Perth-Andover's Corporate GHG & Energy Action Plan

Realised with the

UMNB
Union of the Municipalities of New Brunswick

Climate Change and Energy Initiative

June 2018

Consulting team

YHC ENVIRONNEMENT

Financed by

FCM

New Nouveau Brunswick
Your Environmental Trust Fund at Work
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I. Introduction

A. Context

The simple fact of having asked for a greenhouse gas inventory and an action plan to reduce it already demonstrates the willingness of Perth-Andover's elected officials and municipal leaders to do their part in the protection of air quality and the environment !

Communities across Canada are facing the effects of climate change. Some have to deal with greater droughts, others with more violent storms. For example, shorter and warmer winters accentuate coastal erosion and damage to infrastructure, which is less well protected due to loss of coastal ice. Such repercussions will cost municipalities and their communities millions of dollars and the implementation of adaptation and mitigation measures in and for communities seems inevitable today. Municipal governments have a leading role to play in climate protection. They have direct or indirect control over nearly half of Canada's greenhouse gas (GHG) emissions (350 million tons).

Canada's goal is to reduce its GHG emissions by 30% below 2005 levels under the Paris Agreement.

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I. INTRODUCTION

B. UMNB CCEI & PPC

CLIMATE CHANGE AND ENERGY INITIATIVE (CCEI) - Municipalities in New Brunswick are increasingly aware of environmental challenges they face, and are particularly concerned with actual and future impacts of climate change. The Village of Perth-Andover joined the Climate Change and Energy Initiative of the Union of Municipalities of New Brunswick, to reinforce its efforts to advance in the Partners for Climate Protection Program (PCP). The UMNB initiative fits perfectly in the global and national context of addressing climate change, following the Paris Agreement (COP 21).

The UMNB CCEI aims to offer support to members to realize their corporate and community GHG inventories and Local Action Plan, as well as integrate the QUEST Community Energy Planning approach.

THE PARTNERS FOR CLIMATE PROTECTION (PCP) PROGRAM is a network of Canadian municipal governments that have committed to reducing greenhouse gases (GHG) and to acting on climate change. Since the program's inception in 1994, over 300 municipalities have joined PCP, making a public commitment to reduce emissions. PCP membership covers all provinces and territories and accounts for more than 65 per cent of the Canadian population**.** PCP is the Canadian component of ICLEI's Cities for Climate Protection (CCP) network, which involves more than 1,100 communities worldwide. PCP is a partnership between the **Federation of Canadian Municipalities (FCM) and ICLEI** — Local Governments for Sustainability.

As a member of UMNB, the Village of Perth-Andover has agreed to participate in CCEI.

Link to: ACTION-GHG Perth-Andover

I. Introduction

C. Partners for Climate Protection program (PCP) - Method

UMNB CCEI allows participating municipalities to complete the first 3 steps of the Partners for Climate Protection (PCP) program. Steps 4 and 5 consist of the implementation of action plans and the monitoring and reporting of results.

MILESTONE 1 CREATING A GREENHOUSE GAS EMISSIONS INVENTORY AND FORECAST

A greenhouse gas inventory brings together data on community and municipal energy use and solid waste generation in order to estimate greenhouse gas (GHG) emissions in a given year. The forecast projects future emissions based on assumptions about population, economic growth and fuel mix.

MILESTONE 2 SETTING AN EMISSIONS REDUCTIONS TARGET

An emissions reduction target can be established at any time. The target is normally set, however, following the development of an emissions inventory and forecast or after the quantification of existing emissions reduction measures.

MILESTONE 3 DEVELOPING A LOCAL ACTION PLAN

A Local Action Plan (LAP) is a strategic document that outlines how your municipality will achieve its greenhouse gas (GHG) emissions reduction target. The LAP covers municipal operations and the community.

II. Strategy

A. UMNB - CCEI Objective and Strategy

UMNB CCEI aims to design and implement projects:

- ✓ Which will be examples and role models for New Brunswick and other communities in Canada;
- ✓ Which will improve the quality of life of communities and can guarantee a better environment and economic benefits (energy savings, income, job creation);
- ✓ Which will develop expertise for UMNB members and for New Brunswick.

The strategy is based on the following principles:

1. Build an action plan and portfolio of environmentally and economically successful projects;
2. Design model and innovative projects;
3. Set ambitious and achievable reduction targets;
4. Build on existing programs and funds: for example, FCM and GMF programs, Environmental Trust Fund, NB Power programs, etc. ;
5. Maximize benefits for participating municipalities, their region.

II. Strategy

B. GHG emission reduction Target

For PCP and GMF, the GHG emission reduction targets of participating municipalities are set on a voluntary and non-binding basis. It is important that the targets are ambitious while being realistic both in their importance (projected reductions) and in their duration (year of maturity).

Before setting the reduction targets and the action plan timeline, we took into account:

- PCP and GMF recommendations.
- The objectives of the Government of New Brunswick.
- The GHG reduction potential of the municipality and its community.

The PCP and GMF make the following recommendations:

- For **the Corporate component**, that is, the municipality itself, the recommended target is -20% over the reference year, within 10 years. Thus, if the reference year is 2015, the year of maturity will be 2025.
- For the **Community component,** that is to say citizens, businesses, etc., the recommended target is -6% over the base year, within 10 years.

**** The New Brunswick's Climate Change Action Plan "Transitioning to a Low-Carbon Economy" (2017) - The provincial government will:*** *31 - Establish specific GHG emission targets for 2020, 2030 and 2050 that reflect a total output of:*
a - 14.8 Mt by 2020;
b - 10.7 Mt by 2030; and
c - 5 Mt by 2050.

III. Town Profile

Profile of the municipality and its geographical context

The Village of Perth-Andover is located in Victoria County, in western New Brunswick, 101 kilometers south-east of Edmundston and 175 kilometers north-west of Fredericton. Perth-Andover is adjacent to Andover Parish to the west and Perth Parish to the east. Tobique First Nation Reserve is located on the opposite shore of the river to the north. The Village of Aroostook is located 8 km to the north but the nearest Town is Grand Falls, 39 km to the north.

Municipal composition

- 1 mayor and 5 general councillors
- 54 Full Time employees and seasonal staff

Municipal infrastructures

- 12 buildings, lighting
- 17 vehicles and motorized equipment

Profile of the community

The population of Perth Andover in 2016 was 1,590 inhabitants spread over an area of 8.97 km2, a density of 177.3 hab./km2. It decreased by 10.6% from 2011 to 2016. The Municipality had 769 private dwellings in 2016, of which 717 were occupied by full time residents. 74% of the dwellings were built before 1991.

The official language spoken by the population of Perth Andover is English at 96%, French at 3% and both official languages at 1%.

In Perth-Andover:

- **The Village owns its Electric Light Commission (see appendice)**
- **Public Library**
- **Elementary School**
- **High School**
- **Ambulance**
- **Post Office**
- **Curling Club**
- **Paul's YIG Perth Andover**
- **Country Dollar Store**

III. Town Profile

CLIMATE CHANGE AND ENERGY INITIATIVE (CCEI)

Municipalities in New Brunswick are increasingly aware of environmental challenges they face, and are particularly concerned with actual and future impacts of climate change. The Village of Perth-Andover joined the Climate Change and Energy Initiative of the Union of Municipalities of New Brunswick, to reinforce its efforts to advance in the Partners for Climate Protection Program (PCP).

The UMNB initiative fits perfectly in the global and national context of addressing climate change, following the Paris Agreement (COP 21).

The UMNB CCEI aims to offer support to members to realize their corporate and community GHG inventories and Local Action Plan, as well as integrate the QUEST Community Energy Planning approach.

The Village of Perth-Andover has one public level 3 electric charging stations* on its territory.

*Listed by PlugShare (May 2018)

- **Climate Change and Energy Initiative (CCEI) of the Union of Municipalities of New Brunswick, 2017**
- **Member – Partners for Climate Protection program, FCM, 2016**
- **Village of Perth Andover Strategic Priorities 2016-2020**

IV. Inventory

Corporate GHG Inventory

IV. Inventory

The Village of Perth-Andover has joined the Climate Change and Energy Initiatives Program by commissioning UMNB and YHC Environnement to develop an inventory of its GHG emissions that will be used to develop an action plan that includes a suite of measures. to control and reduce GHG emissions from their sources.

Perth-Andover's emissions inventory consists of two separate components. The first is emissions from the activities of the municipal administration (the Corporate) and the second covers the entire territory of the Municipality (the Community).

This document covers the Greenhouse Gas Emission Inventory for the 2015 reference year of the Corporate Component of the Village of Perth-Andover. The relevant additional elements are detailed in the appendices.

IV. Inventory

A. Summary

The corporate component consists of five emission sectors which, in Perth-Andover's case, are responsible for approximately 87 tons of CO_2 equivalent. The two largest corporate GHG emission sectors are vehicle fleet and buildings The former produce 65.5% of corporate GHGs, the latter generate 20.9%. Waste is responsible for 8.1% of the Municipality's emissions, water and sewage 4.3% and finally 1.2% of emissions are attributed to municipal streetlights.

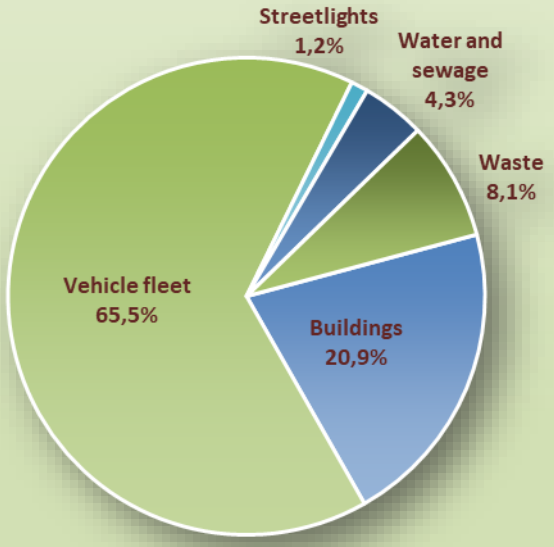
Table 1 :

Corporate GHG Emissions for the base year

GHG (tons eCO2)	2015
Buildings	18
Vehicle fleet	57
Streetlights	1
Water and sewage	4
Waste	7
Total	87
Population	1 590
GHG per capita (teCO2)	0,1

Graph 1 :

Corporate GHG Emissions Breakdown by Sector ($teCO_2$)



IV. Inventory

A. Summary (continued)

In 2015, the energy consumption of the various corporate activities of the Municipality was the source of 79.7 tons of emissions (CO_2 equivalent). For its energy needs, Perth-Andover uses electricity for heating and two types of fuels for vehicles. Electricity is devoted to the energy demand of buildings and other infrastructure. Gasoline, diesel and propane are used by the fleet of vehicles and various equipment and tools of the municipal administration.

Table 2 : Corporate GHG Emissions and Energy Consumption by Type

Energy	2015					
	Volume	Units	(teCO2)	%	(Gj)	%
Electricity	1 346 296	kWh	22,9	28,7%	4 846,7	85,5%
Natural Gas	0	m3	0,0	0,0%	0,0	0,0%
CNG	0	Liters	0,0	0,0%	0,0	0,0%
Diesel	8 751	Liters	23,5	29,5%	335,2	5,9%
Gasoline	12 404	Liters	30,3	38,0%	434,1	7,7%
District Energy	0	Gj	0,0	0,0%	0,0	0,0%
Ethanol Blend (10%)	0	Liters	0,0	0,0%	0,0	0,0%
Biodiesel	0	Liters	0,0	0,0%	0,0	0,0%
Fuel Oil	0	Liters	0,0	0,0%	0,0	0,0%
Propane	1 970	Liters	3,0	3,8%	49,9	0,9%
Waste	-	-	-	-	-	-
Total			**79,7**		**5 665,9**	

B. Corporate Emissions Forecast

The portrait of the corporate inventory of GHG emissions is only valid for the reference year. The projected emissions, seek to present how inventory emissions will evolve at the end of the action plan (2025), based on a business as usual scenario, ie without any direct intervention of the decision-makers. Factors such as demographic change or economic conditions are taken into account in determining future levels of current emissions.

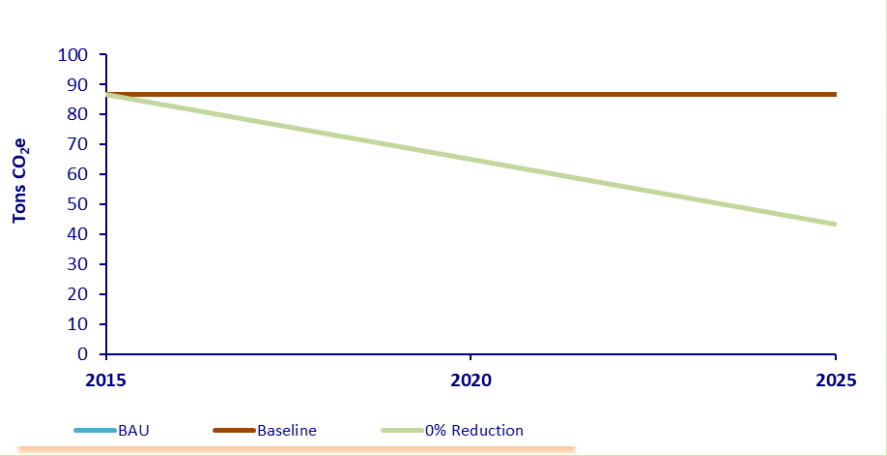
Table 3 :

Corporate Information

Base Year	2015
Forecast Year*	2025
Reduction Target by Forecast Year* (%)	50,0%

Graph 2 :

Forecast of corporate GHG emissions until 2025



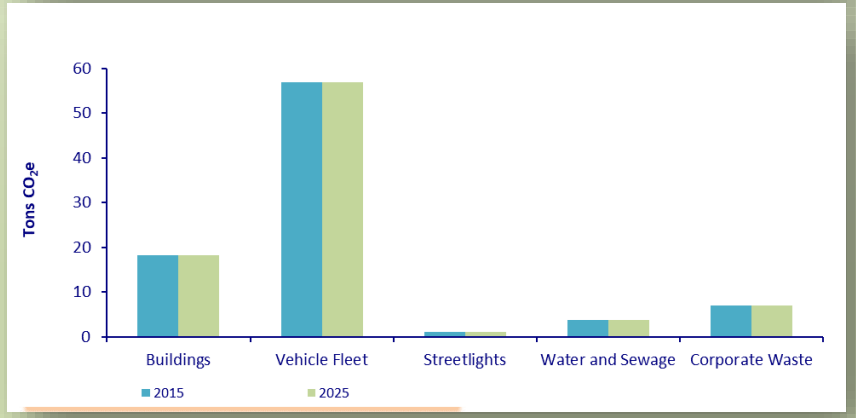
B. Corporate Emissions Forecast (continued)

The corporate inventory of GHG emissions is only valid for the reference year. The forecast emissions seek to show how inventory emissions will evolve at the end of the action plan (2025), based on a business as usual scenario, i.e. without any direct intervention from the decision makers. Factors such as demographic change or economic conditions are taken into account in determining future levels of current emissions.

Table 4 :

Corporate Emissions Forecast by Sector

	Current emissions	% Change Expected**	Emissions in Forecast year
Buildings	18,1	0,0%	18,1
Vehicle Fleet	56,8	0,0%	56,8
Streetlights	1,0	0,0%	1,0
Water and Sewage	3,7	0,0%	3,7
Corporate Waste	7,0	0,0%	7,0
Émissions total (t CO_2e)	**86,7**		**86,7**



V. Action Plan

GHG Action Plan

V. Action Plan

A. Strategy for GHG Reduction and Project Selection

Corporate Action plan

As noted in Section II - Strategy, for PCP and GMF, the GHG emission reduction targets of participating municipalities are set on a voluntary and non-binding basis.

Perth-Andover wish to be a net zero community. And to reach the net zero target for its corporate GHG emissions, the Action Plan propose offset programs included in the community GHG and energy planning.

Perth-Andover owns its Electric Light Commission and purchases power from the Tinker Dam. The resulting GHG emission coefficient for the electricity used and consumed on the territory is quite low. With this interesting environmental advantage, **Perth-Andover** has decided to adopt a corporate target of 50% reductions in GHG emissions for **2025** according to the reference year **2015** and is planning a **100%** reductions in corporate GHG emissions for **2035.**

Table 5 :

Objectives and Year

Objectives and year set by Perth-Andover:		
Corporate Action plan :		
		• **Reduction Target : 50%**
		• **Base year : 2015**
		• **Forecast year : 2025**

V. Action Plan

A. Strategy for GHG Reduction and Project Selection

Guiding principles

The approach behind the development of the Village of Perth-Andover's Action Plan as part of UMNB's CCEI is to develop an action plan that includes projects which :

1) **Improve the quality of life of communities (better environment and savings)**
   - ✓ Improve the quality of life of communities (better environment and savings) ;
   - ✓ Generate GHG emission reductions that meet the goals and needs of the community ;
   - ✓ Allow as much as possible to generate energy savings that guarantee the sustainability of the actions of the Municipality and its community.
2) **Use community resources to develop the expertise of UMNB and New Brunswick members**
   - ✓ Optimize the use of community resources and know-how to maximize socio-economic benefits;
   - ✓ Help develop local and regional expertise to increase the knowledge of communities and New Brunswick..
3) **Will become examples and models for New Brunswick and other communities in Canada**
   - ✓ The projects must enable UMNB member municipalities to stand out / take leadership, to respond to challenges of climate change for New Brunswick communities, to protect the environment, improve the quality of life, and become role models for action and resilience.

V. Action Plan

A. Strategy for GHG Reduction and Project Selection

Global approach

«Good practice» projects

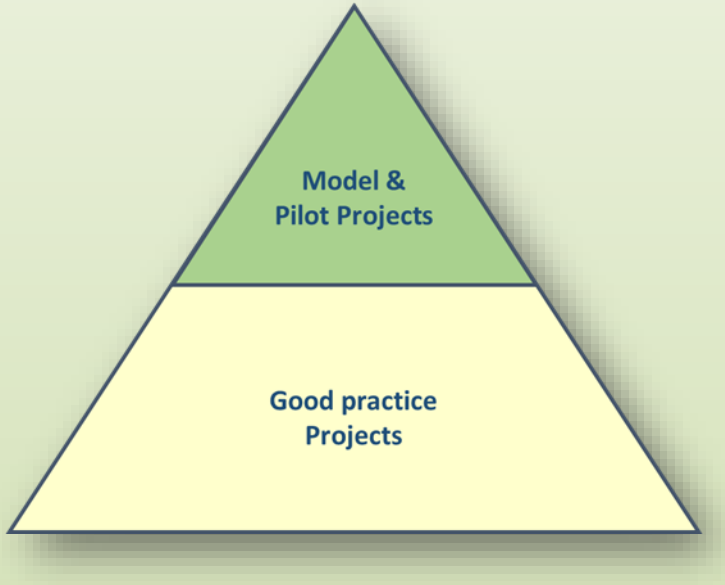
The action plan prioritises projects considered as "good practices". These projects correspond to the application of, for example, measures and technologies supported by the programs of New Brunswick Power, the Government of New Brunswick or Canada.

✓ These "Good Practice" projects form the basis of the Action Plan.

Model projects & UMNB pilot projects

As part of UMNB's CCEI, the action plan also proposes to municipalities two types of model projects & pilot projects :

1. **Transport electrification & EV integration in the community**
2. **EV & Carsharing – SAUVéR (Group Project)**



B. Reference level and target

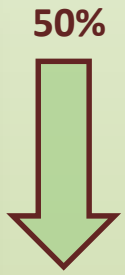
The goal of the Village of Perth-Andover's Corporate Action Plan is to reduce greenhouse gas emissions by 50% by 2025 from their 2015 baseline.

For Perth-Andover, the emissions calculated for the year 2015 allow us to estimate the reductions required to reach the target set by the Municipality's action plan to approximately 43.3 tons or 50%.

Table 6 :

Baseline and Target

	Tons of CO_2 equivalent	Year Base 2015	Year Forcast 2025
1	Current Emissions	86,7	
2	Reduction Target		50,0%
3	Forecast emissions (target) (line 1- line 4)		43,3
4	**Total reductions to be achieved** (line 1- line 3)		**43,3**



V. Action Plan

C. Analysis of the projected results of the action plan

Achieving the objective of Perth-Andover's Action Plan would mean that the level of corporate GHG emissions for the year 2025 be at 42.1 tons of eq. CO_2. This is a decrease of 44.5 tons from the 2015 emissions level of 86.7 tons of eq. CO_2. This represents a potential reduction of 51.4%, which is 1.4 percentage points above the target of 50% and 1.2 tons more than the targeted reduction of 43.3 tons (see Table 6).

Table 7 :

Analysis of the Outcome of the Action Plan

		Total reductions	
		eCO_2(t)	%
1	Current Emissions (Base year)	86,7	100,0%
2	Early action results	2,98	3,4%
3	Expected reductions in the Action Plan	41,5	47,9%
4	**Total Reductions** (line 2 + line 3)	**44,5**	**51,4%**
5	**Level of anticipated emissions** (forcast year) (line 1- line 4)	**42,2**	**48,6%**
6	**Gap with the target**	**1,2**	**1,4%**

D. Project Portfolio – Early Actions

Some projects have been completed or initiated by the Village of Perth-Andover between the reference year of the inventory (2015) and the year of adoption of the action plan presented (2018). These early actions have contributed to the municipality's effort to reduce corporate GHG emissions.

The action plan identified the completion of two (2) project whose estimated reductions were estimated at 3.0 tons of CO_2 equivalent.

Table 8 :

Project Projects completed prior to the adoption of the Action Plan (Early Actions)

		Projects (MAT)		Total GHG reductions (tons)
		Buildings		0,0
1	*EA*	Buildings (Library)	Energy Efficiency (Electricity)	0,01
		Vehicle Fleet		3,0
2	*EA*	Replacement Policy (gasoline & Diesel)	Number of vehicles : 2	3,0
		Streetlights		-
		Water and Sewage		-
		TOTAL		3,0

D. Project Portfolio – Early Actions

1. Buildings (Library) – Energy Efficiency (Electricity) (Early action)

In September 2017, the library is equipped with 2 Mini-Units units of 15 000 Btu. Because they do not produce heat but only moving it, mini-splits are more efficient than other conventional home heating technologies. The same reason explains why their performance varies according to the temperature.

Average energy savings: 1.21%

	Buildings (Library)	Base year : 2015	
1	Electricity used per year	62 080	kWh
2	Cost of electricity per year	8 209	$
3	GHG emissions from electric consumption	1,06	eCO_2 (t)
4	Average Electricity saving (estimated)	1,21	%
5	Electricity reduction per year (kWh)	750	kWh
6	**GHG emissions reduction (tons)**	**0,01**	**eCO_2 (t)**
7	Annual savings	99	$
8	Program length (action plan deadline : 2025)	8	Years
9	Project's lifespan benefit	794	$
10	Annual savings ($ / ton GHG)	7 778	$ / eCO2 (t)

D. Project Portfolio – Early Actions

2. Transportation – Replacement Policy (gasoline & Diesel) (Early action)

Clean vehicle purchase policy is that when the vehicles are to be replaced, the municipality evaluates the possibility of choosing a model smaller than the vehicle currently used.

Note : Cumulative effects of other projects are not considered (ex. Vehicle replacement policy).

		Base year : 2015			
	More compact cars	Gasoline		Diesel	
1	Number of targeted units	1		1	
2	Fuel consumption	4 331	liters	1 118	liters
3	Fuel savings per year (liters)	1 048	liters	57	liters
4	Fuel savings per year ($)	1 162	$	65	$
5	**GHG emissions reduction (tons)**	2,56	eCO2 (t)	0,41	eCO2 (t)
6	**Total GHG emissions reduction (tons)**		**2,97**	**eCO2 (t)**	
7	GHG emissions reduction (%)		21,89	%	
8	Lifetime		10	years	
9	Project's lifespan benefit		12 265	liters	
10	Savings ($ / ton GHG)		413	/ t eCO2	

V. Action Plan

D. Project Portfolio

The most recent measures, technologies and programs have been analyzed and evaluated. They form the basis of the action plans produced by YHC Environnement. Then, based on the 2016 inventory data, as well as the characteristics and needs of the Village of Perth-Andover, the development of the Project Portfolio was completed.

The action plan contains ten (10) projects whose potential reductions are estimated at 41.5 tons of CO_2 equivalent (see Table 9).

V. Action Plan

D. Project Portfolio

Project Portfolio Summary

Table 9 : Corporate Project portfolio

		Projects (MAT)		Total GHG reductions (tons)
		Buildings		2,1
1	*B1*	Buildings (Civic Center)	Energy Efficiency (Electricity)	2,0
2	*B2*	Buildings (2 buildings)	Energy Efficiency (Electricity)	0,1
		Vehicle Fleet		38,9
3	*VF1*	Gradual Fleet Renewal Policy	Number of vehicles : 7	1,7
4	*VF2*	Community Van	Number of vehicles : 1	0,2
5	*VF3*	Clean Vehicle Purchase Policy (gasoline)	Number of vehicles : 2	2,7
6	*VF4*	Idle-free Policy	Number of vehicles : 7	3,1
7	*VF5*	Electric Vehicle Car Sharing System	Number of vehicles : 1	5,2
8	*VF6*	Electric Vehicle (Propane to electric Resurfacer)	Number of vehicles : 1	3,0
9	*VF7*	EV Offset Program	See Community Action Plan	23,0
		Streetlights		-
		Water and Sewage		0,6
10	*WS1*	Water and Sewage	Energy Efficiency (Electricity)	0,6
		Corporate Waste		-
		TOTAL		41,5

V. Action Plan

D. Project Portfolio

1. Buildings (Civic Center) - Energy Efficiency (Electricity)

The Village of Perth-Andover plans to run a new energy audit in 2019 to reassess River Valley Civic Centre's performance. The appropriate energy conservation measures such as:

- Upgrade the lighting System to LED
- Upgrade the Energy Management Control System (ECMS)
- Energy Optimization
- Install Heat Pump System
- Replace existing boilers with high efficiency heating system
- Increase the building envelop performance

Minimum target for overall energy savings: 15%.

	Buildings (Civic Center)	Base year : 2015	
1	Electricity used per year	777 240	kWh
2	Cost of electricity per year	74 316	$
3	GHG emissions from electric consumption	13,21	eCO_2 (t)
4	Electricity saving (estimated)	15	%
5	Electricity reduction per year (kWh)	116 586	kWh
6	**GHG emissions reduction (tons)**	**1,98**	**eCO_2 (t)**
7	Annual savings	11 147	$
8	Program length (action plan deadline : 2025)	8	Years
9	Project's lifespan benefit	89 179	$
10	Annual savings ($ / ton GHG)	5 624	$ / eCO2 (t)

D. Project Portfolio

2. Buildings (2 buildings) - Energy Efficiency (Electricity)

The Village of Perth-Andover plans to implement several energy conservation measures on two buildings:

In short term :
Installation of LED lighting is decided to be realized before 2019

Minimum target for overall energy savings: 5.4%

Other measures could meanwhile be added after analysis :
Upgrade the Energy Management Control System (ECMS)
Energy Optimization
Install Heat Pump System
Replace existing boilers with high efficiency heating system
Increase the building envelop performance

	Buildings (2 buildings)	Base year : 2015	
1	Electricity used per year	110 048	kWh
2	Cost of electricity per year	15 279	$
3	GHG emissions from electric consumption	1,87	eCO_2 (t)
4	Lighting efficiency (estimated)	5,4	%
5	Electricity reduction per year (kWh)	5 899	kWh
6	**GHG emissions reduction (tons)**	**0,10**	**eCO_2 (t)**
7	Annual savings	819	$
8	Program length (action plan deadline : 2025)	6	Years
9	Project's lifespan benefit	4 914	$
10	Annual savings ($ / ton GHG)	8 167	$ / eCO2 (t)

D. Project Portfolio

3. Transportation - Gradual Fleet Renewal Policy

The vehicle replacement policy of the municipality is as follows:

- Fire trucks: after 25 years
- Heavy machinery: after 12 to 15 years
- Heavy trucks: after 8 to 10 years
- Trucks and light vehicles: after 10 years

Thus, at the end of this action plan (2015-2025), almost all of the corporate fleet will be replaced. In addition, the Village plans to reduce its fleet to make it more efficient.

Note : Cumulative effects of other projects are not considered (ex. Idle free policy).

	Base year : 2015			
Gradual Fleet Renewal Policy	Gasoline		Diesel	
1 Number de vehicles	5		8	
2 Fuel consumption	12 404	liters	8 751	liters
3 Fuel cost	13 746	$	9 941	$
4 GHG emissions	30,26	eCO_2 (t)	23,48	eCO_2 (t)
5 Number of vehicles to be replaced	3		4	
6 Average efficiency gains due to renewal of fleet	5,0%		5,0%	
7 Reduction of GHG emissions after conversion	1,21	eCO2 (t)	0,48	eCO2 (t)
8 **Total Reductions in GHG Emissions**	**1,69**	**eCO2 (t)**		

D. Project Portfolio

4. Transportation - Community Van

Community Van is a service offered by the municipality which provides the community and its members a shared means of transportation for short or long distance travels. In this case, the current vehicle is replaced with a recent model.

Note : Cumulative effects of other projects are not considered (ex. Idle free policy).

	Base year : 2015					
Community Van	Gasoline			Diesel		
1 Number de vehicles	1					
2 Fuel consumption	1 463	liters		n/a	liters	
3 Fuel cost	1 552	$		n/a	$	
4 GHG emissions	3,57	eCO_2 (t)		n/a	eCO_2 (t)	
5 Number of vehicles to be replaced	1					
6 Average efficiency gains due to renewal of fleet	5,0%					
7 Reduction of GHG emissions after conversion	0,18	eCO2 (t)			eCO2 (t)	
8 **Total Reductions in GHG Emissions**			**0,18**	**eCO2 (t)**		

D. Project Portfolio

5. Transportation - Clean Vehicle Purchase Policy (gasoline)

Clean vehicle purchase policy is that when the vehicles are to be replaced, the municipality evaluates the possibility of choosing a model smaller than the vehicle currently used.

Note : Cumulative effects of other projects are not considered (ex. Vehicle replacement policy).

	More compact cars	Base year : 2015	
1	Number of targeted units	2	
2	Fuel type	Gasoline	
3	Fuel consumption	5306	liters
4	Fuel savings per year (liters)	1 104	liters
5	Fuel savings per year ($)	1 223	$
6	**GHG emissions reduction (tons)**	**2,69**	**eCO_2 (t)**
7	GHG emissions reduction (%)	20,81	%
8	Lifetime	10	years
9	Project's lifespan benefit	12 234	liters
10	Savings ($ / ton GHG)	454	/ t eCO2

D. Project Portfolio

6. Transportation - Idle-free Policy

Idling refers to running a vehicle's engine when the vehicle is not in motion. Idling occurs when car owner is warming up or cooling down a vehicle, drivers are stopped at a red light, waiting while parked outside a business or residence, or otherwise stationary with the engine running. For the average vehicle with a 3-litre engine, every 10 minutes of idling costs 300 milliliters (over 1 cup) in wasted fuel – and one half of a liter (over 2 cups) if your vehicle has a 5-liter engine.

For a successful anti-idling campaign includes
- the adoption of a speed reduction regulation
- carrying out an awareness-raising campaign
- the acquisition and installation of permanent signs

Since 2003, the Village has an Idle-free policy. The present project is a revised and improved version of current policy.

	Idle-free Policy	Base year : 2015 Gasoline		Diesel	
1	Number of units	4		3	
2	Fuel consumption	10 613	liters	5 589	liters
3	Fuel cost	11 655	$	6 288	$
4	GHG emissions	25,89	eCO_2 (t)	15,00	eCO_2 (t)
5	Average fuel wasted idling	582	liters	624	liters
6	Average fuel economy	5,5%		11,2%	
7	GHG emissions reduction	1,42	eCO2 (t)	1,67	eCO2 (t)
8	Fuel savings ($)	640	$	345	$
9	**Total GHG Emissions reduction**	**3,10**	**eCO2 (t)**		
10	Total fuel savings ($)	985	$		
11	Saving per ton of GHG reduced	318	/ t eCO2		

D. Project Portfolio

7. Transportation - Electric Vehicle Car Sharing System

Electric cars use electrical energy to power an electric motor, they also reduce society's dependence on environmentally damaging fossil fuels while lowering greenhouse gas emissions and air pollution. Electric cars are cost effective, good for the environment and deliver great performance.

Car-sharing :
Optimizes vehicle usage and improves fleet administration. Depending on the situation, the best fit vehicle for the task is used regardless of the department the vehicle is assigned to. Sharing EV among all corporate departments increases the use of this car which has zero GHG emissions and less operational and energy costs.

	Nissan Leaf (2015) versus Chevrolet sierra (2002)	Base year : 2015	
1	Total kilometers travelled	13 794	km
2	Internal users		km
3	External users		km
4	Number of targeted units	1	
5	Energy saved per year (Gj and $)*	66,66	2 001 $
6	**GHG emissions reduction (tons and %)**	**5,24**	**99,2%**
7	Economy (cost) of MAT implementation	n/d	
8	Lifetime	10	years
9	Project's lifespan benefit	20 015	$
10	Savings ($ / ton GHG)	382	/ t eCO2

D. Project Portfolio

8. Transportation - Electric Vehicle (Propane to electric Resurfacer)

Electric cars use electrical energy to power an electric motor, they also reduce society's dependence on environmentally damaging fossil fuels while lowering greenhouse gas emissions and air pollution. Electric cars are cost effective, good for the environment and deliver great performance.

There are two kinds of electric car:

Fully Electric Cars are powered 100% by electricity and have zero tailpipe emissions. Fully electric cars can travel 200-400 km on a single charge.

Plug-in Hybrid Electric Cars have small battery packs for short all-electric driving distances (20-80 km) before a gasoline engine or generator turns on for longer trips.

Perth-Andover plans to acquire a zero emission electric ice resurfacer. This technology aims to eliminate propane consumption for arena ice maintenance. In addition, it considerably reduces the costs of ventilation and heating necessary for the evacuation of exhaust gases (carbon monoxide, etc.) as well as the maintenance costs (hydraulic oil, mechanical parts, etc.).

	Electric Vehicle (Propane to electric Resurfacer)	Base year : 2015	
1	Number of targeted units	1	
2	Propane consumption	1970	liters
3	Energy saved per year (Gj and $)*	39,89	1 033 $
4	**GHG emissions reduction (tons)**	**2,99**	
5	GHG emissions reduction (%)	98,45	%
6	Lifetime	10	years
7	Project's lifespan benefit	10 325	liters
8	Savings ($ / ton GHG)	345	/ t eCO2

D. Project Portfolio

9. Water and Sewage - Energy Efficiency (Electricity)

The Village of Perth-Andover plans run an audit on all Water related facilities.

The energy conservation measures that will be considered are :

- Upgrade the lighting System to LED
- Upgrade the Energy Management Control System (ECMS)
- Energy Optimization
- Install variable-frequency drive (VFD) where applicable
- Install High Efficiency Motors & Pumps where applicable
- Install Energy Meters

Minimum target for overall energy savings : 15%.

	Water and Sewage	Base year : 2015	
1	Electricity used per year	219 900	kWh
2	Cost of electricity per year	27 574	$
3	GHG emissions from electric consumption	3,74	eCO_2 (t)
4	Electricity saving (estimated)	15	%
5	Electricity reduction per year (kWh)	32 985	kWh
6	**GHG emissions reduction (tons)**	**0,56**	**eCO_2 (t)**
7	Annual savings	4 136	$
8	Program length (action plan deadline : 2025)	8	Years
9	Project's lifespan benefit	33 089	$
10	Annual savings ($ / ton GHG)	7 376	$ / eCO2 (t)

VI. APPENDICES

Appendice: Perth-Andover Electric Light Commission

The methodology and references are available on request.

Appendice: Perth-Andover Electric Light Commission

Electric Light Commission Mission Statement

The provision of reliable and affordable power services for the residential and commercial customers in the Municipality, with safety being first priority!

Facilities:

Sub Station- 10 MVA with related equipment

1200 Pole Structures

45 km wire distribution system at 1240/7200 V

Hot Line Equipment

Street Lights (350)

Public Works Building

1000 electrical meters - residential and commercial

200 secondary transformers and related hardware

Services:

- Consultation on entrance location
- Provision of temporary power
- Permanent Service
- Trouble Shooting and Calls
- Hanging Christmas Decorations
- Insure safety of public from our system
- Upgrade services to customers when required
- Provide emergency back up with Boom truck
- Disconnects and Reconnects
- Construction and Maintenance of Lines
- Coordinate jobs with NBTel and NB Power
- Meter Reading
- Street Light Maintenance
- Underground location wires
- Tree Trimming

One attraction to Perth-Andover that no other town or village can claim, is that the we have the lowest power rates in the Province. The Village owns its Electric Light Commission.

Under an agreement with Maine & New Brunswick Electrical Power Co. Ltd., the Village purchases power from the Tinker Dam and resells it to the residents and businesses of the Village over its own distribution system. This arrangement has resulted in a power rate below that paid elsewhere in the province.

Appendice: Perth-Andover Electric Light Commission

	Perth-Andover	NB Power
Residential Service		
Service Charge	$16.49	$23.21
Energy Charge:		
First 1300 kWh	$0.0986	$0.1059
Balance kWh	$0.0960	$0.1059
General Service		
Service Charge	$16.49	$22.52
Energy Charge:		
First 5000 kWh	$0.1208	$0.1297
Balance kWh	$0.0856	$0.0920
Demand Charge:		
First 20 kW	no charge	no charge
Balance KW	$9.42	$10.37
Other Charges		
Dusk to Dawn 100 W	$13.43	$14.14
Dusk to Dawn 200 W	$21.12	$22.23
Wood Pole	$4.14	$4.36

APPENDICE: PERTH-ANDOVER ELECTRIC LIGHT COMMISSION

Maine & New Brunswick Electrical Power Co. Ltd.

The Tinker Dam is a hydroelectric dam built on the Aroostook River in the Canadian province of New Brunswick and operated jointly by WPS Energy and NB Power. Its power house has a capacity of 34 megawatts. The dam and power house are collectively known as the Tinker Generating Station. The dam is located in Aroostook Junction, New Brunswick, immediately downstream of Fort Fairfield, Maine, and less than 1 km east of the Canada–United States border. The reservoir floods the Aroostook River valley into a portion of northeastern Maine. The dam was built in 1923 and the power house contains 5 hydroelectric units (1-5) which were placed in service between 1923-1965.

The Tinker Generating Station benefits from flow regulation upstream in Maine on Millinocket Lake and on the Aroostook River in Squa Pan. There are also control facilities and a power house canal located on the Maine side of the border.

The Tinker Generating Station was constructed as a joint project of the New Brunswick Electric Power Commission and the Maine Public Service. In 1999, the Maine Public Service sold its share of the plant to WPS Power Development, LLC of De Pere, Wisconsin. WPS Power Development operates in Canada under its subsidiary WPS Canada Generation, Inc.

The dam spans the river between Andover Parish on the south side, and Grand Falls Parish on the north side, both in Victoria County.

The Tinker Dam is a hydroelectric dam not classified as a "run of the river" type. For the inventory we used the CO_2 coefficient for a regular dam. The coefficient is close to 0.

Reference:

http://globalenergyobservatory.org/geoid/5730
https://en.wikipedia.org/wiki/List_of_generating_stations_in_New_Brunswick
https://en.wikipedia.org/wiki/Tinker_Dam
https://en.wikipedia.org/wiki/Category:Lists_of_power_stations
https://en.wikipedia.org/wiki/Run-of-the-river_hydroelectricity
https://en.wikipedia.org/wiki/List_of_run-of-the-river_hydroelectric_power_stations