the community, on capital planning, operations and maintenance or on other municipal plans was explored. Table 4.1 provides a summary of Goal and Action statements.



Taking Action GHG Inventory Development and Monitoring

The Town completed a baseline GHG inventory in 2007 and has completed subsequent Town operations and community GHG inventories for 2008, 2009, and 2010. The results of these exercises are integrated into the LAP and continued reporting and monitoring have been identified as an action.

Table 4.1 Summary of LAP Goals and Actions

Goals	Actions
Continue to investigate ways to conserve energy in Town buildings.	Identify remaining measures from energy audits and implement those measures.
	Investigate the feasibility of completing building energy audits on Town buildings that haven't been audited and complete audits if determined feasible.
Develop high potential local energy assets.	Develop a commercial biomass project in partnership with local industry if determined feasible.
	Partner with other communities to support their community wind initiatives.
Improve the procurement process to include requirements that will lead to GHG emission reductions.	Commission a green procurement project in partnership with an academic institution.
Significantly improve the efficiency of water and wastewater infrastructure.	Determine current heat settings for pumphouses and where appropriate, install programmable thermostats.
	Determine pump efficiencies and investigate pump work order on a quarterly basis
Continue to improve the efficiency of street and area lighting.	Investigate feasibility of LED replacement project.
Advance transit studies in the region for the benefit of commuters to neighboring communities.	Engage neighbouring communities to explore partnerships to develop a bus rapid transit service for commuters.
	Complete funding applications for FCM Green Municipal Funding and Environmental Trust Funds to support the project.
Engage and educate the community about climate change.	Develop a newsletter to report progress relative to the actions identified in the Local Action Plan twice per year.
Increase community uptake of energy efficiency measures.	Work with Efficiency NB to successfully recruit a cluster of businesses to participate in a group energy audit and EEM implementation project.
Continue to monitor energy and emissions.	Receive and analyze reports on Town operations and community energy consumption quarterly.
	Receive and analyze Efficiency NB Energy Efficiency implementation reports annually.
Explore modifications to the Municipal Plan to place new controls on residential developments.	Partner with the planning commission to explore ways to more effectively develop the green space associated with residential developments using regulatory controls.
	During renewal of the Municipal Plan, consider controls to encourage passive solar design to ensure maximum passive solar gain in homes.
Make modifications to waste programming as contracts mature and new program options become available.	Consider mandatory Wet / Dry program during contract renewal, which would require modifications to the existing transfer station.

5.0 IMPLEMENTATION PLAN

For each goal and action identified, a specific timeframe and representative(s) responsible for implementation were identified. Additionally, the possible impact associated with implementation of the action within town operations and the community, on capital planning, operations and maintenance, or on other municipal plans was explored. The time frame associated with each action is defined as follows:

- Short-Term: June 2011 to May 2013
- Medium-Term: June 2013 to May 2015
- Long-Term: June 2016 and Beyond

If implemented, the 19 actions included in the implementation plan should serve to reduce energy consumption and GHG emissions in town operations and the community. Table 5.1 presents a complete implementation plan, which will be used during monitoring exercises. See Section 6.0 for information on monitoring the implementation of the actions.

Taking Action
New Energy Efficient Town of Bouctouche Civic Centre

Thanks to geothermal heat pumps and emission controls, it is estimated that the new Town of Bouctouche multipurpose center due to be completed in the Fall of 2011 (Centre J.K. Irving Center) will consume 61% less energy than buildings of a similar function with conventional heating and cooling systems. The conventional system would have produced and estimated 920.3 t CO2e and the integrated system will produce 490.2 t CO2e, which is a reduction of 430.1 t CO2e. The integrated system will also enable the municipality to save approximately $ 203,352 per year. With the decreases in operating costs and significant reduction in energy consumption the decision of City Council unanimously supported the investment in this technology.

Table 5.1 Implementation Plan

Goals	Actions	Timeframe	Responsibility	Impact of Specific Actions to Reduce GHG Emissions				
				Impact: Town Operations / Community	Impact: Capital Planning	Impact: Operations & Maintenance	Impact on other Municipal Plans	NOTES
Continue to investigate ways to conserve energy in Town buildings.	Identify remaining measures from energy audits and implement	Medium	Town Facility Manager / Denny Richard		Potential for increased cost to implement measures, which could be offset by savings.	Potential for decreased energy costs and reduced GHG emissions.		
	Investigate the feasibility of completing building energy audits on Town buildings that haven't been audited and complete audits if determined feasible.	Medium	Town Facility Manager / Denny Richard		Potential for increased cost to implement measures, which could be offset by savings.	Potential for decreased energy costs and reduced GHG emissions.		
Develop high potential local energy assets.	Develop a commercial biomass project in partnership with local industry if determined feasible.	Medium	Biomass Community / Denny Richard	Reduce community energy consumption and GHG emissions. Potentially reduced costs for residents. Support for a local, growing industry.				Considered high potential, based on local availability of biomass, sourced from sustainably managed forests owned by private woodlot owners organized as an association. Additionally, there are local biomass businesses with applicable experience, and representative projects installed within Atlantic Canada.
	Partner with other communities to support their community wind initiatives.	Medium	Town Manager / Council / Denny Richard					
Improve the procurement process to include requirements that will lead to GHG emission reductions.	Commission a green procurement project in partnership with an academic institution.	Medium	Université de Moncton / Denny Richard	Purchase of high efficiency equipment leads to reduced energy consumption and GHG emissions, as well as environmental benefits along the Town's supply chain.	Possible cost increases, which may be offset by efficiency increases.			Feasibility of specific procurement measures must be investigated, as potential increase in cost may not be justified in all cases.
Significantly improve the efficiency of water and wastewater infrastructure.	Determine current heat settings for pump houses and where appropriate, install programmable thermostats.	Short	Crandall Engineering / Denny Richard					
	Determine pump efficiencies and investigate pump work order on a quarterly basis	Short	Crandall Engineering / Denny Richard					
Continue to improve the efficiency of street and area lighting.	Investigate feasibility of LED replacement project.	Medium	NB Power (Bernice Leblanc) / Denny Richard	Reduced energy consumption and GHG emissions in Town operations.	Potentially capital intensive	Potential for decreased energy costs and reduced GHG emissions.		Town currently pays a flat rate for lights, and doesn't save money from purchasing lights. Additionally, the Town is host to an LED pilot project with lighting on Heritage Street.
	Identify other area lighting with potential for wattage reduction or LED replacement.	Short	Denny Richard / Town Operations	Reduced energy consumption and GHG emissions in Town operations.	Potentially capital intensive.	Potential for decreased energy costs and reduced GHG emissions.		
Advance transit studies in the region for the benefit of commuters to neighboring communities.	Engage neighbouring communities to explore partnerships to develop a bus rapid transit service for commuters.	Short	Denny Richard / Town Manager	Reduced community energy consumption and GHG emissions. Reduced costs for residents. Improved access and quality of life for seniors and youth.	Initial study will require funding however, cost can be offset by possible federal (GMF) and provincial (ETF) funding.		Possible impacts on land use and other municipal plans, depending on the most appropriate service model.	Potential to partner with neighbouring communities, or develop a service for Bouctouche residents only, depending on neighbouring community support.
	Complete funding applications for FCM Green Municipal Funding and Environmental Trust Funds to support the project.	Short	Denny Richard / Third Party Service Provider	Reduced cost to investigate the feasibility of the potential bus rapid transit service.				

Goals	Actions	Timeframe	Responsibility	Impact of Specific Actions to Reduce GHG Emissions				
				Impact: Town Operations / Community	Impact: Capital Planning	Impact: Operations & Maintenance	Impact on other Municipal Plans	NOTES
Engage and educate the community about climate change.	Develop a newsletter to report progress relative to the actions identified in the Local Action Plan twice per year.	Short	Town Council / Denny Richard	Increase in transparency associated with municipal human and financial resource use.				
	Hold Town operations, planning commission, and community meetings to update public on changes to Provincial Energy Efficiency programming.	Medium	Efficiency NB (Rachel Lanteigne) / Denny Richard	Increase in transparency associated with municipal, human and financial resource use.				
Increase community uptake of energy efficiency measures.	Work with Efficiency NB to successfully recruit a cluster of businesses to participate in a group energy audit and EEM implementation project.	Short	Efficiency NB (Rachel Lanteigne) / Denny Richard	Reduced community energy consumption and GHG emissions, and reduced costs for commercial sector.				
Continue to monitor energy and emissions.	Receive and analyze reports on Town operations and community energy consumption quarterly.	Ongoing	NB Power (Bernice Leblanc) / Denny Richard	Potential for identification of energy efficiency and demand side management initiatives quarterly, as opposed to annually.		Reduced demand may lead to reduced operations and management costs.		
	Receive and analyze Efficiency NB Energy Efficiency implementation reports annually.	Ongoing	NB Power (Bernice Leblanc) / Denny Richard	Town operations and Community Engagement strategy can be modified based on implementation rates.		Reduced demand may lead to reduced operations and management costs.		
Explore modifications to the Municipal Plan to place new controls on residential developments.	Partner with the planning commission to explore ways to more effectively develop the green space associated with residential developments using regulatory controls.	Medium	Planning Commission / Denny Richard					

6.0 MONITORING

Responsibility for overall implementation of the Actions within the LAP rests with the Town's CAO, and Director of Sustainable Development. These individuals will be responsible for implementing actions in partnership with the individuals identified within the implementation plan.

Quarterly reports on implementing actions within the plan will be provided to Council by a special report. This special report will be prepared by the Director of Sustainable Development, and reviewed by the Town Manager previous to being presented by council. Qualitative and quantitative updates will be provided in this special report on specific progress relative to actions.

Annually, by special report to Council, a summary report noting the most recent quarter's activities relative to the plan as well as all other quarters during that year will be developed by the CAO and the Director of Sustainable Development and submitted to Council by special report. This annual summary report will also provide information on energy consumption and GHG emission production within Town operations and the community.

Council will be responsible for reviewing the report. Should substantive modifications be required to the LAP, the Town CAO, Director of Sustainable Development and representative of Council will reconvene the Steering Committee to validate and gather feedback on proposed changes. Final changes to the LAP will be subject to Council review and an approved motion during a Council session.

7.0 COUNCIL ADOPTION

It is with great pleasure that the sitting Town Council and Town Administration adopt the Town of Bouctouche Local Action Plan. This plan was developed in partnership with the community and Town operations, and it reflects the unique attributes and character of our Town.

The Plan sets the foundation for the Town to continue to transform our operations so that we offer the most effective and efficient services to our citizens, while remaining stewards, committed to preserving, enhancing, and restoring our environment.

Original Signed By:

Aldéo Saulnier
Mayor of Bouctouche

André Cormier
Chief Administrative Officer

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9.0 APPENDICES

Appendix A Energy Asset Exploration

Appendix B Inventory of Assets

APPENDIX A
ENERGY ASSET EXPLORATION

1.0 ENERGY ASSET EXPLORATION

The following section presents information on a variety of energy topics to provide structure and to educate LAP project participants on possible options that could be integrated into the LAP. The scope of this exercise was determined in consultation with the Town, and recognizes the considerable progress made by the Town to investigate some of initiatives in detail before the publication of the LAP.

Note that specific Town actions relevant to the energy topics explored are identified. This includes actions to increase the efficiency of buildings by conducting energy audits on a variety of town buildings, completing a detailed study on wind resources including erecting a structure to collect field data followed by detailed analysis and studying the potential for biomass/geothermal heat options available to the Town.

1.1 Reducing Energy Demand in Buildings

The Canadian Housing and Mortgage Corporation have identified four building components that can be targeted to increase energy efficiency:

- Building envelope;
- Passive solar design;
- Heating, ventilation and air conditioning systems;
- Lighting, power, and water systems; and
- Energy audit findings.

The following sections include a brief discussion of these building components and how to reduce energy demand in residential and commercial/institutional buildings. Further, section 1.1.5 of this report includes a summary of the findings of a series of energy audits conducted on Town buildings in 2008.

Investments to improve energy efficiency are typically supported by short payback periods that result from lower operating costs. Thus, reducing energy demand represents a cost-effective approach to improving the sustainability of a community and is also a key step prior to investing in alternative energy systems that reduce or replace demands on conventional energy supplies.

1.1.1 Building Envelope

A cost-effective means to reduce the energy demand of a building is to improve the thermal performance of its envelope (i.e., walls, roof and foundation) during the construction phase. Once a building is constructed, it becomes more difficult (and costly) to improve the thermal performance of its envelope. The thermal performance is improved by increasing the ability of the envelope to resist heat loss to the outdoors, as well as its ability to resist air infiltration. This is achieved by optimizing the use of insulation, windows, and doors. By increasing the R-value of these envelope components, thermal resistance of the envelope is increased.

Air infiltration occurs when there are gaps in a building's envelope that allow air to enter and exit the interior space. Air infiltration can be reduced by optimizing the use of vapour barriers, and using rubber gaskets, caulking, or expanding foam insulation to seal holes in exterior walls (around electrical boxes for example).

Increasing the thermal performance of a building's envelope reduces heat loss from the structure, thereby reducing the energy inputs required to maintain a comfortable indoor temperature.

1.1.2 Passive Solar Design

Building envelopes contain glass apertures or windows that are capable of reducing or increasing the space heating demands of a building. Buildings designed to maximize solar gain through south facing windows can experience 20 to 50% reductions in energy demand for space heating. Hence, it is recommended that for future constructions, consideration should be given to incorporating efficient passive solar design features in the building.

Passive solar development has negligible costs, reduced daytime lighting requirements, and increased occupant comfort.

1.1.3 Heating, Ventilation, and Air Conditioning

The efficiency of heating, ventilation, and air conditioning systems affect the amount of energy required to maintain a set temperature inside a structure. Since these mechanical systems typically have life spans in the range of 15 to 25 years, upfront investments in high efficiency equipment provide returns through reduced operational costs for years to come.

Employing air-to-air heat exchangers that transfer heat from the exhaust to the incoming air, can realize significant savings in the energy cost. These systems can reclaim approximately 60 to 90% of the heat contained in the exhaust air. Another way that incoming fresh air can be preconditioned prior to entering a building is through earth tube technologies. With earth tube technology, outside air is drawn through a pipe in the ground before it is supplied to the building, to reduce the heating or cooling requirements of the incoming air.

1.1.4 Lighting, Power, and Water Conservation

Reducing energy demand in buildings is critical when striving towards a more sustainable community. It is understood that the Town is striving towards efficient water conserving strategies.

1.1.5 Town Action

Energy audits were completed on 6 Town owned and operated facilities in 2007 and the potential energy and emissions savings were calculated in detail for these facilities (see Table A.1). Energy savings resulting from these energy efficiency actions were translated into avoided GHG emissions using the FCM quantification spreadsheet.

Table A.1 Potential Corporate Building GHG Reductions

Building	Baseline (2007) Electricity Consumption (kWh/yr)	Electricity Savings from EEM (kWh/yr)	Baseline (2007) Propane Consumption (L/yr)	Propane Savings (L/yr)	Baseline (2007) GHG Emissions (t CO_2e)	Potential GHG Emission Reduction Target (t CO_2e)	Avoided Emissions (t CO_2e)
Town Hall/Fire Hall	118,640	53,251	13,678	1,234	80	-35%	28
Public Works Garage	43,720	-21,009	19,634	9,117	52	-8%	4
Information Centre	17,399	15,991	0	0	26	-96%	25
Old Post Office (combined)	31,048	Air to Air + Other EEM's 21,888	0	0	16	-69%	Air to Air + Other EEM's 11
		Water to Air + Other EEM's 19,779				-63%	Water to Air + Other EEM's 10
Library	31,006	4,793	0	0	16	-19%	3
Waste Water Treatment Plant (Lagoon # 2)	526,860	10,322	0	0	263	-2%	5
Total	768,673	With Old Post Office Air to Air 85,506	33,312	10,351	453	With Old Post Office Air to Air -17%	With Old Post Office Air to Air 76
		With Old Post Office Water to Air 83,397				With Old Post Office Water to Air -17%	With Old Post Office Water to Air 75

In the Public Works Garage, electricity consumption increased as a result of implementing Energy Efficiency Measures (EEMs) that result in a reduction of propane consumption.

In the Information Centre, it is assumed that EEMs are implemented in total and fuel oil fuel consumption in the facility is displaced as a result.

The Old Post office houses represent 2 separately metered offices in one facility. The two offices were combined, as well as their baseline electricity consumption, which is reflected in Table A.1. The EEMs compiled relative to this facility include the option of installing air to air or water to air pumps for heating and cooling. It is assumed that only one of these options will be selected and data is presented for each option above.

The Town has already undertaken a number of initiatives that are measurably reducing energy consumption. The Library reduced its electricity consumption by 29.83% between 2000 and 2007. Additionally, the Waste Water Treatment Plant experienced a 113.8% reduction in electricity consumption between 2005 and 2007. These initiatives are an important step and allow the Town to tangibly demonstrate its commitment to reducing unnecessary energy consumption.

As presented in Table A.1, the energy efficiency initiatives which could be implemented in Town buildings represent substantial potential reductions in GHG emissions. The Town, by implementing all of the recommendations, would reduce its facility GHG emissions considerably by 2017.

1.2 RENEWABLE SOURCES OF THERMAL ENERGY

1.2.1 Solar Heat

Solar energy is the most abundant source of energy available on Earth. Solar energy can be converted to electricity or used as heat by way of a variety of collection technologies. The Canadian solar industry and national installed capacity continues to increase, as breakthroughs in collection efficiencies and increases in conventional energy prices reduce economic barriers. While supplies of solar energy are free, capital costs of solar collection technologies can be high relative to conventional systems.

The Town worked with the KC Irving Chair in Sustainable Development at the Université de Moncton to investigate the potential for the installation of photo-voltaic panels to harness solar energy within Town limits. In a report received by the Town, a variety of advantages to using this technology were identified, including that the systems are potentially profitable and sold by local businesses. The report also identified some potential challenges which include the inadequate evaluation of local solar resources, the complex installation process and limited service providers in the Town.

1.2.2 Active Solar Thermal Collection

Active solar collectors use the forced circulation of a working-fluid through a solar collector to capture solar energy as heat. The thermal energy contained in the working fluid can then be passed through a heat exchanger that transfers the solar heat to a thermal store or end-use. For example, a domestic hot water tank hydronic space heating system (using water as a means to heat or cool), or swimming pool.

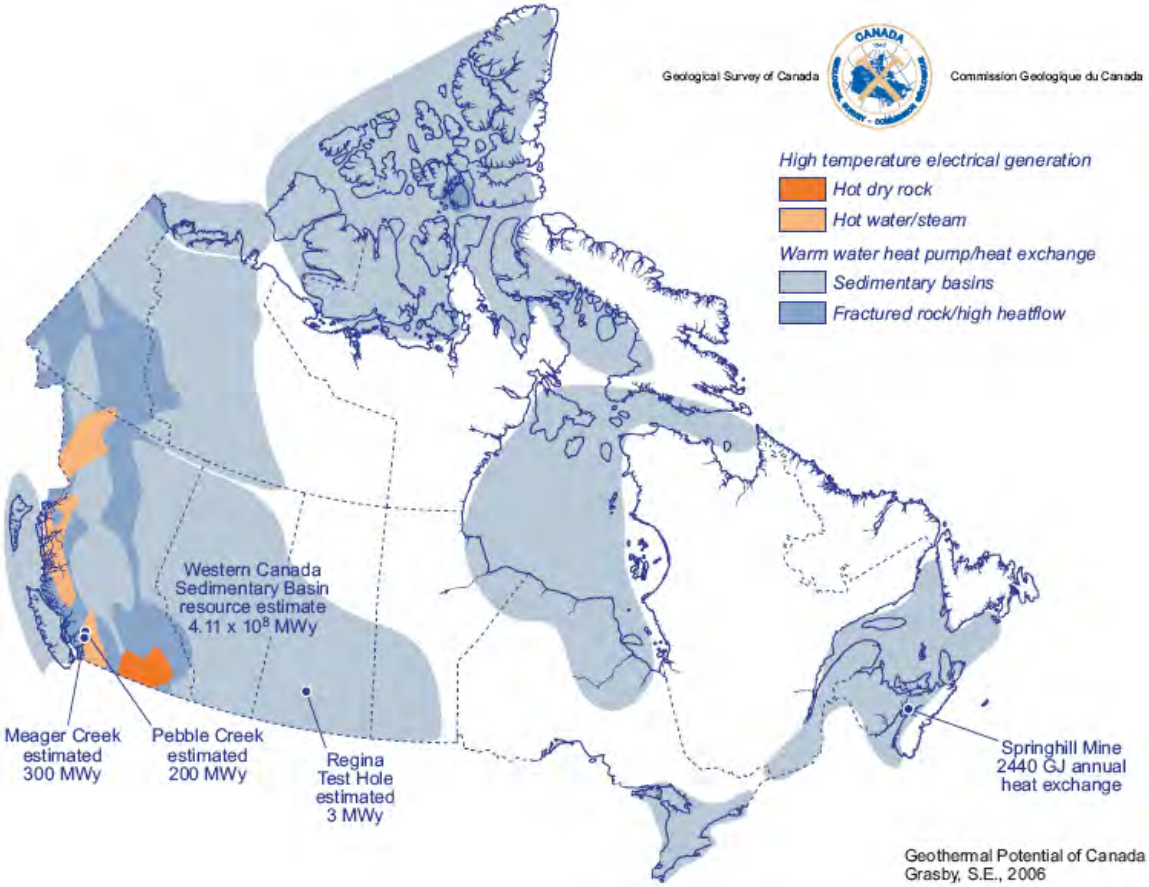
The most common application of active solar collectors in Canada are those that provide domestic hot water; which accounts for approximately 19% of the total energy demand in residential buildings and 9% in commercial buildings. Since the demand for domestic hot water is consistent over the course of a year, relative to demand for space heat, it is easy to design and implement a solar water heating system to replace a portion of the conventional energy supplies required for domestic water heating. These applications have been widely proven in Canada and around the world as an economic way to reduce the climate impacts associated with water heating. There may be incentives offered in the future, which would serve to increase the feasibility of these projects.

Another application of solar collection is the space heating. Solar energy can be used to preheat the ventilation air using the solar walls. The solar walls generate significant energy savings.

1.2.3 Geothermal Heat

The term geothermal energy is used widely to describe a number of different types of renewable energy technologies that rely on thermal energy stored in the Earth's crust to generate heat at the surface. Geothermal heating and cooling, also known as 'geo-exchange' or 'earth energy', uses electricity and heat pumps to concentrate the thermal energy stored at shallow depths below the surface of the earth. A network of pipes is used to gather thermal energy from a large volume of earth, and heat pumps are used to concentrate this energy for use in a building. Figure A.2 summarizes the geothermal potential in Canada.

Figure A.2 Geothermal Potential in Canada



Earth energy systems use heat pump technology to transfer thermal energy from the earth into homes and other buildings for space heating and to transfer heat from the buildings back into the earth for space cooling in the warmer months. In the simplest of terms, holes are drilled into the earth's surface, pipes are inserted, and a fluid (typically groundwater, a water/antifreeze mixture, or a refrigerant) is passed through the pipes into the heat exchange system inside the building and then circulated back into the ground when the cycle is complete.

1.2.3.1 Town Action

In the Bouctouche Potential Renewable Energy Sources report, heat pump technologies were explored and a variety of advantages and disadvantages are listed, as well as specific technologies. The environmental and economic benefits to installing earth energy systems include:

- A constant source of clean, renewable energy;
- Operating and maintenance cost savings over conventional heating and cooling systems;
- Reduction of greenhouse gas emissions and other air contaminants that result from the combustion of fossil fuels in conventional heating and cooling systems; and
- Improved security from rising energy prices.

1.3 MUNICIPAL SOLID WASTE

The International Energy Agencies Task 36 – Integrating Energy Recovery into Solid Waste Management Systems (October of 2006), indicates the potential for municipal solid waste (MSW) to satisfy local energy demands. The conversion of MSW to energy is relatively common in the industrial world, but is less prevalent in Canada and the United States. For example, Austria receives 22 percent of its total energy supply from the burning of MSW

Converting MSW into energy has a number of potential benefits, including:

- Reducing the volume and mass of solid waste entering local landfills;
- Providing a source of energy to local communities; and
- Providing an effective means to deal with pollution streams associated with solid waste management.

In general, MSW is converted to energy through a combustion process that produces steam, flue gas, and ash. The steam can be used to heat buildings that are connected through a district heating network, or generate Town electricity. Ash resulting from the combustion process is disposed of in an approved landfill and flue gas is treated by air pollution control systems prior to venting to the atmosphere.

To feasibly utilize thermal energy generated by a MSW to energy facility, it would have to be distributed to a number of buildings. This is achieved through the development of a district heating network.

1.4 MUNICIPAL WASTEWATER

Domestic water heating represents a significant portion of energy end-use. It is possible to reclaim a portion of this heat by installing counter-flow heat exchangers on the wastewater drains of individual homes. It is also possible to reclaim a portion of this heat on the community level, in wastewater collection networks or wastewater treatment facilities.

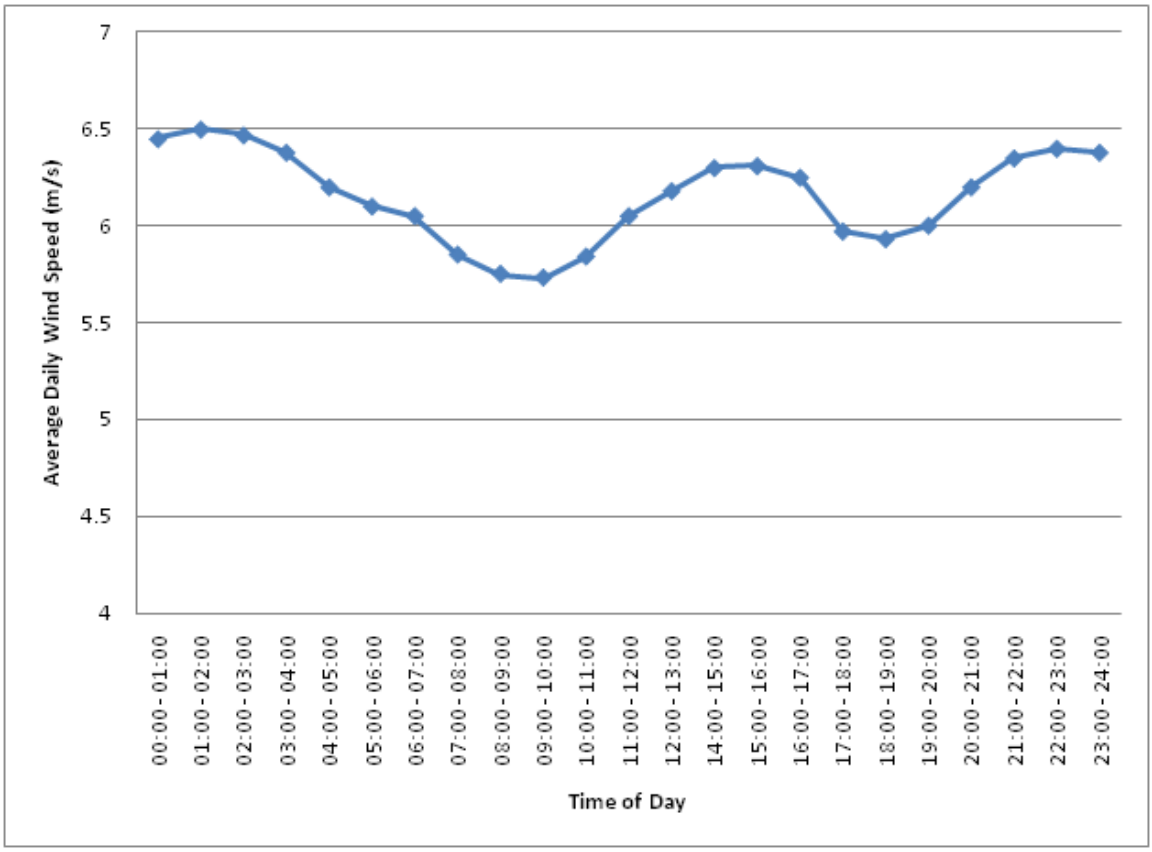
1.5 WIND ENERGY

Between 1997 and 2007, the wind energy industry saw a ten-fold increase. In Canada, planned installations of wind turbines in 2009 were expected to provide 650 MW of wind-generated electricity-supplying about 1% of Canada's electricity demand.

1.5.1 Town Action

Wind resources in the industrial park of the Town of Bouctouche were evaluated by the KC Irving Chair in Sustainable Development at the Université de Moncton, using data collected from a meteorological tower between July 2008 and June 2009. Data was compared and corrected accordingly based on a ten year data set, ending in 2009, from the Moncton airport. This was done to better represent the long term climate in the region. The data was collected from a meteorological tower at a height of 60 m. As the standard height of wind turbines currently in use in Canada is 80 m, this data was extrapolated to a height of 80 m to represent the conditions that would be present at the height of a potential wind turbine. The average wind speed at 80 m above ground was determined to be approximately 6.60 m/s. Figure A.3 presents the wind profile results from this analysis.

Figure A.3 Average Daily Wind Speed Profile from Bouctouche Meteorological Tower



Following data collection, an estimate on the possible revenues from construction and operation over 25 years of a 15 MW wind farm was developed. The results of this showed that the wind farm could operate with a factor of utilization of between 27% and 30%, with potential profits between $18.4 million and $31.4 million over 25 years, depending on several parameters.

Related to the Town's study, the New Brunswick Department of Energy (NBDOE) commissioned a report to develop Model Wind Turbine Provisions and Best Practices for New Brunswick Municipalities, Rural Communities, and Unincorporated Areas. This thorough report was produced to continue to advance wind projects in the Province (NBDOE 3 2008). NB DOE also released a Community Energy Policy on February 9, 2010, which allows for 50 MW of energy production that must be majority-owned by First Nations, municipalities, cooperatives, and not-for-profit organizations, and under 15 MW in total. Energy generation must come from biomass, wind, solar, small hydro or tidal power sources (NBDOE 1 2010).

1.6 SOLAR PHOTOVOLTAIC

A photovoltaic (PV) panel uses thin layers of semi-conducting materials to convert sunlight into electricity. PV collectors can be realized within a community by being mounted on local buildings or on the ground (solar farm). It has been estimated that if a 30 m2 PV array is installed on the roof of a typical average Canadian house, it would supply approximately 4,000 kWh annually, meeting up to 45% of the home's total electricity needs. PV systems can either be stand-alone or grid connected.

1.7 GEOTHERMAL ELECTRICITY GENERATION

Geothermal power plants use geothermal reservoirs to heat a working fluid which is then used to spin a turbine to produce electricity. Thermal energy within a geothermal reservoir is accessed through a well or borehole drilled. Three types of geothermal power plants currently exist and are classified based on the state of the working fluid and include dry steam power plants, flash steam power plants, and binary (organic Rankin) cycle power plants.

Dry steam plants use naturally occurring steam (typically above 200 °C) from the geothermal reservoir, and route it directly through turbine/generator units to produce electricity. An example is the most complex of geothermal power plants, known as The Geysers, in northern California that are known as the world's single largest source of geothermal power. Dry steam systems are the oldest type of geothermal power plant, first used in Lardarello, Italy, in 1904.

Flash steam plants operate in the same manner as a dry steam system but instead of steam, they use water under high pressure, at 180 °C, to spin a turbine to produce electricity. Releasing the high pressure working fluid into a low pressure tank causes the working fluid to flash into steam prior to entering a turbine. Flash steam technologies are becoming more common today as they are more efficient at converting the energy imbedded in the working fluid.

Binary-cycle geothermal power generation plants differ in that the working fluids from a geothermal reservoir never come in contact with the turbine that produces the electricity. By using a heat exchanger to transfer energy from the geothermal working fluid to a secondary, or binary, working fluid with a lower boiling point, lower temperature (below 180 °C) geothermal heat can be used to drive a turbine.

1.8 BIOMASS

Natural Resources Canada (NRCAN) defines biomass as a material produced by living organisms, such as plant material or material derived from animals and microorganisms. The two main types of biomass are raw biomass, which is unprocessed material, and secondary biomass, which is any material that was initially derived from raw biomass, but has undergone considerable changes (NRCAN 2009).

NRCAN classifies bioenergy products into three types including:

- Bioethanol is produced from starch and cellulose components in biomass. Gasoline is blended with bioethanol (NRCAN 2009);
- Biodiesel is produced from new and recycled vegetable oils, including canola, corn, and flax, and tall oils produced from wood pulp, forestry and agricultural residues. Biodiesel can be used in diesel engines, however, it is not widely commercially available because it is more expensive to produce than conventional diesel (NRCAN 2009); and
- Biogas is produced by certain strains of bacteria. In the absence of oxygen, these bacteria break down biomass, such as animal manure and landfill waste, to produce a combustible gas made of methane and carbon dioxide (NRCAN 2009).

1.8.1 Town Action

In the Bouctouche Potential Renewable Energy Report, biomass opportunities were investigated. Biomass is noted as having the potential to reduce waste production by making use of existing waste products while stimulating the local economy and potentially creating new jobs. There are cost barriers however, and information on existing local biomass and biomass demand is difficult to obtain.

Currently there are a number of New Brunswick based biomass facilities under development or in operation as noted on the New Brunswick Department of Energy website, including:

- A Bio-Oil Development Centre pilot project is being undertaken by Greenway Oils Inc in Waterville, Carleton County.
- There are currently three facilities in New Brunswick which are using Bio-mass to produce electricity, including:
    - Fraser Paper, which is operating an 87 MW biomass electricity generator;
    - Irving Pulp & Paper is operating a 30 MW biomass electricity generator; and
    - AV Cell Inc. which is operating a 17.6MW biomass electricity generator.

In November of 2008, NBDNR released a biomass policy for Crown forest biomass, which sets guidelines for harvesting biomass on Crown land (NBDNR 2010). The forest products industry applauded the step, but also expressed concern about where biomass is located and how much may be available (CBC 2008).

APPENDIX B
INVENTORY OF ASSETS

What is a community asset?

These are the attributes of a community. We want to keep, build upon and sustain our community assets. Completing an asset inventory produces a view of what is considered important in a community. For the purposes of the Local Action Plan, particular focus should be paid to community assets that can contribute to reducing GHG emissions.

Asset Group	Name	Asset Type (Project / Event / Group / Infrastructure)	Address	Description and Current Function	Age	Development Plans
Infrastructure Assets: water, sewer, roads, garbage, IT, land use – plans and maps provided by the Town and any private providers if applicable.	Water Pump #3	Infrastructure	78 Girouardville Rd.	This is off line due to E. Coli issues	N/A	Decomissioning, new well under development
	Water Pump #2	Infrastructure	25 Girouardville Rd.	The only functioning well	1982	Mechanical and electrical upgrades
	Water Pump #1	Infrastructure	86 McLaughlin St.	Replacement well almost online	2011	Mechanical and electrical upgrades
	Lift Station "Allain"	Infrastructure	177 Du Couvent Rd.	Sewage pumping	1980	N/A
	Lift Station "Mills"	Infrastructure	30 De la Riviere Ave.	Sewage pumping	1983 (expansion)	N/A
	Lift Station "Rotary"	Infrastructure	2 Acadie St.	Sewage pumping	1977	N/A
	Lift Station "Bay Inn"	Infrastructure	210 Acadie St.	Sewage pumping	1982	N/A
	Lift Station "Gauvin"	Infrastructure	260 Irving Blvd.	Sewage pumping	1983	N/A
	Lift station LFB	Infrastructure	Claude Ave.	Sewage pumping	2008	N/A
	Lift Station "DesRoches"	Infrastructure	41 Des Roches St.	Sewage pumping	2003	N/A
	#2 Post Office Enterprise Kent	Infrastructure	59 Irving Blvd. Suite 201	Enterprise Kent and planning comission	1929	N/A
	Lagune #2	Infrastructure	62 De la Riviere Ave.	WWTP	1978 approx	N/A
	Public Works Garage	Infrastructure	6 Rue Corporation	Machine storage and garage	2001	In need of repairs to roof and ventilation equipment
	Town Hall/Fire Hall	Infrastructure	211 Irving Blvd.	Fire Department, Town hall	1975	Will possibly be sold
	New Municipal Buidling/ artist galerie	Infrastructure	5 Irving Boul	Artist gallery and empty office space	N/A	Up in the air
	Old Post Office #1	Infrastructure	59 Irving Blvd. Suite 201	Location for Enterprise Kent and the planning comission	1929	Extensive renovations completed recently
	260 Irving Blvd. Pumphouse	Infrastructure	260 Irving Blvd.	Sewage pumping	N/A	N/A
	210 Acadia St. Pumphouse	Infrastructure	210 Acadia St.	N/A	N/A	N/A
	Kent District Planning Commission	Group		N/A	N/A	N/A

Asset Group	Name	Asset Type (Project / Event / Group / Infrastructure)	Address	Description and Current Function	Age	Development Plans
Infrastructure Assets: water, sewer, roads, garbage, IT, land use – plans and maps provided by the Town and any private providers if applicable.	Chatellerault Place	Infrastructure	Downtown	Green space	N/A	N/A
	Bouctouche Wharf	Infrastructure	Downtown	This is still active but used primarily for recreational purposes	N/A	Possibly will be bought by the municipality from the Department of Fisheries and Oceans
	Kent Museum	Infrastructure	150 Chemin du Couvent	Second-empire style building, several permanent exhibits on life in Acadia during the olden days	130 years (building)	Ongoing renovations
	Irving Riverside Park/ Monument	Infrastructure	N/A	Park and bronze memorial to KC Irving	N/A	Keep as green space
	Visitor Information Center/ rotaty Park	Infrastructure	4 Acadie St.	Provides travel assistance and counselling, official NB map and touring guide, information about events, attractions, and festivals - park space - picnic tables . Boardwalk, marsh, etc.	N/A	Extensive renos in past years, heat pump, added roof insulation, thermal chimney
	Irving Arboretum	Park space	Chemin du couvent	Over 250 different types of trees, neighbor to a wetland. Outdoor activities including walks, picnics, and bird watching excursions	N/A	Keep as green space
	Irving Eco-Center	Park space	Outside town limits	Designed to preserve and restore one of the great remaining sand dunes on the northeastern coastline of North America. Educational workshops, displays, tours	N/A	N/A
	Farmer's Market	Infrastructure	9 Irving Blvd.	Local produce, baking, crafts on Saturdays from 8am to 1pm from June-Sept	11 years	N/A

Asset Group	Name	Asset Type (Project / Event / Group / Infrastructure)	Address	Description and Current Function	Age	Development Plans
Social and Cultural Assets	Chatellerault Place	Infrastructure	Downtown	Green space	N/A	N/A
	Bouctouche Wharf	Infrastructure	Downtown	This is still active but used primarily for recreational purposes	N/A	Possibly will be bought by the municipality from the Department of Fisheries and Oceans
	Kent Museum	Infrastructure	150 Chemin du Couvent	Second-empire style building, several permanent exhibits on life in Acadia during the olden days	130 years (building)	Ongoing renovations
	Irving Riverside Park/ Monument	Infrastructure	N/A	Park and bronze memorial to KC Irving	N/A	Keep as green space
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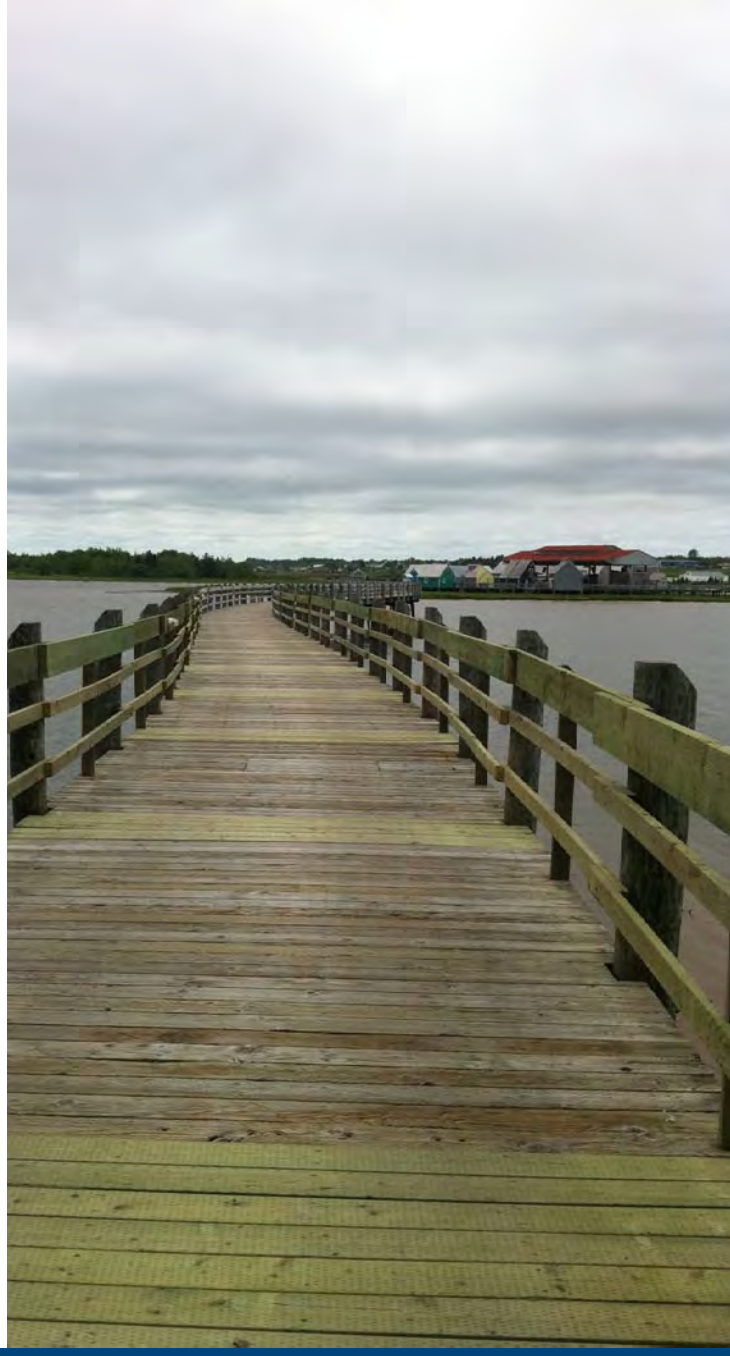
	Irving Arboretum	Park space	Chemin du couvent	Over 250 different types of trees, neighbor to a wetland. Outdoor activities including walks, picnics, and bird watching excursions	N/A	Keep as green space
	Irving Eco-Center	Park space	Outside town limits	Designed to preserve and restore one of the great remaining sand dunes on the northeastern coastline of North America. Educational workshops, displays, tours	N/A	N/A
	Farmer's Market	Infrastructure	9 Irving Blvd.	Local produce, baking, crafts on Saturdays from 8am to 1pm from June-Sept	11 years	N/A

Asset Group	Name	Asset Type (Project / Event / Group / Infrastructure)	Address	Description and Current Function	Age	Development Plans
Social and Cultural Assets	Olivier Soapery	Business	831 Route 505 Ste-Anne-de Kent, NB	Canada's only soap Economuseum - a museum, boutique, library, art gallery, and entertaining show	N/A	tourism
	Monument to the Founding Families of Bouctouche	Infrastructure		Commerative cross paying tribute to the founders of the town	56 years	N/A
	Seawind Buffalo Ranch	Infrastructure	136 Ch. St. Pierre	Buffalo observation and education. Home to over 200 buffalo	N/A	N/A
	St.-Jean-Baptiste Catholic Church	Infrastructure	19 Irving Blvd.	3 entranceways and a corner bell topped by a narrow spire holding an illuminated cross, marble statue of the church's patron saint	56 years	N/A
	Eglise du Plein Evangile	Infrastructure	41 Chemin Girouardville	Faith community and church with 4 pastors	N/A	N/A
	St. Lawrence Anglican Church	Infrastructure		Built on property donated by Robert Douglass, bell was orignally installed on the British ship "SS Helena"	First service Dec. 1865	N/A
	Le Pays de la Sagouine	Infrastructure/ tourism	Acadie st	Village along the shores of Bouctouche Bay featuring an interpretation center, licensed dining, dinner shows, souveniers, arts and crafts. Attracts many tourists	18 Years	N/A
	Tennis Courts	Infrastructure	N/A	5 tennis courts		Located near high shcool
	Athletic Field	Infrastructure	N/A	N/A	N/A	N/A
	Gymnasiums	Infrastructure	N/A	2 gymnasiums	N/A	N/A
	Illuminated Baseball Field	Infrastructure	N/A	N/A	N/A	N/A
	Softball field	Infrastructure	N/A	N/A	N/A	N/A
	Gun Club		N/A	N/A	N/A	N/A
	Golf Bouctouche	Group	211 Girouard Rd.	N/A	N/A	N/A
	Snowmobile Club	Group	1404 Route 515	N/A	N/A	N/A
	Cross-country ski club	Group		Not much hapening	N/A	N/A
	Arena (Forum)	Infrastructure	25 Rue de Kent		1968	May be torn down or sold

Asset Group	Name	Asset Type (Project / Event / Group / Infrastructure)	Address	Description and Current Function	Age	Development Plans
Social and Cultural Assets	New Civic Center	Infrastructure	N/A	Will house a 1,000 seat arena, indoor walking track, and multi-purpose community space, and new town hall	N/A	N/A
	Public Library	Infrastructure	84 Irving Blvd.	N/A	1985	In need of new roof and maintenance
	Festival des Mollusques	Event	Throughout Bouctouche	Week-long seafood festival in July includes pageants, races, golf tournaments, parade, and fireworks	N/A	N/A
	Ecofestival Bouctouche	Event	Throughout Bouctouche	4 day event with a focus on nature, eco-adventures, music, art and sustainable development	5th year	N/A
	Fete Nationale de l'Acadie (Aug.15)	Event	Throughout Bouctouche	National holiday in Acadia, traditional tintamarre parade. Music, games, face-painting, etc.	N/A	N/A
	Le Carnival du Flocon Magique	Event	Throughout Bouctouche	Winter carnaval	N/A	N/A
	La Chandeleur	Event			N/A	N/A
Environmental Assets: physical geology, topology and land use, areas requiring remediation (i.e. Brownfields), ecosystem and watercourse identification – maps provided by the counties and/or the province and/or the federal government.	Bouctouche River	Natural feature			N/A	N/A
	Bouctouche Dune	Park space			N/A	N/A
	Irving Arboretum	green space		Walking and biking trails, bridges and rest areas, more species of trees being planted each year	N/A	N/A
	Trails	Infrastructure	Bouctouche to the dune - 14 km	Walking and biking trails, bridges and rest areas,	N/A	Yearly maintenance

Asset Group	Name	Asset Type (Project / Event / Group / Infrastructure)	Address	Description and Current Function	Age	Development Plans
Energy Assets: local sources of energy (i.e., efficiency, wood, pellets, wind) and energy suppliers to the local area (NB Power, fuel providers).	Bouctouche Potential Renewable Sources Report - KC Irving Chair in Sustainable Development	Project	N/A	Provides a list of possible renewable resources for the Town of Bouctouche and lists the main advantages and disadvantages associated with using each	N/A	N/A
	NB Power	N/A	N/A	Local energy supplier	N/A	N/A
	Heat pumps	N/A	N/A	Jonic Ventilation	N/A	N/A
	Solar energy	N/A	N/A	N/A	N/A	N/A
	Biomass energy	N/A	N/A	N/A	N/A	N/A
	Wind energy	N/A	N/A	N/A	N/A	N/A
Economic Assets: economic development agencies, business and industry associations.	CBDC-Kent	Group	190 Irving Blvd.	Promotes the creation of small businesses and the expansion and modernization of existing businesses by offering technical and financial assistance to entrepreneurs	N/A	N/A
	Bouctouche Business Improvement Corporation	Group	211 Irving Blvd.	Local business improvement association focused on promoting and ensuring balanced development of downtown, and ensuring merchants provide a range of quality products/ services	22 years	N/A
	Chamber of Commerce	Group		Non-profit volunteer association, representing about 100 local businesses and agencies, promoting trade, industry, and civic well-being	> 50 years	N/A
	Economic Profile	Project	N/A	Information about employment, business, and several other municipal sectors		N/A

Asset Group	Name	Asset Type (Project / Event / Group / Infrastructure)	Address	Description and Current Function	Age	Development Plans
Economic Assets: economic development agencies, business and industry associations.	Enterprise Kent	Group	59 Irving Blvd. Suite 201	Goal is to stimulate local economic development	36 years	N/A
	Co-Operative Grocery Store	Infrastructure	191 Irving Blvd.	N/A	N/A	N/A
	Cormier Raymond Magasin	Infrastructure	Saint-Marie-de-Kent	N/A	N/A	N/A
	Bouctouche Bay Eco-Tourism Project	Project	N/A	5 year ecotourism master plan, started in mid-90s.	N/A	Inactive
Governance and Service Assets: health and education facilities, health authorities, schools and the community college, provincial government officials, and special service networks.	Fire Department	Infrastructure/ Group	211 Irving Blvd.	Volunteer firefighter's association has 3 firetrucks, a rescue unit, a rescue boat, and extraction tools. Also responsible for fire prevention and awareness	N/A	Looking at new building
	RCMP	Infrastructure/ Group	x chemin du couvent	Criminal Investigation Division, Patrol and Intervention Division, Employee Services Division	N/A	In need of new building
	Kent County Solid Waste Commission	Group	211 Irving Blvd.	Wet/Dry Recycling, Hazardous Waste, Battery Recycling, and Backyard Composting Programs	N/A	Could take over managment of Transfer Station in 2014. Need for improvments and larger facilities for waste separation holding back mandatory waste separation in Town.
	Westmorland-Albert Solid Waste Corporation Sanitary Landfill	Infrastructure	2024 Route 128, Berry Mills	Landfill near Moncton, where waste from Bouctouche is transported. Cells have specially designed liner systems and last about 3 years	18 years	N/A
	Ecole Clement-Cormier	Infrastructure	37 Richard Ave.	French High School	N/A	N/A
	Ecole Dr-Marguerite-Michaud	Infrastructure	25 Landry St.	Elementary School	N/A	N/A
	Manoir St-Jean-Baptiste	Infrastructure	5 Richard Ave.	Senior Citizen's Home	N/A	N/A
	Kent Senior Homecare	Infrastructure	25 Irving Blvd.	Senior Citizen's Home	N/A	N/A
	Bouctouche Health Center	Infrastructure	Bouctouche Industrial Park	2 doctors, a massage therapist, a counselling center, blood test lab and fitness center	N/A	N/A



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