Perth-Andover's Community GHG & Energy Action Plan

Climate Change and Energy Initiative

June 2018

Realised with the Union of the Municipalities of New Brunswick

Consulting team YHC ENVIRONNEMENT

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Union of the Municipalities of New Brunswick

Spatial Quest

CONTENTS

I. Introduction

Communities across Canada are facing the effects of climate change. Some have to deal with greater droughts, others with more violent storms.

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.

The 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 PARTNERS FOR CLIMATE PROTECTION (PCP) PROGRAM

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.

Perth-Andover is engaged:

- ✓ 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

I. Introduction

In addition to the Corporate GHG Action Plan, the Community GHG & Energy Plan is the UMNB CCEI second foundation stone. The Plan brings a powerful and dynamic tool to help communities for smart and sustainable development allowing to reduce their carbon footprint.

What is a Community GHG & Energy Plan?

***The Plan** is a long-term plan that identifies ways to reduce GHG emissions and to support the Municipality's local economy by increasing its competitiveness, helping to create local or regional jobs in the energy sector, improving energy efficiency, and improving energy security.*

In 2018, planning and coordinating energy use and GHG emission reduction at the community level remains innovative especially for smaller size communities outside metropolitan areas. However, in cities or communities where it has been done, it has resulted in some of the most efficient, and from an energy standpoint, most cost-competitive cities in the world, with resulting reductions in associated environmental impacts.

The communities that are leaders have taken an integrated energy systems approach looking at the potential for innovation in how energy is sourced, generated, consumed, re-captured, conserved, stored, and delivered. ***The UMNB CCEI's Community GHG & Energy Plan** will be a "living document", in that the actions taken by the Municipality and community stakeholders are expected to grow and change over time.*

Why a Community & GHG Energy Action Plan

***The Plan** is great tool to face community transformation challenges encountered in New Brunswick: Climate change impacts, population growth or decline, development growth and economic transformation.*

Those challenges push municipalities and communities to examine ways to reduce its cost of services while continuing to maintain and enhance the quality of life. And how energy is used, and the cost of that energy to residents as well as to the municipality, is an important factor. Smart solutions also reduce environmental impacts associated with the consumption of energy. A good strategy and planning can enhance prosperity by making the municipality more economically competitive.

Enhancing access to energy efficiency, conservation and demand-management opportunities can also have a positive effect on the local retail and service industry. Businesses that increase the energy efficiency of their facilities and operations can improve their competitiveness in the marketplace.

II. The Plan's Strategy

Vision

The vision of the Plan is to achieve a low carbon and smart energy community in an economically viable way:

Reducing its carbon footprint by increasing energy conservation, using energy efficiently through new development and retrofits, transportation planning, producing renewable or clean energy, helping to improve local energy security.

Goals

The vision is supported by a series of goals that bring focus to mitigating climate change, improving energy performance within the community and creating economic advantage:

1. **Foster a shift towards low carbon technologies.**
2. **Increase energy efficiency for new and existing buildings.**
3. **Foster a shift towards low carbon transportation that integrates EV infrastructure, promotes alternative fuel vehicles, low carbon fuel options, as well as public transit and active transportation as mechanisms to reduce the number of vehicles on the road.**
4. **Create or help adaptive, sustainable, affordable, and reliable local renewable and clean energy supply.**
5. **Design, build, and revitalize neighbourhoods as complete communities that offer multi-modal transportation options.**
6. **Create new market opportunities for innovative energy solutions that are attractive for local and new businesses, and through high quality, affordable, clean energy services foster retention and growth of existing businesses and industries.**
7. **Build awareness about energy investment and create a culture of energy conservation amongst residents, business, institutions, and industries.**
8. **Build knowledge, skills, and technical capacity through partnerships that deliver innovative energy solutions at the local scale.**

II. The Plan's Strategy

The principles provide direction for the development of the projects and initiatives presented in the Plan. To build and implement an action plan and portfolio of environmentally and economically successful projects all proposed solutions, projects, or initiatives should consider these principles:

1. **Advocate for urgent action to address climate change**
2. **Set achievable reduction targets**
3. **Maximize benefits for the municipality and the community**
4. **Ensure and enhance a sustainable energy system**
5. **Maximize efficient use of energy**
6. **Design model and innovative projects**
7. **Build on existing programs and funds: for example, FCM and GMF programs, Environmental Trust Fund, NB Power programs, etc.**
8. **Create a competitive and economic advantage for the Community**
9. **Demonstrate global leadership**

GHG Emission Reduction Target *17% for 2025 and 34% for 2035*

For the Community Plan, GHG emission reduction target is 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 is -6% over the base year, within 10 years.**
- ✓ **The objectives of the Government of New Brunswick.***
- ✓ **The GHG reduction potential of the municipality and its community.**

**** 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.

II. The Plan's Strategy

Timeline For efficiency, the choice of a pertinent timeline is essential. Because the scope of the Community Plan is important and imply major technological and behavioral changes, we recommend a 20 years timeline. However, for reviewing and monitoring process the Community Plan propose a 10 year step in 2025 concordance with the **Corporate GHG Action Plan**.

Approach and developing the Plan

Background data was collected via energy distributors in New Brunswick and from various other provincial and federal sources. Electricity data was provided by NB Power, Saint John Energy and Perth Andover Electric and Light Commission.

For all participant, a workshop was held to do a mapping exercise through a community GHG & energy planning process. The workshop allowed the team, the municipality and its stakeholders to identify areas or sectors where GHG reduction projects, conservation and efficiency measures could be focused, to assess the potential for local generation, particularly renewable energy, and look at the energy implications of future growth and prosperity. Webinars were held with each participants to finalize the Corporate GHG & Energy Action Plan as well as to prepare the final workshop to complete the Community GHG & Energy Action Plan. Each municipality CCEI manager invited to workshops and webinars, stakeholders they considered important to assist, councillors and municipal employees.

Each Community Plan include a presentation document and more importantly is also build with a series of tool joined in annexes:

- Annexe A: Project's description with implementation procedures
- Annexe B: Excel Projects Sheets with GHG and energy data calculation
- Annexe C: Mapping document for Workshop (Spatial Quest)

As final step, the Community and the Corporate plan are submitted to the Participant Municipality to be adopted by resolution.

YHC Environnement, an energy planning and environment consultant, was retained by UMNB to provide services to produce inventories, action plans and the various tool needed. Spatial Quest was hired to do the GHG and energy mapping related to workshop's organisation and as liaison agent with the concerned stakeholders in New Brunswick.

III. The Community's Profile

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 population of Perth Andover in 2016 was 1,590 inhabitants spread over an area of 8.97 km^2, a density of 177.3 hab./km^2. 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%.

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 significantly low.

With the 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.*

Perth-Andover aims to be "The first net zero community" in New Brunswick

Picture 1: Perth-Andover's Map

III. The Community's Profile

Picture 2: Perth-Andover's GHG Emissions Map

III. The Community's Profile

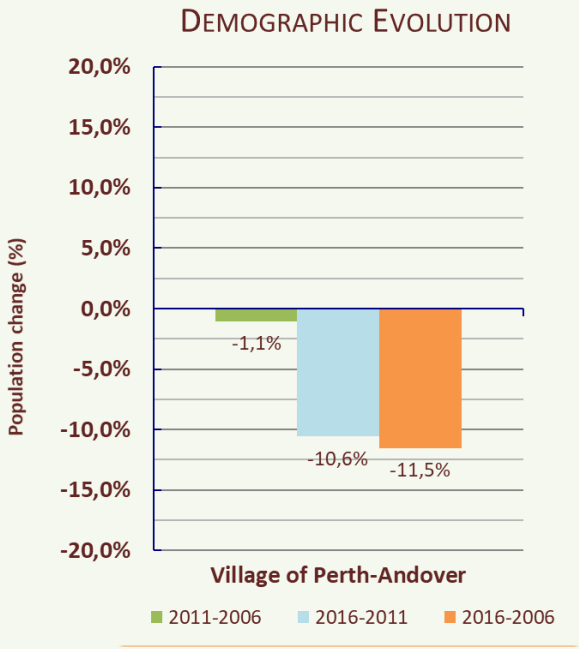
Challenges

- ✓ The Village of Perth Andover and its community are facing important challenges related to population's decrease: 11,5% between 2006 and 2016.
- ✓ For the Village, the challenge is while its responsibilities and expenses related to energy remain similar or increase, tax incomes are decreasing in time.
- ✓ Energy needs are difficult to curb down.

Opportunities

- ✓ Perth-Andover owning its Electric Light Commission purchases and generates income selling clean energy.
- ✓ The Village is aiming to maximise the use of its clean electricity in the Community for example by:
  - Promoting electric and clean equipment to remove residential oil furnace;
  - Promoting EV acquisition and use;
  - Negotiating deal with clean tech industries and businesses to develop green and clean projects on its territory;
  - Etc.
- ✓ For Perth-Andover there is a major opportunity to be "a perfect size" living lab to learn and test ways to become a green and prosperous "net zero community".

A Plan for Perth-Andover to be "The first net zero community" in New Brunswick.



IV. The Plan's Summary

The Plan

- **The Plan aims to help Perth-Andover and its Community to face main challenges.**
- **Use Perth-Andover asset of its Electric Light Commission selling clean energy comparative advantage to generate income and become a "net zero community" with:**
  A. A program promoting high efficient electric equipment "mini split" for heating purposes to replace oil products use
  B. Promote with a program EV acquisition and use to replace oil products use
  C. Help transport electrification provincial program (NB Climate Change Action Plan)
  D. At the corporate level, test and show example for transport electrification
- **Reduce dependency on fossil energies:** Eliminate all residential heating oil use
- **Curb down energy use, expenses and reduce GHG emissions**
  - Promote individual and collective energy efficient habits:
    a. Implement an ongoing anti-idling campaign & fuel efficient driving all across the community
    b. Increase at least by 25% clothe line usage
  - Promote energy efficient technologies:
    a. LED lighting to replace 60% all lights in the community
    b. At least half of residential and commercial to improve their energy efficiency
  - Promote energy wise decision-making : smaller vehicles are in average 20% more fuel efficient
- **Implement low capital project & strategy to generate good return on investment overcome tax income decrease**

COMMUNITY GHG INVENTORY

V. The 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 Community Component of the Village of Perth-Andover. The relevant additional elements are detailed in the appendices.

V. The Inventory

A. Summary

The community component consists of five emission sectors. For Perth-Andover, the total emissions of the community is approximately 9 252 tons of CO_2 equivalent. Most of these came from transportation that is 65.2%. Commercial generated 18.2% of emissions, residential 13.7%, industrial 1.5% and finally 1.3% of emissions are attributed to the community waste.

The Community, with its 1 590 inhabitants has a per capita emission rate of 5.8 tons of CO_2 equivalent

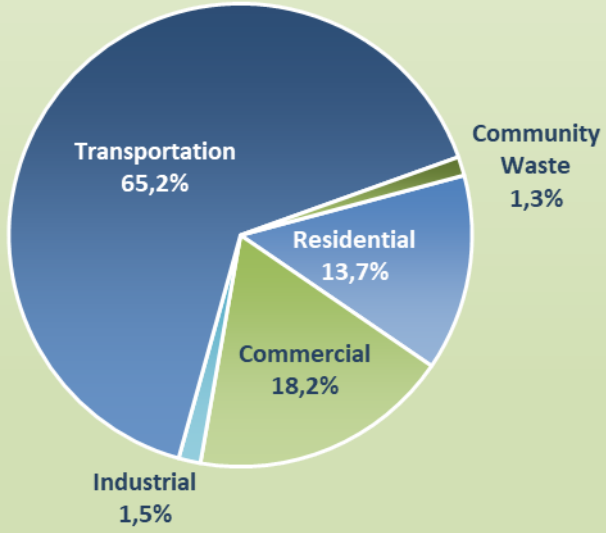
Table 1 :

Community GHG Emissions for the base year

GHG (tons eCO_2)	2015
Residential	1 270
Commercial	1 686
Industrial	142
Transportation	6 033
Community Waste	122
Total	**9 252**
Population	1 590
GHG per capita ($teCO_2$)	5,8

Graph 1 :

Community GHG Emissions Breakdown by Sector ($teCO_2$)



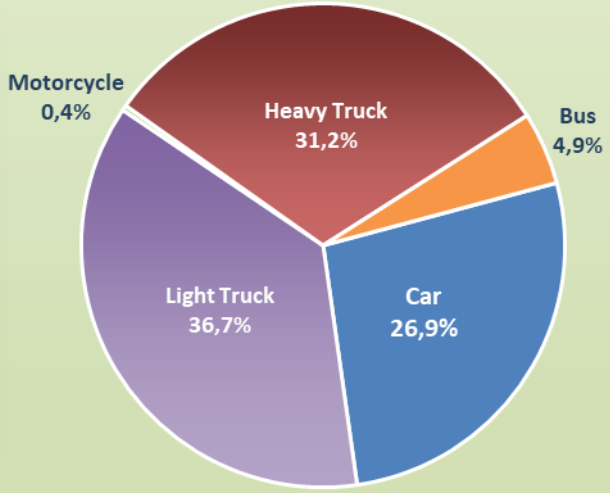
B. Transportation

For the year 2015, the Perth-Andover community had 1 336 vehicles numbered on its territory. With 6 033 tons of eq. CO_2, the transportation sector is responsible for a large part (65.2%) of greenhouse gas emissions of the community (see Graph 1). Emissions from the sector come from five (5) subclasses; light truck because of their large number, form the category that generates the most emissions from GHG, with 36.7% of the total sector. Heavy truck is in second place with 31.2%, follow car 26.9%, bus 4.9%, and finally motorcycle with 0.4%.

Table 2 :
Transportation GHG Emissions Breakdown by Vehicle Type ($teCO_2$)

Vehicle Type	2015			
	Number	%	($teCO_2$)	%
Car	644	48,2%	1 623,9	26,9%
Light Truck	564	42,2%	2 214,3	36,7%
Motocycle	45	3,4%	21,3	0,4%
Heavy Truck	78	5,8%	1 880,3	31,2%
Bus	5	0,4%	292,9	4,9%
Total	1 336		6 033	

Graph 2 :
Transportation GHG Emissions Breakdown by Vehicle Type ($teCO_2$)



C. Industrial, Commercial and Institutional Buildings (ICI)

In 2015, an estimated 3 097.2 tons of eq. CO_2, greenhouse gas emissions come from Perth-Andover's residential and industrial, commercial and institutional (ICI) sectors. Fuel oil gets noticed as first source of GHG emissions with 2 255.6 tons of eq. CO_2. Electricity and heavy fuel oil Assume 470.0 and 187.1 tons and propane emits 184.6 tons eq. CO_2.

TABLE 3 :

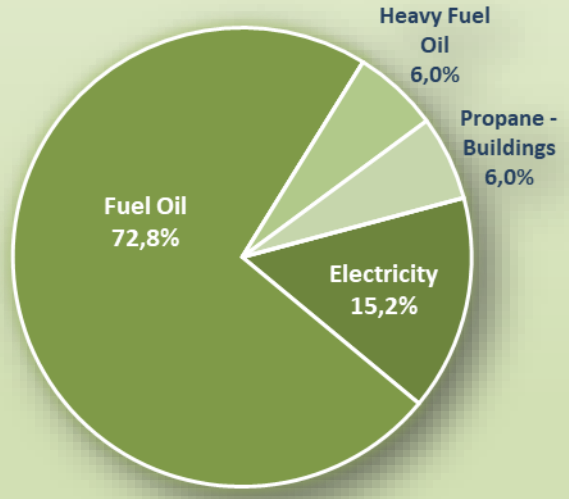
COMMUNITY GHG EMISSIONS AND ENERGY CONSUMPTION BY TYPE

Energy	2015					
	Volume	Unit	($teCO_2$)	%	(Gj)	%
Electricity	27 644 256	kWh	470,0	15,2%	99 519	72,6%
Fuel Oil	824 670	Liters	2 255,6	72,8%	31 997	23,3%
Natural Gas	0	m3	0,0	0,0%	0	0,0%
Diesel - Buildings	0	Liters	0,0	0,0%	0	0,0%
Heavy Fuel Oil	59 482	Liters	187,1	6,0%	2 528	1,8%
Propane - Buildings	119 536	Liters	184,6	6,0%	3 025	2,2%
District Energy	0		0,0	0,0%	0	0,0%
Total			**3 097,2**		**137 070**	

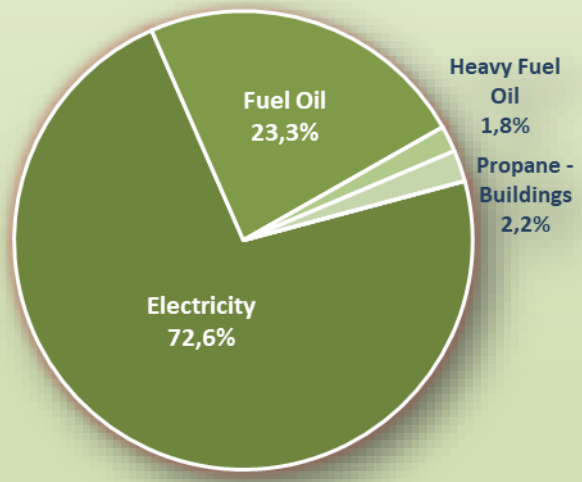
C. Industrial, Commercial and Institutional Buildings (ICI) (continued)

Fuel Oil produces 72.8% of the sector's emissions and meets 23.3% of the Perth-Andover Territory's energy needs for the residential sector and ICI. Electricity, heavy fuel oil and propane-buildings accounted for 15.2%, 6.0% and 6.0% of greenhouse gases, respectively, and together they contributed to the satisfaction of 72.6%, 1.8% and 2.2% of their energy demand in their sectors for the Perth-Andover community.

Graph 3 :
Residential and ICI GHG Emissions Breakdown by Energy Type ($teCO_2$)



Graph 4 :
Residential and ICI Energy Consumption Breakdown by Energy Type (GJ)



D. Community Waste

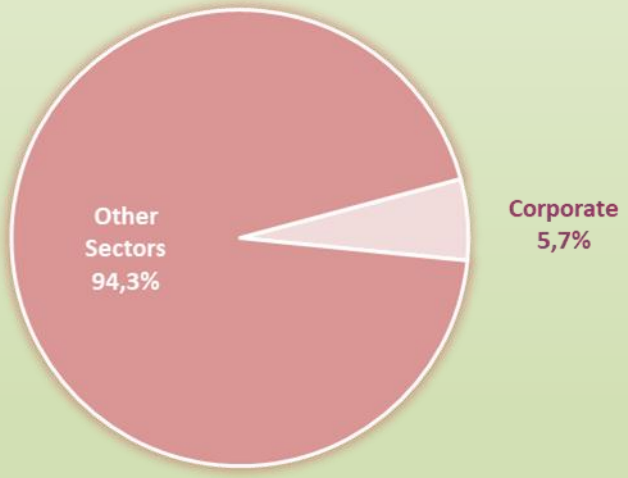
In 2015, the 860 tons of Perth-Andover solid waste produced 121.7 tons of eq. CO_2 greenhouse gas. They are responsible for 1.3% of the total emissions of the Community (see Graph 1).

The estimated share of corporate issues is 7.0 tons of eq. CO_2 (5.7% of the total) which would correspond to nearly 42 tons of waste.

TABLE 4 :
COMMUNITY LANDFILL WASTE BY CATEGORY

Waste Category	2015			
	Tons	%	(teq. CO_2)	%
Corporate	42	4,9%	7,0	5,7%
Other Sectors	818	95,1%	114,7	94,3%
Total	860		121,7	

GRAPH 5 :
COMMUNITY LANDFILL WASTE GHG EMISSIONS BY CATEGORY (TECO_2)



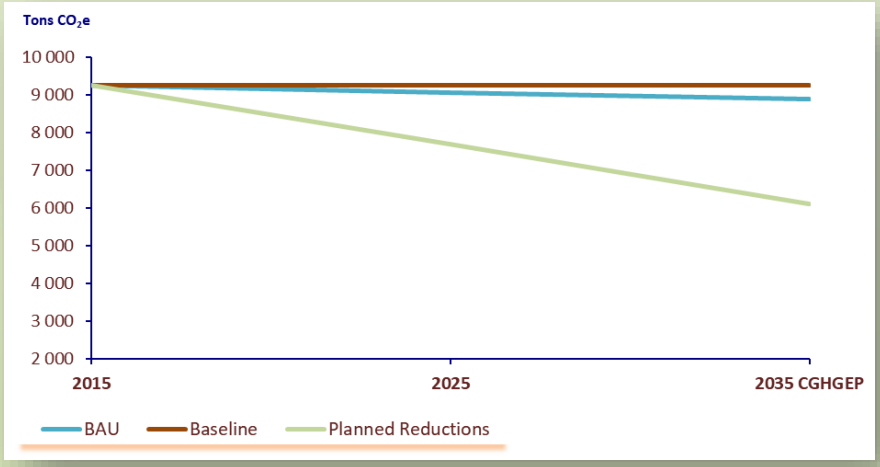
E. Community Emissions Forecast

Community emissions forecast present how the inventory emissions may evolve at the end of the action plan (2025), based on a business as usual scenario, i.e. 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 5 :
COMMUNITY INFORMATION

Base Year	2015	
Forecast Year*	2025	2035 CGHGEP
Reduction Target by Forecast Year* (%)	17,0%	34,0%

GRAPH 6 :
COMMUNITY EMISSIONS FORECAST



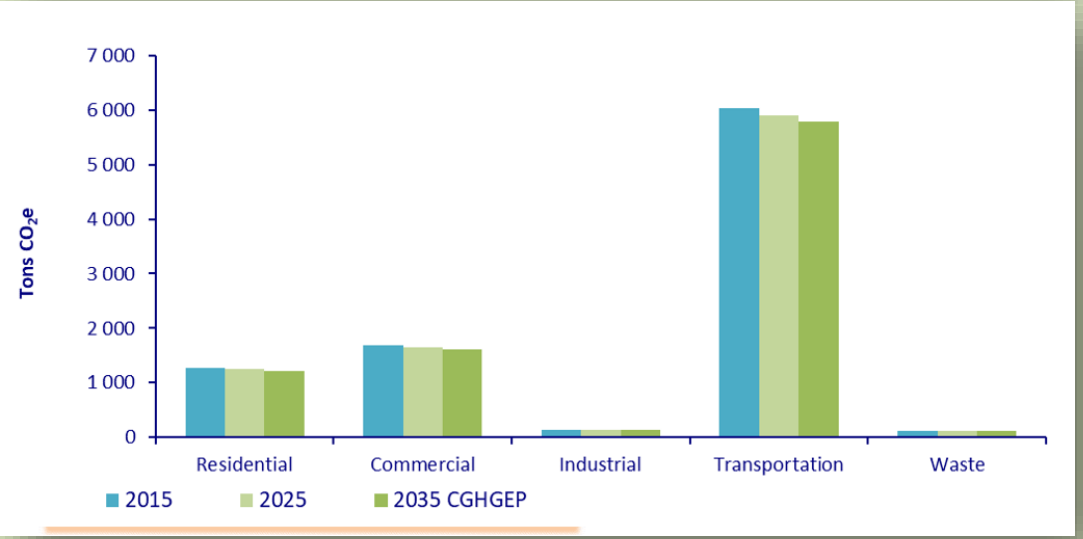
V. The Inventory

E. Community Emissions Forecast (continued)

Table 6 :

Community Emissions Forecast by Sector

	Current emissions	% Change Expected**	Emissions in Forecast year	Emissions in CEP Forecast year
Residential	1 269,6	-4,0%	1 244,2	1 218,8
Commercial	1 686,0	-4,0%	1 652,3	1 618,6
Industrial	141,6	-4,0%	138,8	135,9
Transportation	6 032,8	-4,0%	5 912,1	5 791,5
Waste	121,7	-4,0%	119,3	116,9
Total Emissions (t CO_2e)	**9 251,7**		**9 066,7**	**8 881,6**



COMMUNITY PLAN

VI. The Plan

A. Strategy for GHG Reduction and Project Selection

Community 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.

Considering the context of the Municipality, and the fact that the Village owns its Electric Light Commission and purchases power from the Tinker Dam, which produces a very low-GHG power, the community plan proposes the achievement of a target of 17% reductions in GHG emissions for 2025 and 34% reductions in GHG emissions for 2035 according to the reference year 2015.

Table 7 :
Community Information

Objectives and year set by Perth-Andover:		
Community Action plan :		
		• Reduction Target : 17% and 34%
		• Base year : 2015
		• Forecast year : 2025 and 2035

VI. The 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.

VI. The Plan

A. Strategy for GHG Reduction and Project Selection

Global approach

«Good practice» projects

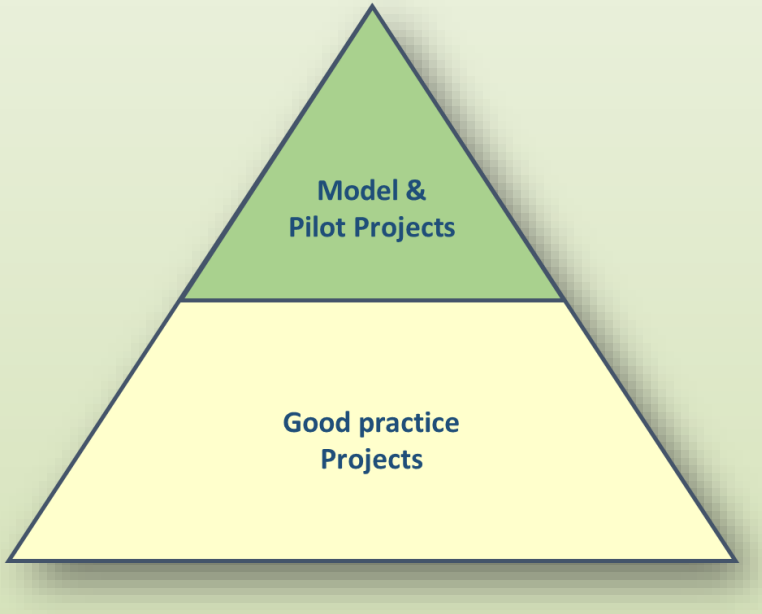
The action plan prioritises projects considered as "good practices". These projects correspond to the application of, for example, measures and technologies supported by the programs of New Brunswick Power, the Government of New Brunswick or Canada.

✓ 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)**



VI. The Plan

B. Reference level and target

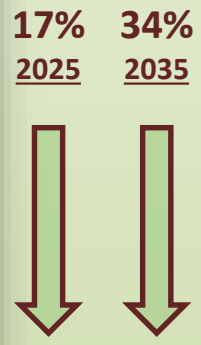
The goal of the Village of Perth-Andover's Community Action Plan is to reduce greenhouse gas emissions by 17% by 2025 and 34% by 2035 from their 2015 baseline.

For Perth-Andover, the emissions calculated for the year 2015 allow us to estimate the reductions required to reach the target set by the Community's action plan to approximately 1 572.8 tons or 17% by 2025 and 3 145.6 tons or 34% by 2035.

Table 8 :

Baseline and Target

	Tons of CO2 equivalent	Year Base 2015	Forecast 2025	Forecast EGHGEP 2035
1	Current Emissions	9 252		
2	Community Emissions Forecast (BAU Scenario)		***9 067***	***8 882***
3	Reduction Target		17,0%	34,0%
4	Forecast emissions (target) (line 1 - line 5)		7 679	6 106
5	**Total reductions to be achieved (line 1 - line 4)**		**1 572,8**	**3 145,6**
6	**Total reductions to be achieved (Including BAU Scenario)**		**1 387,8**	**2 775,5**



VI. The 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 community GHG emissions for the year 2025 be at 7 640 tons of eq. CO_2. This is a decrease of 1 612 tons from the 2015 emissions level of 9 252 tons of eq. CO_2. This represents a potential reduction of 17.4%, which is 0.4 percentage point above the target of 17% and 39.3 tons more than the targeted reduction of 1 572.8 tons (see Table 8).

Table 9 :

Analysis of the Outcome of the Action Plan

		Total reductions		Forecast EGHGEP 2025
		$eCO_2(t)$	%	
1	Current Emissions (Base year)	9 252	100,0%	
2	Early action results	0,4	0,0%	
3	Expected reductions in the Action Plan	1 612	17,4%	
4	**Total Reductions (line 2 + line 3)**	**1 612**	**17,4%**	
5	**Level of anticipated emissions (forecast year) (line 1 - line 4)**	**7 640**	**82,6%**	
6	**Gap with the target (Action Plan 2025)**	**39,3**	**0,4%**	
7	**Considering BAU Scenario (2025)**	**224,4**	**2,0%**	**19,4%**

VI. The Plan

D. Project Portfolio – Early Action

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 community GHG emissions.

The action plan identified the completion of one (1) project whose estimated reductions were estimated at 0.4 ton of CO_2 equivalent.

Table 10 :

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

	Projects (MAT)			Total GHG reductions (tons)
	Residential			0,4
1	*EA*	Mini-Split Rental Program (Early Action)	Number of units 93	0,4
	ICI			-
	Transportation			-
	Community Waste			-
	TOTAL			0,4

D. PROJECT PORTFOLIO – EARLY ACTION

Mini-Split Rental Program (Early Action)

Perth-Andover has set up a heat pump rental program. Units are available for customers inside and outside of the Village. Customers, depending on their heating and cooling needs can chose between different models. A free home assessment is performed in order to: Review of the current electrical panel and service for install ; Review the layout and square footage of the home ; Evaluate heating and cooling needs ; Educate on the basics of how Mini Split Ductless Heat Pumps cut your home heating costs.

Because they do not produce heat but only moving it, mini-splits are more efficient than other convectional home heating technologies.

The same reason explains why their performance varies according to the temperature.

	Mini-Split Rental Program (Early Action)	Base year : 2015	
1	Number of Mini-splits installed (as of 2017)	93	
2	Total residential electricity consumption	14 889 484	kWh
3	Number of households	719	
4	Electricity Intensity (kWh/household)	20 709	kWh/household
5	Total electricity needs (estimated)	1 925 900	kWh
6	Energy use for heating purposes	65,94	%
7	Energy use for cooling purposes	0,38	%
8	Electric Consumption - heating	1 269 938	kWh
9	Electric Consumption - cooling	n/a	kWh
10	Electricity consumption GHG emissions	21,6	eCO_2 (t)
11	Average heating savings (estimated)	1,6	%
12	Average cooling savings (estimated)	n/a	
13	Electricity reduction per year (kWh)	20 935	kWh
14	**GHG emissions reduction (tons)**	**0,36**	**eCO2 (t)**

VI. The 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 2015 inventory data, as well as the characteristics and needs of the Community of Perth-Andover, the development of the Project Portfolio was completed.

The action plan contains twelve (12) projects whose potential reductions are estimated at 1 611.8 tons of CO_2 equivalent (see Table 11).

VI. The Plan

D. Project Portfolio

Project Portfolio Summary

Table 11 : Community Project portfolio

	Projects (MAT)			Total GHG reductions (tons)
	Residential			974,7
1	*R 1*	LED lighting		3,9
2	*R 2*	Energy efficiency (Residential buildings)		8,8
3	*R 3*	Clean Energy Conversion (Oil to Electricity)	Conversion rate : 100%	959,7
4	*R 4*	Mini-Split Rental Program	Number of units 160	0,6
5	*R 5*	Energy efficiency - Residential - Clothes Line Program		1,7
	ICI			84,0
6	*ICI 1*	LED lighting	See Action R 1	11,0
7	*ICI 2*	Energy efficiency (commercial buildings)		73,0
	Transportation			553,1
8	*T 1*	Idle-free Policy		376,8
9	*T 2*	Fuel-efficient driving		114,9
10	*T 3*	Electric Vehicle Community Program	EV Units 21	23,3
11	*T 4*	Compact vehicles		38,1
	Community Waste			-
12	*W1*	Domestic composting		-
	TOTAL			**1 611,8**

D. PROJECT PORTFOLIO

1. Infrastructure (lighting) - LED lighting

LED technology is more reliable with a much longer life span compared to incandescent or fluorescent bulbs. LED technology is more reliable with a much longer life span compared to other types of lighting. According to Hydro-Quebec : "Most LED bulbs last about 25,000 hours, while incandescent lightbulbs last only 1,000." So if they're on 8 hours a day, 365 days a year, LED bulbs could last more than 8 years". In the community, voluntary conversions and those made through information, awareness and incentive campaigns reduce electricity consumption. It is assumed that 60% of the incandescent bulbs will be replaced by LED bulbs at the end of this action plan.

	LED lighting	Base year : 2015 GJ	kWh	Ratio
1	Total residential energy consumption	68 042	18 900 653	
2	Estimated residential lighting power consumption	2 477	687 984	3,64%
3	Total CI sector energy consumption	64 264	17 851 065	
4	Estimated commercial lighting power consumption	6 889	1 913 634	10,72%
5	Total industrial energy consumption	4 764	1 323 275	
6	Estimated industrial lighting power consumption	173	48 167	3,64%
7	Efficiency gains due to conversion		55%	
8	Conversion rate for 2025		60%	
9	Annual energy conversion reduction (residential)		227 035	kWh
10	Annual Energy Conversion Reduction (CI)		631 499	kWh
11	Annual Energy Reduction in Conversion (Industries)		15 895	kWh
12	Reduction of GHG emissions from conversion (residential)		4	t eCO_2
13	Conversion GHG emission reduction (CI)		11	t eCO2
14	Reduction in Conversion GHG Emissions (Industries)		0	t eCO2
15	**Reduction of GHG emissions from conversion (all sectors)**		**15**	**t eCO2**

D. PROJECT PORTFOLIO

2. Infrastructure (heating, cooling & envelope) - Energy efficiency (Residential buildings)

According to the community inventory, more than 13,7% of the community's GHG emissions come from the commercial and institutional sector. Improving energy efficiency is therefore a key means of reducing overall community emissions. NB Power has developed a series of financial incentive programs such as waterproofing, insulation or replacement of home heating systems. The average implementation rate of these measures is set at 50%. The average efficiency of all these measures is set at 10%.

	Energy efficiency (Residential buildings)		Base year : 2015	
1	Energy saving (estimated)		10,0%	
2	Participating households (number and %) *		360	50,0%
3	Energy saved per year (Gj)		1 775	
4	**Reduction of GHG emissions (tons and %)**		**8,82**	**5,0%**
	* Rough estimation			
	Estimation details			
5	Total electricity Consumption	53 602	Gj	
6	Energy use for heating purposes	65,94%		
7	Electric Consumption - heating	35 345	Gj	
8	Fuel consumption - heating	0	Gj	see below
9	Propane consumption - heating	157	Gj	
10	Electricity consumption GHG emissions	167	eCO_2 (t)	
11	**Fuel consumption GHG emissions (See Oil Removal Program)**	**0**	**eCO_2 (t)**	
12	Propane GHG emissions	10	eCO_2 (t)	
13	GHG emissions targeted	176	1,9%	
14	Projects' rate of implementation	50%	To set	
15	Total community emissions	9 252	eCO_2 (t)	
16	Average energy efficiency gain	10,0%	To set	
17	Number of Dwellings in the community	720		
18	Participating households	360	Rough estimation	
	See Oil removal project : Community aims to eliminate all heating oil use at the end of the current Action Plan			

VI. The Plan

D. Project Portfolio

3. Infrastructure (heating, cooling) - Clean Energy Conversion (Oil to Electricity)

Perth-Andover wishes to become a net zero community. To reach the net zero target for its corporate GHG emissions, the Action Plan proposes offset programs included in the community GHG and energy planning. Perth-Andover targets a complete removal of heating oil consumption in the community in favor of electricity. In the case of Perth-Andover, this project is particularly interesting since the community has access to hydroelectric power. The Village owns its Electric Light Commission and purchases power from the Tinker Dam. As a result, both power rates and GHG emissions of Perth-Andover are the lowest in the province. According to the community inventory, more than 13.7% of the community's GHG emissions come from the residential sector.

A survey of oil residential consumer will be realized in the next 2 years to target an efficient clean energy switch.

	Clean Energy Conversion (Oil to Electricity)		Base year : 2015	
1	Energy conversion		100,0%	
2	Participating households (number and %) *		720	100,0%
3	Energy saved per (Gj)		4 285	
4	**Reduction of GHG emissions (tons and %)**		**959,7**	**95,3%**
	* Rough estimation			
	Estimation details			
5	Heating oil consumption	14 283	Gj	
6	Heating oil GHG emissions	1 007	eCO_2 (t)	
7	**Projects' rate of implementation**	**100%**	**Target**	
8	Number of Dwellings in the community	720		
9	Participating households	720	Rough estimation	
10	Electricity needs (result of conversion)	9 998	Gj	
11	Electricity GHG Emissions (result of conversion)	47	eCO_2 (t)	
12	Residual Heating Oil consumption	0	Gj	
13	Residual Heating GHG Emissions	0	eCO_2 (t)	
14	**GHG reduction**	**959,7**	eCO_2 (t)	

D. PROJECT PORTFOLIO

4. Infrastructure (heating & cooling) - Mini-Split Rental Program

The program, as described in the Early Actions section, will be continued. During the current action plan, in addition of the 93 units already installed, The Village's target is to install 20 more mini-splits each year.

The outcome of this project will be better evaluated if the power consumption of the homes are monitored. The efficiencies achieved and the customers feedback could bring valuable data to the project.

	Mini-Split Rental Program	Base year : 2015	
1	Number of Mini-splits installed	160	
2	Total residential electricity consumption	14 889 484	kWh
3	Number of households	720	
4	Electricity Intensity (kWh/household)	20 680	kWh/household
5	Total electricity needs (estimated)	3 308 774	kWh
6	Energy use for heating purposes	65,94	%
7	Energy use for cooling purposes	0,38	%
8	Electric Consumption - heating	2 181 806	kWh
9	Electric Consumption - cooling	n/a	kWh
10	Electricity consumption GHG emissions	37,1	eCO_2 (t)
11	**Average heating savings (estimated)**	**1,6**	**%**
12	Average cooling savings (estimated)	n/a	
13	**Electricity reduction per year (kWh)**	**35 967**	**kWh**
14	**GHG emissions reduction (tons)**	**0,61**	**eCO2 (t)**

D. PROJECT PORTFOLIO

5. Infrastructure (heating, cooling & envelope) - Energy efficiency - Residential - Clothes Line Program

Perth-Andover wishes to promote simple yet efficient measures that will reduce energy costs and carbon footprint of its citizens. According to the community inventory, more than 13,7% of the community's GHG emissions come from the residential sector. Clothe lines have multiple advantages : Low installation/repair cost, saves money, zero GHG emission, etc. The average implementation rate of these measures is set at 25%.

	Infrastructure (heating, cooling & envelope)		Base year : 2015	
1	Energy saving (estimated)		12,5%	
2	Participating households (number and %)		165	22,9%
3	Energy saved per year (kWh)		98 763	
4	**Reduction of GHG emissions (tons and %)**		**1,7**	**0,0%**
	Estimation details			
5	Average electric clothes Dryer consumption per household	100	kWh / month	
6	Total power use for clothes drying	1 200	kWh / year	
7	Number of Dwellings in the community	720		
8	Ratio of households with an electric clothes dryer	91,4%		
9	Annual estimated power used by laundry dryers	790 103	kWh / year	
10	Total estimated GHG emissions of laundry drying	13	eCO_2 (t)	
11	**Clothes lines efficiency**	**100%**		
12	**Clothes lines use rate**	**50%**	**6 months / year**	
13	**Projects' rate of penetration**	**25%**	**To set**	
14	Participating households	165		
15	Energy reduction	98 763	kWh	
16	GHG reduction	2		
17	Energy savings	10 459	$	
18	Total community emissions	9 252	eCO_2 (t)	

D. PROJECT PORTFOLIO

6. Infrastructure (heating, cooling & envelope) - Energy efficiency (Commercial buildings)

According to the community inventory, more than 18.2% of the community's GHG emissions come from the commercial and institutional sector. Improving energy efficiency is therefore a key means of reducing overall community emissions. NB Power has put in place a program called " Energy Smart Commercial Buildings Retrofit Program" for Commercial Buildings. The average implementation rate of these measures is set at 50%. The average efficiency of all these measures is set at 10%.

	Energy efficiency (commercial buildings)		Base year : 2015	
1	Energy saving (estimated)		0	
2	Energy saved per year (Gj)		2 023	
3	**Reduction of GHG emissions (tons and %)**		**73,00**	**5,0%**
	Estimation details			
4	Total electricity Consumption	42 929	Gj	
5	Energy use for heating purposes	48,35%		
6	Electric Consumption - heating	20 756	Gj	
7	Fuel consumption - heating	16 909	Gj	
8	Propane consumption - heating	2 786	Gj	
9	Electricity consumption GHG emissions	98	eCO_2 (t)	
10	Fuel consumption GHG emissions	1 192	eCO_2 (t)	
11	Propane GHG emissions	170	eCO_2 (t)	
12	GHG emissions targeted	1 460	15,8%	
13	**Projects' rate of implementation**	**50%**	**To set**	
14	Total community emissions	9 252	eCO_2 (t)	
15	**Average energy efficiency gain**	**10,0%**	**To set**	

D. PROJECT PORTFOLIO

7. 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-liters 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

	Idle-free Policy	Base year : 2015 Gasoline		Diesel	
1	Number of units	1 237		87	
2	Fuel consumption	1 614 428	litres	767 049	litres
3	GHG emissions	3 938	eCO_2 (t)	2 058	eCO_2 (t)
4	Average fuel wasted idling	133 002	litres	19 488	litres
5	Average fuel economy	8,2%		2,5%	
6	GHG emissions reduction	324,5	eCO2 (t)	52,3	eCO2 (t)
7	**Total GHG Emissions reduction**		**376,76 eCO2 (t)**		

D. PROJECT PORTFOLIO

8. Transportation - Fuel-efficient driving

Driving can significantly influence fuel consumption. We assume in this project that community drivers, through incentives, promotional campaigns and economic reasons, will gradually integrate these principles of effective behaviour.

According to Natural resources Canada, Adopting these five fuel-efficient driving techniques can reduce fuel consumption and carbon dioxide emissions by as much as 20 percent (20%):

1. Accelerate gently
2. Maintain a steady speed
3. Anticipate traffic
4. Avoid high speeds
5. Coast to decelerate

	Fuel-efficient driving	Base year : 2015	
1	Community transportation emissions	6 033	eCO_2 (t)
2	Total community emissions	9 252	eCO_2 (t)
3	Number of targeted units	128	
4	**Reduction of GHG emissions (tons and %)**	**115**	**1,24%**

D. PROJECT PORTFOLIO

9. Transportation - Electric Vehicle Community Program

The EV Community Program is proposed for the Community GHG and Energy Planning timeline. The program is related to the NB Climate Action Plan and will help the community to integrate EV and gradually replace conventional vehicle use.

Perth-Andover Offset Program : The municipality aims to be a "Net Zero" equivalent for corporate GHG emission. To reach the "Net Zero" equivalent objective, Perth-Andover will support community efforts to integrate EV use on its territory. The Village owns its Electric Light Commission and provide a low carbon energy.

Pert-Andover wish to become a EV "pilot & model" village to test EV equipment, technologies and green transport transformation.

Information : EV 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.

			Base year :	2015
			Target year :	2025
1	Perth- Andover - GHG Offset Target - eCO_2 (t)		**23**	
2	Target number of EV units for 2025	Minimum & maximum	8	21
3	*NB CCAP Target for EV units for 2025 (estimated)*	*Total & annually*	*21*	*3*
4	GHG emissions reduction (tons and %)	Minimum	23	0,3%
5		Maximum	64	0,7%
6	Transport GHG emissions reduction (%)	Minimum & Maximun	0,4%	1,1%
7	Savings per year (Minimum & maximum)	Minimum & Maximun	2 776 $	25 331 $
8	Number of car & light Truck		1 208	
9		Minimum & maximum	0,6%	1,7%

D. Project Portfolio

9. Transportation - Electric Vehicle Community Program (continued)

(A) Credit for electricity consumed for private EV Charging. Perth-Andover will offer a credit for the electricity used for private electric recharge.
i- Perth EV owners will have to register their EV with the Village and the Commission to receive a credit.
(Amount and Duration of credit must be confirmed)

(B) Charging Station: EV owners & users will need an access to sufficient charging stations (CS) reliability for public locations and private charging.
i- In 2018, Perth-Andover counts 2 public CS on its territory including one (1) level 3 (fast charging) CS. With the EV program the Village is planning to increase public CS in 4 other location (see location).
ii- EV owners will also need a reliable private CS installed at home. (Better electricity price and PA EV credit)
iii- Perth-Andover will work to negotiate interesting price with retailer for private charger. (See Addenergie)

EV-Charging Station (Installed & planned)

Location	*Comment*	*Number*
	Total	**5**
Perth Johnson Pharmacy 16 NB-109, NBPower N3 NBPower - FLO		1
Near the Tim Hortons, Subway, Gas Stations, Highway 2	*Proposed W1*	1
Near light industrial area	*Proposed W1*	1
Near Town Hall and SNB	*Proposed W1*	1
Civic Centre, 2 Schools:	*Proposed W1*	1

D. PROJECT PORTFOLIO

10. Transportation - Compact vehicles

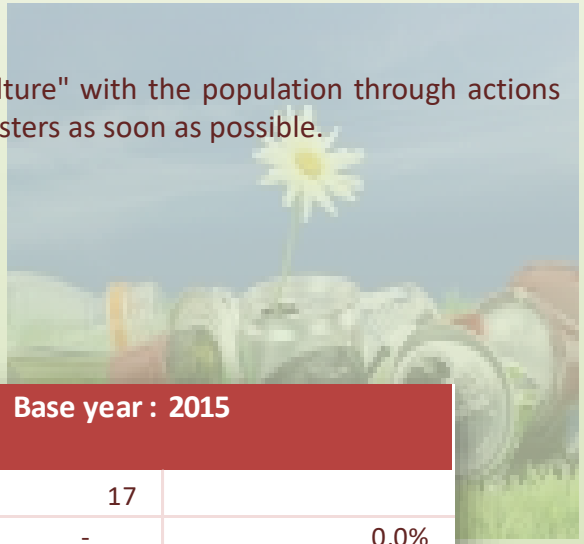
The community vehicle fleet is becoming more fuel-efficient and fuel-efficient, consuming about 20% less fuel. Change is achieved through targeted incentives, public awareness, a gradual change in transportation patterns, or the availability of more attractive business models.

	Compact vehicles	Base year : 2015	
1	Community transportation emissions	6 033	eCO_2 (t)
2	Total community emissions	9 252	eCO_2 (t)
3	Number of targeted units	60	
4	**Reduction of GHG emissions (tons and %)**	**38**	**0,41%**

D. PROJECT PORTFOLIO

11. Solid Waste - Domestic composting

The Village of Perth-Andover intends to promote and establish a "domestic composting culture" with the population through actions such as training, composting, etc. This project involves the distribution of 70 domestic composters as soon as possible.



	Solid Waste	Base year : 2015	
1	Compostable materials diverted from landfill	17	
2	GHG emissions reduction (tons & %)	-	0,0%
3	**Duration of the project**	**7**	
	Estimation details		
4	Community Waste sector emissions	122	eCO_2 (t)
5	Total community emissions	9 252	eCO_2 (t)
6	Residential solid waste	409	Tons
7	Number of Dwellings in the community	720	
8	**Number of composters to be distributed**	**70**	**Units**
9	Number of users per composter	2,24	
10	Average organic material per person / year	0,184	Tons
11	Proportion of organic matter actually composted	60%	
12	Compostable materials diverted from landfill	17,31	Tons
13	Avoided Emissions	**2**	eCO_2 (t)
14	Emissions from composting	7	eCO_2 (t)
15	Net Short-term Reductions	**0**	eCO_2 (t)

VI. APPENDICES

Appendice: Perth-Andover Electric Light Commission

Partners for Climate Protection program (PCP) - Method

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

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.