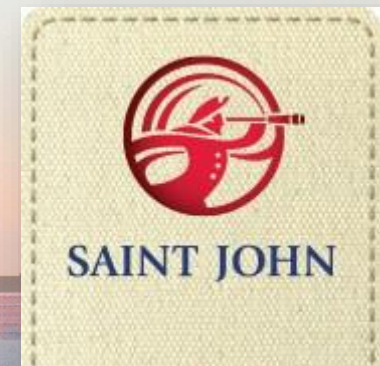


City of Saint John Corporate GHG & Energy Action Plan



January 2019

Realised with the



Consulting team



Financed by



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Corporative GHG Inventory & Action Plan

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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 Saint John'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.

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 City of Saint John 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 City of Saint John has agreed to participate in CCEI.

[Link to: ACTION-GHG Saint John](#)

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. CITY OF SAINT JOHN - CCEI OBJECTIVE AND STRATEGY

City of Saint John 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. PLAN SJ POLICIES THAT WOULD SUPPORT THE COMMUNITY AND CORPORATE ENERGY PLAN

- 1. NE-4** Encourage reduced automobile emissions by promoting a more compact, mixed-use development pattern and making walking, cycling and transit use viable transportation choices.
- 2. NE-5** Work with the Government of New Brunswick, industry and other agencies to develop and implement clean air initiatives, including emission reduction strategies.
- 3. NE-7** Reduce emissions from City Infrastructure, including buildings and fleets, through corporate purchasing and operating policies that support the Municipal Energy Efficiency Program.
- 4. NE-37** Continue to improve the energy efficiency of municipal service delivery, including facilities, equipment, fleet, street-lights, and procurement through the Municipal Energy Efficiency Program.
- 5. NE-38** Explore and encourage the development and use of alternative energy sources, such as solar, wind, geothermal, biomass and energy recovery.
- 6. NE-39** Encourage excellence in energy efficiency in new development in retrofitting of existing development.
- 7. NE-40** Support public education and action on the use of alternative energy sources and energy efficiency measures.
- 8. NE-41** Work with relevant agencies to develop and implement an Energy and Greenhouse Gas Emissions plan for the City.

- 9. TM-12** Encourage and promote the use of the active transportation network by residents as a healthy transportation choice by undertaking such initiatives as public education campaigns, mapping of the network and way-finding signage.
- 10. TM-22** Recognize and promote public transit as an important component of a sustainable urban transportation system which contributes to economic development and helps the City achieve its environmental goals and objectives.
- 11. TM-23** Provide effective fiscal support for efficient, affordable, safe and convenient transit services linking major employment, commercial, residential and recreational areas.
- 12. NE-42** Work with the Government of New Brunswick, the Government of Canada and relevant agencies to support research efforts that better quantify the predicted impacts of climate change.
- 13. NE-43** Proactively plan for climate change by taking action to manage the effects of climate change and minimizing adverse impacts through the development of a Climate Change Plan in partnership with other levels of government.

(continued)

II. STRATEGY

B. PLAN SJ POLICIES THAT WOULD SUPPORT THE COMMUNITY AND CORPORATE ENERGY PLAN

14. NE-44 Mitigate local contributions to climate change by:

- a. Working with the Government of New Brunswick, the Government of Canada and relevant agencies to reduce local emissions of greenhouse gases;
- b. Working with the Government of New Brunswick and Saint John Energy to explore renewable sources of energy;
- c. Supporting initiatives to increase public awareness and action on the reduction of greenhouse gas emissions;
- d. Encouraging excellence in emissions reduction and green building standards for all development; and
- e. Recognizing that a variety of initiatives, such as the development of complete communities, increasing economic diversification, offering a range of transportation choices and encouraging local food production all contribute to mitigation of greenhouse gas emissions.

15. MS-1 Ensure the first priority for the City is to maintain and upgrade existing municipal servicing systems.

16. MS-7 Develop an asset management system that will inventory and manage the replacement of infrastructure in an effort to optimize service delivery over the life of an asset.

II. STRATEGY

C. 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. CITY PROFILE

Profile of the municipality and its geographical context

The City of Saint John is located in southern New Brunswick, in the County of Saint John, of which it is the chief City. Saint John is 415 kilometers west-northwest of Halifax, 915 kilometers east of Montreal and 650 kilometers northeast of Boston. Located at the mouth of the Saint John River on the edge of the Bay of Fundy, the City, with its port, occupies an important place in the economy of the Maritimes. Saint John is the oldest incorporated municipality in Canada and the second largest City in New Brunswick after Moncton.

Municipal composition

- 1 mayor, 2 general councillors and 8 neighborhood councillors
- 682 full time employees and seasonal staff and 203 police employees

Municipal infrastructures

- 183 buildings, lighting, water and sewage
- 429 vehicles and motorized equipment

Profile of the community

The population of Saint John in 2016 was 67,575 inhabitants spread over an area of 315.96 km², a density of 213.9 hab./km². It experienced a population decrease of 3,6% from 2011 to 2016. The City had 33,801 private dwellings in 2016, of which 30,208 were occupied by full time residents. 81% of dwellings were built before 1991.

The official languages spoken by the Saint John population are 86% English, 0,15% French, and 13% both French and English.

In Saint John:

- | | | | |
|---------------------|---------------------|--------------------|---------------------|
| • Public library | • Ferry | • Outlets | Skateboarding Parks |
| • University | • City Transit | • Shopping Centers | Play Parks |
| • Elementary School | • Bus Rapid Transit | • Market Square | Sporting Facilities |
| • Middle School | • Taxi Service | • Parks | Golf Courses |
| • High School | • Camping | • Beaches | Aquatic Facilities |
| • Harbor | • Marina | • Ice Rinks | Trails |
| • Airport | | | |

III. CITY 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 City of Saint John 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 City of Saint John has eight public electric charging stations* on its territory.

*Listed by PlugShare (July 2018)

- Climate Change and Energy Initiative (CCEI) of the Union of Municipalities of New Brunswick, 2017
- City of Saint John, NB, Saint John City Market energy upgrades, 2018
- Asset Management Policy and Strategy, 2017
- Municipal Energy Efficiency Program (MEEP), 2014
- Our Saint John, Integrated Community Sustainability Plan, 2009
- Member – Partners for Climate Protection program, FCM, 2006



III. CITY PROFILE

Municipal Energy Efficiency Program (MEEP)

Goals and Objectives:

- ✓ Reduce total energy use and GHG emissions by 35%
- ✓ Assist other municipalities, communities and business sectors using lessons learned
- ✓ Advise Council and Senior Staff on energy policies, standards, guidelines and procurement of environmentally sound equipment
- ✓ Raise energy awareness amongst staff

Provincial, National and International Awards

- Premier's Award - Energy Efficiency 2011- Commercial Energy Efficiency Champion
- Top 13 in North America for Best Energy Management Practices
- Milton F. Gregg Conservation Award
- FCM-CH2M Hill Sustainable Community Award 2008: Energy
- Canadian Association of Municipal Administrators (CAMA) 2004: Environmental Award
- Government of New Brunswick Community Recognition Award
- Premier's Award - Energy Efficiency for New Construction of Police Headquarters and Transit Operations Building
- 2017 Smart Community Award Presented by QUEST

Environmental, Social and Economic Benefits

The City of Saint John has been early adopter of new advances, technologies, and approaches and a strong promoter of efficiency awareness amongst staff and management. The MEEP has proven to be successful in reducing energy costs and GHG emissions, and this success has showcased the City as a leader in Sustainable Energy Management. Following are some of the accomplishment and benefits of the MEEP as of 2015:

- Energy savings of over \$2.3M
- Reduced energy consumption by approximately 8.6M KWH and 49,000 GJ of natural gas and oil/propane, or 30%, from baseline
- Greenhouse gas emissions reduced by 9400 tons of CO₂, or 24%, from baseline, with emission reductions expected to meet and exceed the 35% reduction target by 2020 as indicated in the MEEP objectives
- Help other NB municipalities such as Moncton and Fredericton to undertake their own climate change and energy efficiency initiatives
- Capital Investment of over \$5 million in energy efficiencies measures to reduce GHG emissions

IV. INVENTORY

CORPORATE GHG INVENTORY

IV. INVENTORY

The City of Saint John 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.

Saint John'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 City of Saint John. The relevant additional elements are detailed in the appendices.

IV. INVENTORY

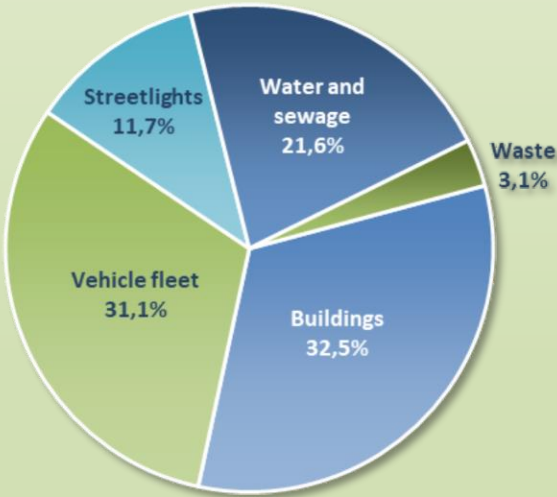
A. SUMMARY

The corporate component consists of five emission sectors which, in Saint John's case, are responsible for approximately 23 776 tons of CO₂ equivalent. The two largest corporate GHG emission sectors are buildings and vehicle fleet. The former produce 32.5% of corporate GHGs, the latter generate 31.1%. Water and sewage is responsible for 21.6% of the Municipality's emissions, streetlights 11.7% and finally 3.1% of emissions are attributed to municipal waste.

TABLE 1 :
CORPORATE GHG EMISSIONS FOR THE BASE YEAR

GHG (tons eCO2)	2015
Buildings	7 737
Vehicle fleet	7 390
Streetlights	2 771
Water and sewage	5 134
Waste	744
Total	23 776
Population	67 575
GHG per capita (teCO2)	0,4

GRAPH 1 :
CORPORATE GHG EMISSIONS BREAKDOWN BY SECTOR (teCO₂)



IV. INVENTORY

A. SUMMARY (continued)

In 2015, the energy consumption of the various corporate activities of the Municipality was the source of 23 031.8 tons of emissions (CO₂ equivalent). For its energy needs, Saint John uses electricity, natural gas, fuel oil and propane for heating and two types of fuels for vehicles. Electricity, natural gas, fuel oil and propane are devoted to the energy demand of buildings and other infrastructure. Gasoline and diesel 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		(teCO ₂)	%	(Gj)	%
	Volume	Units				
Electricity	48 111 540	kWh	13 471,2	58,5%	173 201,5	53,8%
Natural Gas	971 119	m ³	1 857	8%	38 107	12%
CNG	0	Liters	0	0%	0	0%
Diesel	2 037 035	Liters	5 466,2	23,7%	78 018,4	24,2%
Gasoline	788 719	Liters	1 924,1	8,4%	27 605,2	8,6%
District Energy	0	Gj	0	0%	0	0%
Ethanol Blend (10%)	0	Liters	0	0%	0	0%
Biodiesel	0	Liters	0	0%	0	0%
Fuel Oil	12 767	Liters	34,9	0%	495,4	0%
Propane	180 007	Liters	277,9	1,2%	4 556,0	1,4%
Waste	-		-		-	
Total			23 031,8		321 983,2	

IV. INVENTORY

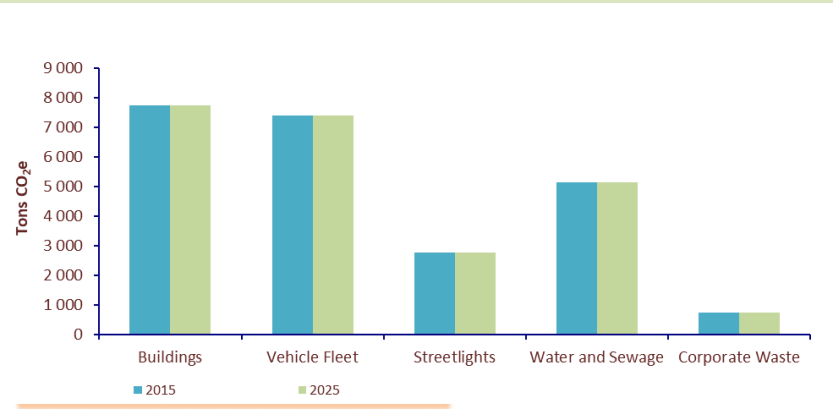
B. CORPORATE EMISSIONS FORECAST

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 (BAU), 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.

For Saint John, the business as usual scenario anticipates that, apart from the present action plan reduction, the level of the corporate GHG emissions will remain stable.

TABLE 3 :
CORPORATE EMISSIONS FORECAST BY SECTOR

	Current emissions	% Change Expected**	Emissions in Forecast year
Buildings	7 736,8	0,0	7 736,8
Vehicle Fleet	7 390,3	0,0	7 390,3
Streetlights	2 770,6	0,0	2 770,6
Water and Sewage	5 134,1	0,0	5 134,1
Corporate Waste	744,4	0,0	744,4
Émissions total (t CO ₂ e)	23 776,2		23 776,2



IV. INVENTORY

B. CORPORATE EMISSIONS FORECAST (continued)

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.

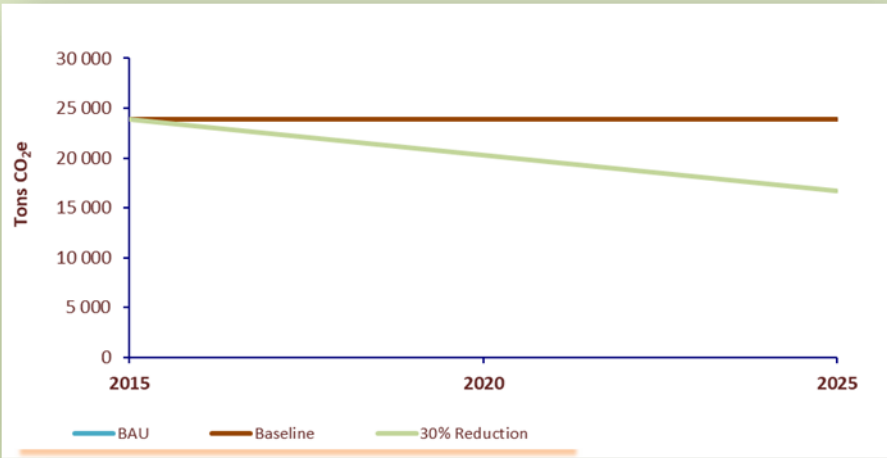
For Saint John, the business as usual scenario anticipates that, apart from the present action plan reduction, the level of the corporate GHG emissions will remain stable. This action plan is expected to bring them down by 30% (Graph 2).

TABLE 4 :
CORPORATE INFORMATION

Base Year	2015
Forecast Year*	2025
Reduction Target by Forecast Year* (%)	30,0%

Baseline: 2015 (Base year)
BAU: Business as usual scenario forecast (when BAU scenario predicts no change in GHG emissions, it equals to Baseline)
2025: Action Plan deadline

GRAPH 2 :
FORECAST OF CORPORATE GHG EMISSIONS UNTIL 2025



GHG & ENERGY 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.

Taking into account the context of the Municipality, the corporate plan proposes the achievement of a target of 30% reductions in GHG emissions for 2025 according to the reference year 2015.

TABLE 5 :
OBJECTIVES AND YEAR

Objectives and year set by Saint John:		
Corporate Action plan :		
		• Reduction Target : 30%
		• 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 City of Saint John'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)**
 - ✓ 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

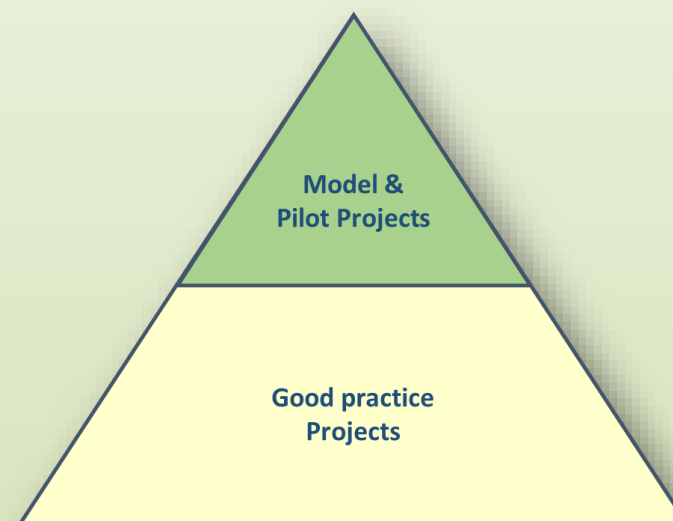
The action plan prioritises projects considered as "good practices". These projects correspond to the application of, for example, measures and technologies supported by the programs of New Brunswick Power, the Government of New Brunswick or Canada.

- ✓ 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 :

- **Transport electrification & EV integration in the community**



V. ACTION PLAN

B. REFERENCE LEVEL AND TARGET

The goal of the City of Saint John's Corporate Action Plan is to reduce greenhouse gas emissions by 30% by 2025 from their 2015 baseline.

For Saint John, 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 7 132.9 tons or 30%.

TABLE 6 :
BASELINE AND TARGET

Tons of CO ₂ equivalent		Base 2015	Year Forecast 2025
1	Current Emissions	23 776,2	
2	Reduction Target		30,0%
3	Forecast emissions (target) (line 1- line 4)		16 643,3
4	Total reductions to be achieved (line 1- line 3)		7 132,9

30%



V. ACTION PLAN

C. ANALYSIS OF THE PROJECTED RESULTS OF THE ACTION PLAN

Achieving the objective of Saint John's Action Plan would mean that the level of corporate GHG emissions for the year 2025 be at 16 501.7 tons of eq. CO₂. This is a decrease of 7 274.5 tons from the 2015 emissions level of 23 776.2 tons of eq. CO₂. This represents a potential reduction of 30.6%, which is 0.6 percentage points above the target of 30% and 141.6 tons more than the targeted reduction of 7 132.9 tons (see Table 6).

TABLE 7 :
ANALYSIS OF THE OUTCOME OF THE ACTION PLAN

	Total reductions	
	eCO ₂ (t)	%
1 Current Emissions (Base year)	23 776,2	100,0%
2 Early action results	2 295,8	9,7%
3 Expected reductions in the Action Plan	4 978,7	20,9%
4 total Reductions (line 2 +line 3)	7 274,5	30,6%
5 Level of anticipated emissions (forecast year) (line 1- line 4)	16 501,7	69,4%
6 Gap with the target	141,6	0,6%

V. ACTION PLAN

D. PROJECT PORTFOLIO – EARLY ACTIONS

Some projects have been completed or initiated by the City of Saint John between the reference year of the inventory (2015) and the year of adoption of the action plan presented (2019). These early actions have contributed to the municipality's effort to reduce corporate GHG emissions. The action plan identified the completion of seven (7) projects whose estimated reductions were estimated at 2 295.8 tons of CO₂ equivalent.

TABLE 8 :

PROJECTS COMPLETED PRIOR TO THE ADOPTION OF THE ACTION PLAN (EARLY ACTIONS)

Projects (Measures, Actions, Technologies)			Total GHG reductions (tons)
Buildings ; Water & Sewage			312,2
1	EA 1 Energy Efficiency (Natural gas)	Multiple buildings	129,2
2	EA 2 Energy Efficiency (Propane)	Buildings (West Garage)	8,8
3	EA 3 Energy Efficiency (Electricity)	Multiple buildings	159,2
4	EA 4 Energy Efficiency (heating oil)	Buildings (Public Garden)	15,0
Vehicle Fleet			73,2
5	EA 5 Optimal Replacement Policy	Number of units 143	57,4
6	EA 6 Saint John Transit - Fleet renewal	Number of units 3	15,8
Streetlights			1 910,4
7	EA 7 Streetlight replacement	Number : 8100	1 910,4
TOTAL			2 295,8

V. ACTION PLAN

D. PROJECT PORTFOLIO – EARLY ACTIONS

1. Description - Early Actions (2016-2019)

The City of Saint John has carried out several measures, actions and realizations. The action plan we are currently working on cannot integrate them all because their positive impact is already pointed out in the 2015 inventory. "Early actions" are those initiated or carried out between the base year of the inventory (2015) and the year of adoption of the action plan (2019).

Buildings (multiple buildings)		Base year : 2015
1 Natural gas use	432 261	m3
2 Cost of natural gas	369 454	\$
3 GHG emissions from natural gas use	826,75	eCO ₂ (t)
4 Savings	15,62	%
5 Natural gas use reduction	67 533	m3
6 GHG emissions reduction	129,17	eCO₂ (t)
7 Annual savings	57 721	\$

Buildings (West Garage)		Base year : 2015
1 Propane use	17 437	Liters
2 Cost of propane	6 975	\$
3 GHG emissions from propane use	26,92	eCO ₂ (t)
4 Savings	32,69	%
5 Propane use reduction	5 700	Liters
6 GHG emissions reduction	8,80	eCO₂ (t)
7 Annual savings	2 280	\$

V. ACTION PLAN

D. PROJECT PORTFOLIO – EARLY ACTIONS

2. Description - Early Actions (2016-2019) (continued)

The City of Saint John has carried out several measures, actions and realizations. The action plan we are currently working on cannot integrate them all because their positive impact is already pointed out in the 2015 inventory, "Early actions" are those initiated or carried out between the base year of the inventory (2015) and the year of adoption of the action plan (2019).

Buildings (multiple buildings)		Base year : 2015
1 Electricity use	5 495 123	kWh
2 Cost of electricity	467 085	\$
3 GHG emissions from electricity use	1 538,63	eCO ₂ (t)
4 Savings	10,34	%
5 electricity use reduction	568 454	kWh
6 GHG emissions reduction	159,17	eCO₂ (t)
7 Annual savings	48 319	\$

Buildings (Public Garden)		Base year : 2015
1 Heating oil use	12 767	Liters
2 Cost of heating oil	9 703	\$
3 GHG emissions from heating oil use	34,92	eCO ₂ (t)
4 Savings	43,08	%
5 Heating oil use reduction	5 500	Liters
6 GHG emissions reduction	15,04	eCO₂ (t)
7 Annual savings	4 180	\$

V. ACTION PLAN

D. PROJECT PORTFOLIO – EARLY ACTIONS

3. Description - Early Actions (2016-2019) (continued)

The City of Saint John has carried out several measures, actions and realizations. The action plan we are currently working on cannot integrate them all because their positive impact is already pointed out in the 2015 inventory, "Early actions" are those initiated or carried out between the base year of the inventory (2015) and the year of adoption of the action plan (2019).

Saint John Transit - Fleet renewal		Base year : 2015
1 Number de vehicles		3
2 Fuel consumption		33 577 litres
3 Fuel cost		36 169,06 \$
4 GHG emissions		90,10 eCO ₂ (t)
5 Average efficiency gains due to renewal of fleet		0
6 Total Reductions in GHG Emissions		15,77 eCO ₂ (t)

Optimal Replacement Policy	Base year : 2015	
	Gasoline	Diesel
1 Number de vehicles	109	34
2 Fuel consumption	305 953 litres	149 691 litres
3 Fuel cost	313 842 \$	165 789 \$
4 GHG emissions	746,38 eCO ₂ (t)	401,69 eCO ₂ (t)
5 Number of vehicles to be replaced	109	34
6 Average efficiency gains due to renewal of fleet	5,0%	5,0%
7 Reduction of GHG emissions after conversion	37,3 eCO ₂ (t)	20,1 eCO ₂ (t)
8 Total Reductions in GHG Emissions	57,40 eCO ₂ (t)	

V. ACTION PLAN

D. PROJECT PORTFOLIO – EARLY ACTIONS

4. Description - Early Actions (2016-2019) (continued)

The City of Saint John has carried out several measures, actions and realizations. The action plan we are currently working on cannot integrate them all because their positive impact is already pointed out in the 2015 inventory, "Early actions" are those initiated or carried out between the base year of the inventory (2015) and the year of adoption of the action plan (2019).

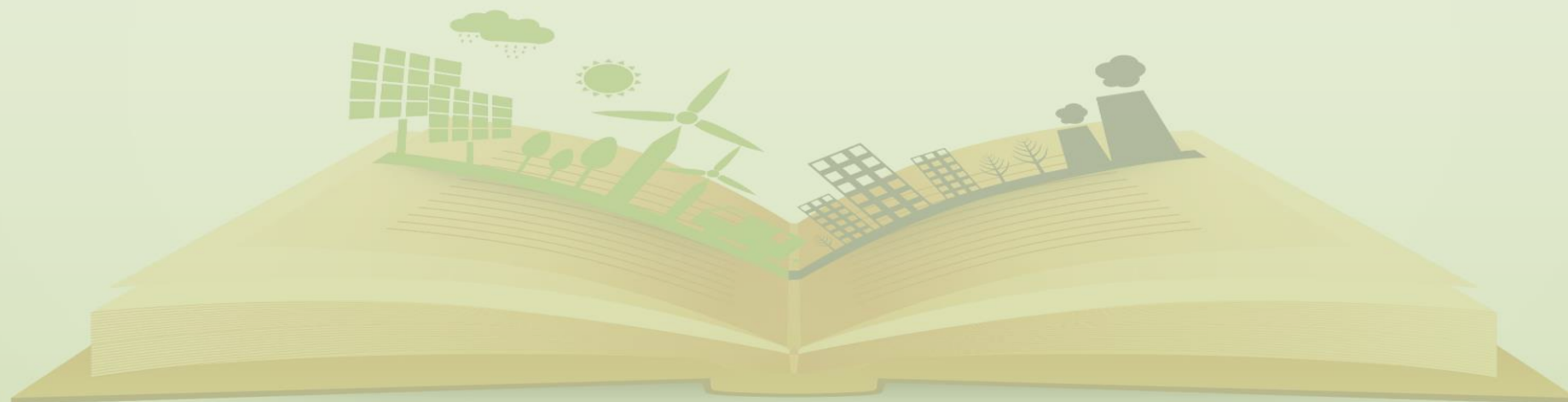
Streetlights		Base year : 2015	
1	Total lighting consumption	9 685 380	kWh
2	Cost of electricity for lighting	823 257	\$
3	GHG emissions from lighting electric consumption	2 712	eCO ₂ (t)
4	Efficiency gains after conversion	70,4%	
5	Annual consumption after conversion	2 862 346	kWh
6	Annual energy savings due to conversion	6 823 034	kWh
7	Annual savings due to conversion (for City of Saint John)	116 500	\$
8	Reduction of GHG emissions after conversion	1910,4	eCO₂ (t)
Note : The capital investment of the conversion is provided by Saint John Energy			

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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 City of Saint John, the development of the Project Portfolio was completed.

The action plan contains thirteen (13) projects whose potential reductions are estimated at 4 978.7 tons of CO₂ equivalent (see Table 9).



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Project Portfolio Summary

TABLE 9 : CORPORATE PROJECT PORTFOLIO

Projects (Measures, Actions, Technologies)			Total GHG reductions (tons)
Buildings			2 835,2
1	B1 Buildings (Municipal Garages)	Energy Efficiency (Elec. Natural gas & propane) & Renewable Energy	349,4
2	B2 Buildings (Sport & Leisure Buildings)	Energy Efficiency (Electricity & Natural Gas) & Renewable Energy	420,3
3	B3 Buildings (Management & Commissions)	Energy Efficiency (Electricity & Natural Gas) & Renewable Energy	1 969,8
4	B4 Buildings (Fire stations)	Energy Efficiency (Electricity & Natural Gas) & Renewable Energy	95,7
Vehicle Fleet			806,9
5	VF1 Optimal Replacement Policy - rental vehicles	Number of vehicles : 27	4,3
6	VF2 Optimal Replacement Policy	Number of vehicles : 175	97,3
7	VF3 Optimal replacement policy (SJT)	Number of vehicles : 31	442,0
8	VF4 Corporate Idle-free Policy	Number of vehicles : 268	114,5
9	VF5 Telemetry & Idle-free Policy	Number of vehicles : 87	63,0
10	VF6 Electric Vehicle	Number of vehicles : 2	1,5
11	VF7 Electric Vehicle (Saint John Transit)	Number of vehicles : 2	86,7
12	VF8 Hybrid Vehicle	Number of vehicles : 4	2,0
Water and Sewage			1 336,6
13	WS1 Water & Sewage	Energy Efficiency (Electricity)	1 336,6
TOTAL			4 978,7

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D. PROJECT PORTFOLIO

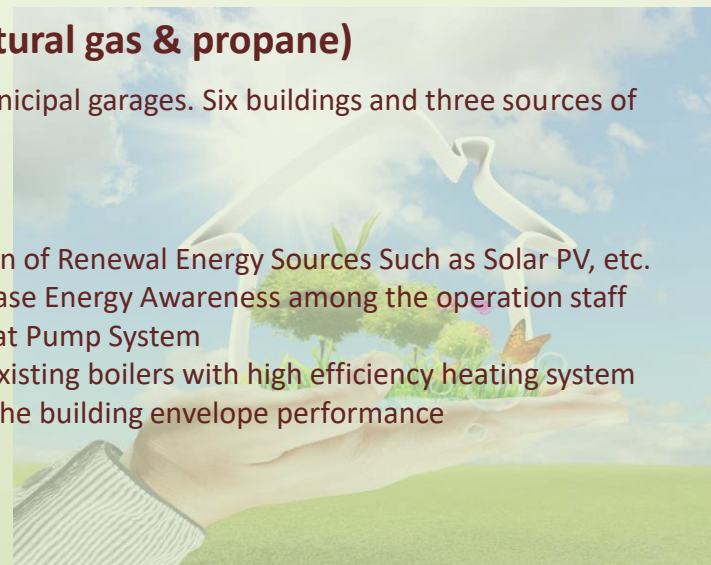
1. Buildings (Municipal Garages) - Energy Efficiency (Elec. Natural gas & propane)

City of St John plans to implement several energy conservation measures at its municipal garages. Six buildings and three sources of energy are targeted.

Among planned actions, there are:

- Upgrade the lighting System to LED
- Upgrade the Energy Management Control System (ECMS)
- Energy Optimization
- Installation of Renewal Energy Sources Such as Solar PV, etc. and Increase Energy Awareness among the operation staff
- Install Heat Pump System
- Replace existing boilers with high efficiency heating system
- Increase the building envelope performance

Overall estimated GHG reductions: 55%



Buildings (Municipal Garages)	Base year : 2015					
	Electricity		Natural Gas		Propane	
1 Energy Use (Consumption)	1 397 644	kWh	114 627	m3	17 437	Liters
2 Energy Costs	118 800	\$	97 972	\$	6 975	\$
3 GHG emissions	391	eCO ₂ (t)	219	eCO ₂ (t)	27	eCO ₂ (t)
4 Average efficiency gains	68	%	34	%	32	%
5 Energy Use reduction	950 500	kWh	38 991	m3	5 500	Liters
6 Total Reductions in GHG Emissions			349	eCO ₂ (t)		
7 Annual savings (2025)			129 380	\$		
8 Capital investment			699 500	\$		
9 Projects' benefits (2019-2025)			322 450	\$		
10 Net Capital investment (Investment - cost reductions)			377 050	\$		

Further technical and financial feasibility study may be required to validate numbers

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2. Buildings (Sport & Leisure Buildings) - Energy Efficiency (Electricity & Natural Gas)

City of St John plans to implement several energy conservation measures at its sports and leisure buildings. Multiple buildings, such as arenas, parks, ball fields, etc., and two sources of energy are targeted.

Among planned actions, are:

- Upgrade the lighting System to LED
- Upgrade the Energy Management Control System (ECMS)
- Energy Optimization
- Install Solar Hot Water System

- Installation of Renewal Energy Sources Such as Solar PV, etc. and Increase Energy Awareness among the operation staff
- Install High Efficiency Motors for the Compressors
- Replace existing boilers with high efficiency heating system
- Increase the building envelope performance
- Install Air to Air Heat pump system in some areas

Overall estimated GHG reductions: 49%

Buildings (Sport & Leisure Buildings)	Base year : 2015	
	Electricity	Natural Gas
1 Energy Use (Consumption)	2 751 899 kWh	45 428 m3
2 Energy Costs	233 911 \$	38 827 \$
3 GHG emissions	771 eCO ₂ (t)	87 eCO ₂ (t)
4 Average efficiency gains	49 %	48 %
5 Energy Use reduction	1 352 000 kWh	21 916 m3
6 Total Reductions in GHG Emissions	420,26	eCO₂ (t)
7 Annual savings (2025)	153 260 \$	
8 Capital investment	1 406 400 \$	
9 Projects' benefits (2019-2025)	340 430	\$
10 Projects' savings (2019-2025)	1 065 970	\$

Further technical and financial feasibility study may be required to validate numbers

V. ACTION PLAN

D. PROJECT PORTFOLIO

3. Buildings (Management & Commissions) - Energy Efficiency (Electricity & Natural Gas)

City of St John plans to implement several energy conservation measures at its management buildings. Multiple buildings, such as Tourists information Centre, City Hall, Transit Buildings, etc., and two sources of energy are targeted.

Among planned actions, are:

- Upgrade the lighting System to LED
- Install Solar Lights
- Upgrade the Energy Management Control System (ECMS)
- Installation of Renewal Energy Sources Such as Solar PV, etc. and Increase Energy Awareness among the operation staff
- Install Heat Pump System
- Increase the building envelope performance
- Energy Optimization

Overall estimated GHG reductions: 34%

Buildings (Management & Commissions)	Base year : 2015	
	Electricity	Natural Gas
1 Energy Use (Consumption)	15 623 969 kWh	745 610 m3
2 Energy Costs	1 328 037 \$	637 273 \$
3 GHG emissions	4 375 eCO ₂ (t)	1 426 eCO ₂ (t)
4 Average efficiency gains	37 %	26 %
5 Energy Use reduction	5 722 770 kWh	193 272 m3
6 Total Reductions in GHG Emissions	1 969,82	eCO₂ (t)
7 Annual savings (2025)	730 341	\$
8 Capital investment	3 088 400	\$
9 Projects' benefits (2019-2025)	3 147 899	\$
10 Net Capital investment (Investment - cost reductions)	-59 499	\$
Further technical and financial feasibility study may be required to validate numbers		

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4. Buildings (Fire Stations) - Energy Efficiency (Electricity & Natural Gas)

City of St John plans to implement several energy conservation measures at its fire station stations. All eight buildings and two sources of energy are targeted.

Among planned actions, are:

- Install LED lighting and Lighting Control
- Install Heat Pump System at Fire Station #1, #5 and #7
- Install Heat Pump DHW Tanks at Fire Station #1,#8
- Upgrade the ECMS & Energy Optimization
- Install High Efficiency Motors for the Compressors
- Replace Existing Boilers at fire #4,#8 with Biomass or Heat Pump Technology
- Install 40 KW Solar PV system
- Upgrade building envelope
- Install Heat recovery system

Overall estimated GHG reductions: 24%

Buildings (Fire stations)	Base year : 2015	
	Electricity	Natural Gas
1 Energy Use (Consumption)	965 707 kWh	65 453 m3
2 Energy Costs	82 085 \$	55 943 \$
3 GHG emissions	270 eCO ₂ (t)	125 eCO ₂ (t)
4 Average efficiency gains	22 %	29 %
5 Energy Use reduction	211 000 kWh	18 986 m3
6 Total Reductions in GHG Emissions	95,68 eCO₂ (t)	
7 Annual savings (2025)	36 745 \$	
8 Capital investment	273 000 \$	
9 Projects' benefits (2019-2025)	60 825 \$	
10 Net Capital investment (Investment - cost reductions)	212 175 \$	

Further technical and financial feasibility study may be required to validate numbers

V. ACTION PLAN

D. PROJECT PORTFOLIO

5. Transportation - Optimal Replacement Policy - rental vehicles

The City of Saint John, each year, rents some vehicles for seasonal needs.

This rental fleet is regularly renewed with recent models.

The City prioritizes the smallest models that meet his needs.

Optimal Replacement Policy - rental vehicles	Base year : 2015	
	Gasoline	Diesel
1 Number de vehicles	23	4
2 Fuel consumption	27 469 litres	6 912 litres
3 Fuel cost	29 198 \$	7 198 \$
4 GHG emissions	67,01 eCO ₂ (t)	18,55 eCO ₂ (t)
5 Number of vehicles to be replaced	23	4
6 Average efficiency gains due to renewal of fleet	5,0%	5,0%
7 Reduction of GHG emissions after conversion	3,4 eCO ₂ (t)	0,9 eCO ₂ (t)
8 Total Reductions in GHG Emissions	4,28 eCO ₂ (t)	

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D. PROJECT PORTFOLIO

6. Transportation - Optimal Replacement Policy

The City of Saint John has a fleet replacement policy that aims to optimize fleet size and usage. Vehicles are replaced based on a formula that takes into account:

- Their age
- Their general state
- Their usage (mileage)

In addition, once a vehicle has reached its useful life, the City assesses whether better management of the remaining fleet could prevent its replacement or it could be replaced by a smaller vehicle.

As a result, this project includes a cleaner vehicle purchase policy component.

Optimal Replacement Policy	Base year : 2015	
	Gasoline	Diesel
1 Number de vehicles	121	54
2 Fuel consumption	387 979 litres	372 840 litres
3 Fuel cost	390 823 \$	397 246 \$
4 GHG emissions	946,49 eCO ₂ (t)	1000,49 eCO ₂ (t)
5 Number of vehicles to be replaced	121	54
6 Average efficiency gains due to renewal of fleet	5,0%	5,0%
7 Reduction of GHG emissions after conversion	47,3 eCO ₂ (t)	50,0 eCO ₂ (t)
8 Total Reductions in GHG Emissions	97,35 eCO₂ (t)	

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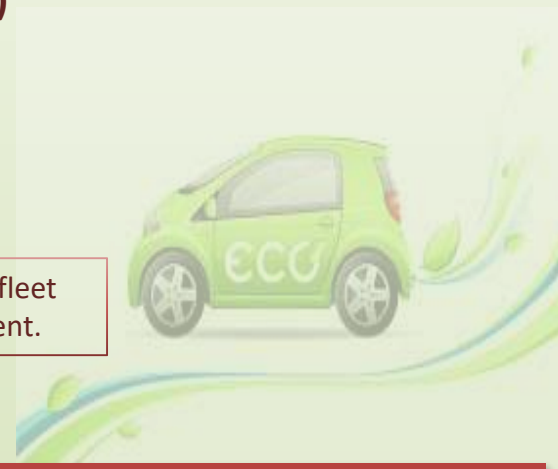
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7. Transportation - Optimal Replacement Policy (Saint John Transit)

The vehicle replacement policy of the municipality is as follows:

- Trucks and light vehicles: after 10 years
- Transit buses : after 17 years

Thus, at the end of this action plan (2015-2025), a large number of the vehicles of the bus fleet will be replaced. In addition, the City plans to optimize the fleet size to make it more efficient.



Base year : 2015	
Optimal replacement policy (SJT)	
1 Number de vehicles	47
2 Number of vehicles to be replaced	31
3 Fuel consumption	941 145 litres
4 Fuel cost	1 013 799 \$
5 GHG emissions	2525,50 eCO ₂ (t)
6 Average efficiency gains due to renewal of fleet	17,5%
7 Total Reductions in GHG Emissions	441,96 eCO₂ (t)

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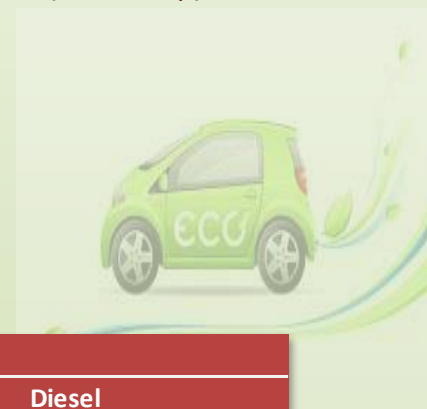
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8. Transportation - Idle-free Policy

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



Corporate Idle-free Policy	Base year : 2015			
	Gasoline		Diesel	
1 Number of units	173		95	
2 Fuel consumption *	491 215	litres	681 259	litres
3 Fuel cost *	506 876	\$	734 112	\$
4 GHG emissions *	1198,33	eCO ₂ (t)	1828,11	eCO ₂ (t)
5 Average fuel wasted idling	25 189	litres	19 760	litres
6 Average fuel economy	5,1%		2,9%	
7 GHG emissions reduction	61,45	eCO ₂ (t)	53,02	eCO ₂ (t)
8 Fuel savings (\$)	25 992	\$	37 644	\$
9 Total GHG Emissions reduction	114,47	eCO₂ (t)		
10 Total fuel savings (\$)	63 636	\$		
11 Saving per tonne of GHG reduced	556	/ t eCO ₂		
* Cumulative effects of replacement policy are roughly taken into account				

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9. Transportation – Telemetry & Idle-free Policy Telemetry

Telemetry is a particularly effective measure to improve energy efficiency and the GHG emissions related to vehicle use. This is a management measure that makes it possible to optimize the use of vehicles.

An information gathering module retrieves the electronic data from the vehicle in order to optimize the efficiency of its use by changes in behavior. The management of this information is carried out by means of computer software and enables the vehicle manager to obtain reports according to the parameters he has previously established.

Telemetry combined with idle-free policy allows fuel savings exceeding 10%

Telemetry & Idle-free Policy	Base year : 2015			
	Gasoline		Diesel	
1 Number of units	70		17	
2 Fuel consumption *	198 858	litres	53 963	litres
3 Fuel cost *	198 094	\$	56 728	\$
4 GHG emissions *	485,12	eCO ₂ (t)	144,81	eCO ₂ (t)
5 Average fuel economy	10,0%			
6 GHG emissions reduction	48,51	eCO ₂ (t)	14,48	eCO ₂ (t)
7 Fuel savings (\$)	19 809	\$	5 673	\$
8 Total GHG Emissions reduction	62,99	eCO ₂ (t)		
9 Total fuel savings (\$)	25 482	\$		
10 Saving per tonne of GHG reduced	404,53	/ t eCO ₂		
* Cumulative effects of replacement policy are roughly taken into account				

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10. Technical Sheet - Electric Vehicle

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.

Fully Electric Cars are powered 100% by electricity and have zero tailpipe emissions.

City of Saint John plans to replace two of its cars by full electric models.

Base year : 2015		
Nissan Leaf (2018) versus Chevrolet Aveo (2010)		
1 Total kilometers travelled	13 317 km	
2 Number of targeted units	2	
3 Energy saved per year (Gj and \$)	22,26	680 \$
4 GHG emissions reduction (tonnes and %)	1,48	68,1%

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11. Technical Sheet - Electric Vehicle (Saint John Transit)

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.

Fully Electric Cars are powered 100% by electricity and have zero tailpipe emissions.

Saint John Transit plans to buy two full electric buses for 2020 in replacement of two diesel buses.

Base year :		2015
Diesel vs electric bus		
1 Total kilometers travelled	64 805	km
2 Number of targeted units	2	
3 Diesel use (GJ and \$)	1 613	45 375 \$
4 GHG emissions from diesel use (tons)	113	eCO ₂ (t)
5 Electricity use of replacement buses (GJ and \$)	338	7 987 \$
6 GHG emissions from electricity use (tons)	26	eCO ₂ (t)
7 GHG emissions reduction (tonnes and %)	86,72	76,7%

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12. Technical Sheet - Hybrid Vehicle (Saint John Transit)

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.

Hybrid Electric Cars have small battery packs for short all-electric driving distances before a gasoline engine or generator turns on for longer trips.

City of Saint John already has two hybrid cars and plans to add four more hybrid models at its fleet.

Base year : 2015		
Daimler Smart versus Chevrolet Volt (2018)		
1 Total kilometers travelled	31 302	km
2 Number of targeted units	4	
3 Energy saved per year (Gj and \$)	29,32	893 \$
4 GHG emissions reduction (tonnes and %)	1,95	39,4%



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13. Water and Sewage - Energy Efficiency (Electricity)

City of St John plans to implement several conservation measures to its Water and sewage facilities some of which are :

- Upgrade the lighting System to LED
 - Upgrade the Energy Management Control System (ECMS)
 - Energy Optimization
 - Investigate new water treatment technology
 - Installation of Renewal Energy Sources Such as Solar PV, etc. and Increase Energy Awareness among the operation staff
 - Install variable-frequency drive (VFD) where applicable
 - Install High Efficiency Motors & Pumps where applicable
 - Install Energy Meters
 - Develop and Implement a demand response strategies through load shifting, shedding or on site generation
- Overall estimated GHG reductions: 27%

Base year : 2015	
Water & Sewage	
1 Electricity use	17 477 448 kWh
2 Electricity cost	1 485 583 \$
3 GHG emissions from electric consumption	4 894 eCO ₂ (t)
4 Efficiency gains	27,3 %
5 Electricity use reduction (kWh)	4 782 000 kWh
6 GHG emissions reduction (tons)	1 336,57 eCO ₂ (t)
7 Annual savings (2025)	478 200 \$
8 Capital investment	3 331 000 \$
9 Projects' benefits (2019-2025)	1 335 000 \$
10 Net Capital investment (Investment - cost reductions)	1 996 000 \$
Further technical and financial feasibility study may be required to validate numbers	

VI. APPENDIX

The methodology and references are available on request.

