



# Local Climate Action Plan 2020 – Living Document

Issued for:  
Partners for Climate Protection (PCP) Milestone 3

July 29<sup>th</sup>, 2020

## REVISION HISTORY

Revision	Date	By	Purpose
R0	2020Feb20	Emma Power	Initial draft for Town review
R1	2020Mar23	Emma Power	Updated as per review meeting with the Town on March 23rd
IFR	2020May7	Emma Power	Updated as per review meeting with the Town on April 27 <sup>th</sup> , revised electricity emissions factor, added reduction target, and priority project summary table  Issued for Review
2020July29	2020July29	Emma Power	Final version for Council adoption

**CITATION REFERENCE:**

Climate Action Plan: Issued in Accordance with Partners for Climate Protection (PCP) Milestone 3  
The Town of Paradise, 2020  
FCM Transition 2050 Partnership Grant Initiative

**Written by:**

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**Acknowledgements:**

This document is the culmination of support and effort on the part of several Departments within the Town of Paradise. With thanks to FCM for developing the Transition 2050 program and generously providing the funding which allowed the project to move forward; and also the Newfoundland and Labrador Environmental Industry Association (NEIA) for taking the role of lead proponent and facilitating all project administration.

This Climate Action Plan has been drafted based on industry best practice and the guidance documents provided by the Federation of Canadian Municipalities (FCM) including:

- Greenhouse Gas Protocol: Global Protocol for Community Scale Greenhouse Gas Emissions Inventories
- FCM: PCP Protocol: Canadian Supplement to the International Emissions Analysis Protocol
- FCM + ICLEI: Reaching Milestone 2 – How to set emissions reduction targets
- FCM + ICLEI: Partners for Climate Protection – Six Steps to a Sustainable Community: A Guide to Local Action Planning
- FCM + ICLEI: Reaching Milestone 3 – How to Create a Local Action Plan to Manage Energy and Emissions
- *A Guidance Document for Reporting Greenhouse Gas Emissions for Large Industry in Newfoundland and Labrador*. Government of Newfoundland and Labrador Office of Climate Change, 2017.
- *2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories*. Intergovernmental Panel on Climate Change. 2019. Volume 5, Chapter 6 – Wastewater Treatment and Discharge
- *National Inventory Report 1990-2018: Greenhouse Gas Sources and Sinks in Canada, Canada's Submission to the United Nations Framework Convention on Climate Change*. Environment and Climate Change Canada. 2020.

# EXECUTIVE SUMMARY

The Town of Paradise’s Vision is to create a Paradise for everyone; a prosperous, independent, inclusive, and self-sufficient community, that is sustainable for generations to come. The Town’s commitment to climate action is confirmed in their decision to join a cohort of six municipalities as a partner in the Federation of Canadian Municipalities (FCM) Municipalities for Climate Innovation Program (MCIP) Transition 2050 (T2050) Partnership Grant Initiative<sup>1</sup>. Through this program, Town staff have received training regarding climate science, greenhouse gas emissions mitigation, and climate change adaptation, and have participated in a collaborative workshop with experienced facilitators and like-minded community leaders.

One of the targeted outcomes of the T2050 program is to progress through the FCM Partners for Climate Protection (PCP) Program Milestones 1, 2, 3, and (time permitting) Milestone 4.

<b>Milestone 1</b>	Corporate GHG Emissions Inventory  (Town owned and operated assets)	See Appendix A	✓ INVENTORY COMPLETED  FCM Achievement of Milestone 1
<b>Milestone 2</b>	Set an Emissions Reduction Target  (completed through an iterative risk/opportunity analysis)	See Appendix B	✓ COMPLETED  FCM Achievement of Milestone 2 – pending approval of this document
<b>Milestone 3</b>	Develop a Local Climate Action Plan  ( <i>this document</i> )	See Section 1 for a detailed list of targeted climate actions	✓ COMPLETED  FCM Achievement of Milestone 3 – pending approval of this document
<b>Milestone 4</b>	Implement (one or more projects) within the Local Climate Action Plan	See Section 1	✓ IN PROGRESS Upon execution of the T2050 keystone project

## GHG EMISSIONS INVENTORY:

The Town of Paradise corporate emissions inventory is calculated as **6,791 tonnes of CO<sub>2</sub>e** for the year 2019, GWP AR5, including all community solid waste production. Excluding community solid waste, the Town of Paradise emissions inventory is calculated as 1,709 tonnes of CO<sub>2</sub>e per year. See Appendix A for additional details on the GHG emissions for the Town.

The following categories were included as per FCM guidance documents and ISO 14064-1 standard:

BUILDINGS AND FACILITIES	TRAFFIC LIGHTS AND STREET LIGHTS	WATER AND WASTEWATER	FLEET, VEHICLES AND EQUIPMENT	SOLID WASTE
120 tCO <sub>2</sub> e	29 tCO <sub>2</sub> e	659 tCO <sub>2</sub> e	790 tCO <sub>2</sub> e	5,192 tCO <sub>2</sub> e, total Community  104 tCO <sub>2</sub> e, estimated 2% Corporate only
GHGP – Scope 2	GHGP – Scope 2	GHGP – Scope 2 & 3	GHGP – Scope 1	GHGP – Scope 3

<sup>1</sup> Please see Project Charter – FCM Climate Change Partnership Staff Grant Program, Rev 1 dated 2019 Apr 01 for full details on the overall program.

ISO – Energy Indirect	ISO – Energy Indirect	ISO – Energy Indirect & Other Indirect	ISO - Direct	ISO – Other Indirect
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**GHG EMISSIONS REDUCTIONS TARGETS:**

To arrive at a reductions target, the project leads undertook an iterative Risk and Opportunities analysis which considered equally a) emissions reductions potential, b) project costs and operational savings, c) existing Town initiatives, and d) available funding programs. The realities of climate science and international, national, and provincial commitments were also considered. See Appendix B for further details on the iterative process and evaluation criteria, and Appendix C for an overview of the climate science that forms the basis of this plan.

The following GHG emissions reduction targets were determined for the Town of Paradise:

- ➔ 5-15% below 2018 levels by 2023
- ➔ 40-55% below 2018 levels by 2030
- ➔ Net-zero by 2050

The actions that will contribute to the achievement of these targets are outlined by emissions category in Section B.4. While a bottom-up approach was taken to ensure the targets are achievable, an expanded target range was specified to ensure sufficient ambition – reflecting the urgency of the climate crisis and striving toward the reductions scientifically required to limit global warming to 1.5°C.

The actions identified for the 2023 and 2030 time periods are expected to result in annual cost savings<sup>1</sup> for the Town of **\$340,000 and \$961,000**, respectively, compared to the 2018 baseline year.

**CLIMATE ACTION PLAN SUMMARY:**

Projects were organized into priority tiers – Tier 1 being highest priority for the Town, Tiers 2 and 3 being lower priority. Ease of execution, available funding, GHG reduction and cost savings potential, timeframe, and alignment with Town goals were some of the factors taken into account when assigning priority tiers. The projects assigned to each tier are shown in the table below. Details related to each project can be found in the respective category-specific action table in Section 1 of this report.

Project	Category
<b>Priority Tier 1</b>	
Target Net-Zero Designs for all new/retrofitted Municipal Buildings	Buildings & Facilities
Renewable Energy Demonstration Project at Paradise Park	Buildings & Facilities
Youth Center Energy Efficiency	Buildings & Facilities
ECO-Driver Training	Fleet
Vehicle Procurement Policy Update	Fleet

<sup>1</sup> Considering current electricity and fuel prices. Due to the uncertainty associated with projecting these costs, the annual savings estimated are a conservative estimate. The annual savings are cumulative – the 2030 savings amount includes the 2023 savings as the annual savings are continuous

Internal Staff Commuting Initiatives	Fleet
Review of Bus System	Fleet
Solar Lights at Paradise Park	Streetlights & Traffic Signals
Leak Detection Program	Water and Wastewater
Water & Sewer Commercial/Industrial Policy	Water and Wastewater
Achieve Secondary WW Treatment	Water and Wastewater
Small Scale Composting	Solid Waste
Waste Reduction Campaign	Solid Waste
TerraCycle Program(s)	Solid Waste
Annual Emissions Tracking	Organizational Change
Public Engagement on Climate Change and GHGs	Organizational Change
Food Security Committee/Working Group	Organizational Change
<b>Priority Tier 2</b>	
Additional EV Charging Stations	Fleet
Commercial Water Metering Program	Water and Wastewater
Community Composting Program	Solid Waste
Community Free-Store	Solid Waste
FCM Climate Change Staff Grant	Organizational Change
Incorporate Eco-Assets	Organizational Change
<b>Priority Tier 3</b>	
Residential Energy Efficiency Program	Buildings & Facilities
Residential Water Metering Program	Water and Wastewater
Sludge Composting	Solid Waste
Carbon Offset Purchasing	Organizational Change

TOWN COMMITMENT:

By adopting this plan, the Town of Paradise commits to:

- Annual completion of a corporate GHG emissions inventory
  - Shifting of the baseline year as appropriate (ie. change of emissions factors)
  - Comparison of latest GHG inventory to baseline year to monitor reduction progress
- Annual review of the Climate Action Plan including updating of project priority, project status, and addition of new opportunities
- Annual Review of the Emissions Reductions Targets

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# 1. CLIMATE ACTION PLAN

Through the FCM T2050 project, the Town of Paradise has completed the targeted Milestone 1, 2 and 3 deliverables and intends to complete Milestone 4 upon execution of their T2050 keystone project. This section includes a description of the Climate Action Plan’s purpose and a detailed action plan matrix. This matrix is meant to be a living document to guide the Town in actions for addressing climate change within the Town’s boundaries.

The Milestones of the PCP Program are as follows:

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li><u>Milestone 1</u> – GHG Emissions Inventory           <ul style="list-style-type: none"> <li>○ (see Appendix A)</li> </ul> </li> <li><u>Milestone 2</u> – Set Emissions Reductions Target           <ul style="list-style-type: none"> <li>○ (see Appendix B, Section B.4)</li> </ul> </li> <li>○ <u>Milestone 3</u> – Create a Local Climate Action Plan           <ul style="list-style-type: none"> <li>○ (this document)</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li><u>Milestone 4</u> – Implement the Local Action Plan           <ul style="list-style-type: none"> <li>○ One or more projects identified in this document</li> </ul> </li> <li><u>Milestone 5</u> – Monitor Progress and Report Results           <ul style="list-style-type: none"> <li>○ I.e. record the changes in the organization and track GHG emissions and project progress annually</li> </ul> </li> </ul> |
|---|---|

The individual emissions reducing projects identified herein were selected by means of an iterative risk and opportunity analysis conducted by the T2050 consultant and the Town’s project leads. The Categories of Action were defined according to the FCM PCP protocol for municipalities<sup>1</sup>: Buildings, Fleet, Street and Traffic Lighting, Water and Wastewater, and Municipal Solid Waste. An action category was also specified for Organizational Change – this accounts for general policy or organizational actions.

Projects were organized into priority tiers – Tier 1 being highest priority for the Town, Tiers 2 and 3 being lower priority. Ease of execution, available funding, GHG reduction and cost savings potential, timeframe, and alignment with Town goals were some of the factors taken into account when assigning priority tiers. The projects assigned to each tier are shown in the table below. Details related to each project can be found in the respective category-specific action table in this report section.

Project	Category
<b>Priority Tier 1</b>	
Target Net-Zero Designs for all new/retrofitted Municipal Buildings	Buildings & Facilities
Renewable Energy Demonstration Project at Paradise Park	Buildings & Facilities
Youth Center Energy Efficiency	Buildings & Facilities
ECO-Driver Training	Fleet
Vehicle Procurement Policy Update	Fleet
Internal Staff Commuting Initiatives	Fleet
Review of Bus System	Fleet
Solar Lights at Paradise Park	Streetlights & Traffic Signals
Leak Detection Program	Water and Wastewater

<sup>1</sup> [https://canadainfrastructure.ca/Documents/reports/PCP/PCP\\_Protocol\\_Canadian\\_Supplement\\_EN.pdf](https://canadainfrastructure.ca/Documents/reports/PCP/PCP_Protocol_Canadian_Supplement_EN.pdf)

Water & Sewer Commercial/Industrial Policy	Water and Wastewater
Achieve Secondary WW Treatment	Water and Wastewater
Small Scale Composting	Solid Waste
Waste Reduction Campaign	Solid Waste
TerraCycle Program(s)	Solid Waste
Annual Emissions Tracking	Organizational Change
Public Engagement on Climate Change and GHGs	Organizational Change
Food Security Committee/Working Group	Organizational Change
<b>Priority Tier 2</b>	
Additional EV Charging Stations	Fleet
Commercial Water Metering Program	Water and Wastewater
Community Composting Program	Solid Waste
Community Free-Store	Solid Waste
FCM Climate Change Staff Grant	Organizational Change
Incorporate Eco-Assets	Organizational Change
<b>Priority Tier 3</b>	
Residential Energy Efficiency Program	Buildings & Facilities
Residential Water Metering Program	Water and Wastewater
In-House Sludge Composting	Solid Waste
Carbon Offset Purchasing	Organizational Change

Based on these projects, the realities of climate science, and international, national, and provincial commitments, the following emissions reduction targets were identified:

- ➔ 5-15% below 2018 levels by 2023
- ➔ 40-55% below 2018 levels by 2030
- ➔ Net-zero by 2050

The actions that will contribute to the achievement of these targets are outlined by emissions category in Section B.4. While a bottom-up approach was taken to ensure the targets are achievable, an expanded target range was specified to ensure sufficient ambition – reflecting the urgency of the climate crisis and striving toward the reductions scientifically required to limit global warming to 1.5°C.

The actions identified for the 2023 and 2030 time periods are expected to result in annual cost savings<sup>1</sup> for the Town of **\$340,000 and \$961,000**, respectively, compared to the 2018 baseline year.

Please see Appendix A for the full emissions inventory, Appendix B for further details on the risk opportunity analysis process, and Appendix C for an overview of the climate science that forms the basis of this plan.

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<sup>1</sup> Considering current electricity and fuel prices. Due to the uncertainty associated with projecting these costs, the annual savings estimated are a conservative estimate. The annual savings are cumulative – the 2030 savings amount includes the 2023 savings as the annual savings are continuous



By adopting this plan, the Town of Paradise commits to:

- Annual completion of a corporate GHG emissions inventory
  - Shifting of the baseline year and previous years as appropriate (ie. change of emissions factors)
  - Comparison of latest GHG inventory to baseline year to monitor reduction progress
- Annual review of the Climate Action Plan including updating of project priority, project status, and addition of new opportunities
- Annual Review of the Emissions Reductions Targets

To ensure consistency and transparency in Town process, all PCP Milestones will be logged and tracked using the PCP Tool, which can be found here: <https://pcptool.ca/>.

<b>BUILDINGS &amp; FACILITIES</b>	<b>Details</b>	<b>Budget</b>	<b>Funding Programs Available?</b>	<b>Responsible Party</b>	<b>Timeframe</b>	<b>Status</b>	<b>Priority Tier</b>
<b>Existing Initiatives</b>							
<b>Investment in LEED Silver Building</b>	Paradise Double Ice Complex has achieved an energy use intensity (EUI) well below the Canadian and Atlantic averages for multi-rink arenas.	<b>\$22 M</b>	<b>N/A</b>		<b>2014</b>	•	
<b>New Initiatives</b>							
<b>Target Net-Zero Designs for all new/retrofitted Municipal Buildings</b>	<p>Create a Policy whereby all new municipal building designs and/or major retrofits and renovations address energy efficiency and target net-zero, net zero ready, or as high an energy efficiency measure as is feasible and practical.</p> <p>It should be noted that the Paradise Town Hall currently has an energy use intensity (EUI) above the national and Atlantic averages.</p>	<b>N/A</b>	<b>N/A</b>	<b>Engineering Department &amp; Admin</b>	<b>2020</b>	<ul style="list-style-type: none"> <li>This goal is already incorporated into the Strategic Plan: “Strive for carbon neutral footprint in municipal operations” and “strive for optimum energy efficiency in all municipal facilities”</li> </ul>	<b>1</b>
<b>Renewable Energy Demonstration Project</b>	<p>Install a renewable energy system on Town land to raise awareness and demonstrate cost savings. This could be a small scale wind turbine and/or some solar panels. Hybrid Power Panels could provide electricity and pre-heat water for the splash pad at Paradise Park.</p> <p>Note that the levelized cost of energy (LCOE) for solar power is now around \$0.12/kWh. Small scale wind LCOE ranges from \$0.03-0.17/kWh.</p>	<b>Pilot Project – up to \$500K</b> <b>80% coverage possible</b>	<b>GMF – Renewable energy production on a brownfield</b>	<b>Engineering Department</b>	<b>2020-2025</b>	<ul style="list-style-type: none"> <li>Paradise Park, the arena and Town Hall sites are all located on a brownfield, therefore, this particular stream of the GMF can be explored</li> <li>The Town recently received a proposal for a private company to install wind turbines on municipal land</li> </ul>	<b>1</b>
<b>Youth Center Energy Efficiency</b>	Improve energy efficiency at the Youth Center (insulation, air sealing, etc.)	<b>TBD</b>	<b>GMF – Retrofit of Municipal Facilities</b>	<b>Engineering Department</b>	<b>2020</b>	<ul style="list-style-type: none"> <li>Already on Stephen Stockley’s radar</li> </ul>	<b>1</b>

			TakeCharge NL – Town Challenge				
<b>Residential Energy Efficiency Program</b>	<ul style="list-style-type: none"> <li>- Air sealing/insulation, fuel switching, renewables, heat pumps</li> <li>- Capacity building for local contractors</li> <li>- Low income and seniors focus?</li> </ul>	<b>Pilot Project - \$500K</b>  <b>80% coverage possible</b>  <b>20% recover through resident component</b>	<b>GMF – Community Efficiency Financing</b>	<b>Engineering Department</b>	<b>2030</b>	<ul style="list-style-type: none"> <li>• Fits with strategic plan – bring up to other departments for future consideration</li> <li>• Potential for group GMF application end of 2020 – 2021</li> </ul>	<b>3</b>

<b>FLEET</b>	<b>Details</b>	<b>Budget</b>	<b>Funding Programs Available?</b>	<b>Responsible Party</b>	<b>Timeframe</b>	<b>Status</b>	<b>Priority Tier</b>
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<b>Existing Initiatives</b>							
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<b>Oil Recycling Filters</b>	Installation of oil recycling filters on vehicles and equipment					<ul style="list-style-type: none"> <li>• Considered for new vehicles since 2018-19</li> </ul>	
<b>EV Charging Stations</b>	4 charging stations located at the Double Ice Complex					<ul style="list-style-type: none"> <li>•</li> </ul>	

<b>New Initiatives</b>							
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<b>ECO-Driver Training</b>	<p>Utilize resources from Natural Resources Canada to conduct fuel efficient driver training with Town staff (SmartDriver in the City). A Powerpoint presentation can be provided for internal use.</p> <p>The powerpoint is self-explanatory and does not require an expert trainer – simply facilitate a meeting whereby the course content is reviewed with Town staff so that they are made aware of efficient driving techniques. Certificates can be given to participating employees upon completion.</p>	<b>N/A</b>	<b>NRCan</b>	<b>Public Works</b>	<b>2020</b>	<ul style="list-style-type: none"> <li>• Online training found as well</li> <li>• Emma sent Tracy and Melissa the powerpoint</li> </ul>	<b>1</b>
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<b>Anti-Idling Technology</b>	Application to the Freight Transportation Fuel Efficiency Program for Anti-Idling Technologies.  <a href="https://www.exec.gov.nl.ca/exec/occ/pdf/FTFEP_List_of_Eligible_Fuel_Saving_Devices.pdf">https://www.exec.gov.nl.ca/exec/occ/pdf/FTFEP_List_of_Eligible_Fuel_Saving_Devices.pdf</a>	<b>TBD</b>	<b>LCELF</b>	<b>Public Works</b>		<ul style="list-style-type: none"> <li>Chris/mechanic to review list of eligible devices (link to the left)</li> </ul>	<b>2</b>
<b>Additional EV Charging Stations</b>	Install Level 2 charging stations at the Town Hall or in public spaces	<b>Approx. \$3000 - 15,000 each depending on electrical requirements with potential 50% coverage through ZEVIP</b>	<b>GMF – Reduce fossil fuel use in fleets  ZEVIP</b>	<b>Engineering Department</b>	<b>2025-2030</b>		<b>2</b>
<b>Vehicle Procurement Policy Update</b>	Incorporate improved fuel efficiency standards or hybrid/electric requirement in procurement policy  Note the following approximate/typical fuel economy comparison: <ul style="list-style-type: none"> <li><u>Electric car – 1.4 to 2.7 L/100km (equivalent cost)</u></li> <li>Compact Car – 5 to 10 L/100 km</li> <li>Mini Van or SUV – 7 to 15 L/100 km</li> <li>Truck – 10 to 25 L/100 km</li> </ul>	<b>N/A</b>	<b>N/A</b>	<b>Engineering Department &amp; Procurement</b>	<b>2020</b>		<b>1</b>
<b>Internal Staff Commuting Initiatives</b>	Internal incentive program to encourage carpooling, biking, and walking to work. May include events such as bike/walk to work days, departmental competitions, or an internal carpool matching system. Estimate staff commuting and include in GHG inventory for future monitoring.	<b>N/A</b>	<b>N/A</b>	<b>Engineering Department &amp; Communications</b>	<b>2020</b>		<b>1</b>
<b>Review of Bus System</b>	Investigate new options to encourage bus ridership, reduce commuter traffic and GHGs. Ideas include: <ul style="list-style-type: none"> <li>Express bus to Downtown St. John’s for major events (hockey games/concerts, etc.)</li> <li>Park and Ride locations</li> <li>Daily/monthly subsidized passes for residents</li> <li>Improve bus experience – bus stop wifi, reduced wait times, explore possibility of On Demand service via incorporation of technology (ie. pilot project with Metrobus)</li> </ul>	<b>Total TBD  Pilot Project - \$500K  80% coverage possible</b>	<b>GMF – Transportation networks and commuting options</b>	<b>Planning Development</b>	<b>2020</b>	<ul style="list-style-type: none"> <li>Emma sent case studies to Tracy and Melissa</li> <li>Interested in focus on accessible transit</li> <li>Go-Bus initiative?</li> </ul>	<b>1</b>

- Promote use of public transit system by tracking GHGs and costs saved by commuters via graphs/barometers on the Town website and social media
- Explore micro-transit systems and technologies (refer to case studies from Belleville, ON and Okotoks, AB)
- GreenPower Motors has accessible, small buses

STREET, TRAFFIC & AREA LIGHTING	Details	Budget	Funding Programs Available?	Responsible Party	Timeframe	Status	Priority Tier
<b>Existing Initiatives</b>							
NL Power LED Streetlight Pilot Project	HPS streetlight bulbs are replaced with LED bulbs as they reach the end of their lives. Paradise currently has 44 LED streetlights.					•	
<b>New Initiatives</b>							
Solar Lights at Paradise Park	Install solar powered light standards at Paradise Park – The Park and the adjacent community centre are the main emergency warming stations and a central feature in the Town’s emergency plan. Solar powered street lights will provide lighted area in the case of an emergency outage.	\$36K	T2050 Funding	Engineering + Recreation	2020-2021	<ul style="list-style-type: none"> <li>Fundamental to manage procurement/installation</li> <li>This area lost power during the big storm January 2020</li> </ul>	1

WATER + WASTEWATER	Details	Budget	Funding Programs Available?	Responsible Party	Timeframe	Status	Priority Tier
<b>Existing Initiatives</b>							
Permanent Water Conservation Order		N/A	N/A			•	
New Wastewater Treatment Plant	A wastewater treatment plant is being commissioned on St. Thomas Line. This is a primary treatment facility (screening of solids and UV treatment) that will serve ~56% of the population, transitioning them from an untreated ocean outfall situation which has damaging environmental effects.				2020	• Began operation July 2020	
Sludge Composting	Divert the sludge from the St. Thomas Line wastewater treatment plant from landfill by composting via Pardy's. Composting the sludge reduces GHG emissions by <b>841 tCO2e per year</b> compared to landfilling.			Engineering		•	1
<b>New Initiatives</b>							
Commercial Water Metering Program	Monitoring of water meters on commercial facilities.	TBD	GMF - Water conservation	Engineering & Planning	2025	• Meters are already in place but are not monitored	2
Residential Water Metering Program	Installation of residential water meters. Would require a large communications/public water conservation education component.	TBD	GMF - Water conservation	Engineering & Planning	2030	•	3
Leak Detection Program	Investigate and repair leaking water and sewer piping infrastructure. Targeting 5% reduced volumes by 2023.	N/A	GMF – Water conservation	Engineering	2020	• Looking at implementing this this year. Associated with asset management review	1

<b>Water &amp; Sewer Commercial/Industrial Policy</b>	Introduce a policy to reduce water usage and increase waste diversion for high C/I producers. Goal being to educate producers about their impacts on the system and encourage innovation and more sustainable practices. Targeting 5% reduced volumes by 2023.	N/A	N/A	Engineering	2020	<ul style="list-style-type: none"> <li>This is an important issue that should be addressed soon</li> </ul>	1
<b>Engineered Wetland Wastewater Treatment</b>	Investigate possibility of incorporating an engineered wetland into wastewater and stormwater management plan (rather than upgrading sewer pipes) in order to increase system resiliency and generate carbon offsets. Determine whether the number of lift stations can be reduced to save money and energy.	TBD	MCW GMF – Wastewater systems	Engineering	2030+	<ul style="list-style-type: none"> <li></li> </ul>	3
<b>Achieve Secondary WW Treatment</b>	Required by Federal regulations. If sludge continues to be composted rather than landfilled, upgrading to secondary treatment will result in decreased emissions of <b>66 tCO2e per year</b> . Landfilling the sludge increases emissions significantly – an increase of 1103 tCO2e per year.	TBD	GMF – Wastewater systems	Engineering	2025	<ul style="list-style-type: none"> <li></li> </ul>	1

<b>SOLID WASTE</b>							
	Details	Budget	Funding	Responsible Party	Timeframe	Status	Priority Tier
<b>Existing Initiatives</b>							
<b>Curbside Recycling and Drop-Off Locations</b>	Paradise Green Depot available for public drop-off of recyclables (beverage containers, electronics); Drop-off location at the Town Hall for cell phones and accessories. Blue bag curbside recycling program in place.	N/A	N/A			<ul style="list-style-type: none"> <li>In 2018, only about 6% of MSW was diverted through curbside recycling. Recycling collected through the Green Depot is not monitored</li> </ul>	
<b>Resident Compost Bin Distribution Program</b>	Participation in the Backyard Compost Bin Distribution Program offered by MMSB (Multi-Materials Stewardship Board) whereby bins are offered to residents at a discounted price	N/A	N/A			<ul style="list-style-type: none"> <li>Implemented in 2013-14, and 2017-19</li> <li>40 composters sold in the past 3 years</li> </ul>	

New Initiatives							
<b>Community Composting Program</b>	<p>Community-wide, mandatory composting program (additional stream of curbside collection)</p> <p>Organic waste accounts for 30% or more of household waste – diversion of this waste from landfill can result in huge emissions reductions and cost savings in the solid waste sector: <b>1471 tCO<sub>2</sub>e and \$131,000 in tipping fee savings annually.</b></p>	TBD	<p>MMSB – Community Waste Diversion Fund</p> <p>GMF – Waste Diversion</p>	Public Works & Engineering	2025-2030	<ul style="list-style-type: none"> <li>Possibility of a regional program, but not much movement lately</li> </ul>	2
<b>Small Scale Composting</b>	<p>Investigate options for a community composting pilot program – small-scale collection or a drop-off site.</p> <p>For example, a Novid 542 composting machine, costing ~\$94,000) could service around 1600 people and <b>reduce annual GHG emissions by 119 tCO<sub>2</sub>e and save \$10,500 per year in tipping fees.</b> There is also the potential to sell finished compost for revenue (up to \$62,000 per year).</p> <p>The Novid machines are available in many sizes, are modular (can be expanded later), and are manufactured in Manitoba.</p>	<p>Est. \$150,000 for machine + programming</p> <p>with potential for 80% funding if approached as an FCM pilot project</p>	<p>MMSB – Community Waste Diversion Fund</p> <p>GMF – Waste Diversion</p>	Recreation & Public Works	2020-2025	<ul style="list-style-type: none"> <li></li> </ul>	1
<b>In-House Sludge Composting</b>	<p>Consider composting wastewater sludge in-house (using industrial machine or other methods, in order to save Pardy's fees)</p>		GMF – Waste Stream Management	Engineering	2030+	<ul style="list-style-type: none"> <li>Review once looking into secondary treatment</li> </ul>	3
<b>Waste Reduction Campaign</b>	<p>Create a public education campaign to increase recycling and composting rates in the community. Ideas include:</p> <ul style="list-style-type: none"> <li>Competitions between zones (involve the schools) – provide a prize for the greatest waste reduction/diversion such as a new playground for that zone (possibly a playground made if recycled materials)</li> <li>Display barometers/graphs of waste reduced + tipping fee savings + GHG reductions for each zone on the website/social media <ul style="list-style-type: none"> <li>Savings from reduced tipping fees could go toward the prize (playground)</li> </ul> </li> <li>Establish a relationship with the Green Depot to better track how much recycling is diverted</li> </ul>	TBD	<p>MMSB–Community Waste Diversion Fund</p> <p>GMF – Waste Diversion</p>	Engineering + Communication	2020-21	<ul style="list-style-type: none"> <li>Key to achieving recycling rate increases associated with the emissions reduction targets</li> </ul>	1



	<ul style="list-style-type: none"> <li>Include educational materials and promotion related to above composting program</li> <li>Better promote the backyard compost bin program through MMSB</li> </ul>						
<b>TerraCycle Program(s)</b>	<p>Implement one or more of the recycling programs offered by TerraCycle. Many are free, either offering pre-paid shipping labels or a drop-off location. Programs may be internal (for Town staff only), or community-wide (the Town could offer a public drop-off location for specific items)</p> <p><a href="https://www.terracycle.com/en-CA/brigades">https://www.terracycle.com/en-CA/brigades</a></p> <p>For example, used or broken writing utensils can be collected in a box at the Town Hall, and dropped off to any Staples location</p>	<b>N/A</b>	<b>N/A</b>	<b>Public Works Coordinator &amp; Communications</b>	<b>2020-2021</b>	<ul style="list-style-type: none"> <li>Once Town Hall reopens, get some bins for internal and community use (residents and businesses)</li> </ul>	<b>1</b>
<b>Community Free-Store</b>	<p>Akin to a Farmer’s Market (or held at an existing Farmer’s Market) create an area where people can donate and pick up used, good quality items.</p>		<b>?</b> <b>MMSB or FCM</b>	<b>Planning</b>	<b>2025</b>	<ul style="list-style-type: none"> <li>Farmers market under construction – consider implementation here</li> </ul>	<b>2</b>

<b>ORGANIZATIONAL CHANGE</b>	<b>Details</b>	<b>Budget</b>	<b>Funding</b>	<b>Responsible Party</b>	<b>Timeframe</b>	<b>Status</b>	<b>Priority Tier</b>
<b>New Initiatives</b>							
<b>Annual Emissions Tracking</b>	<p>Designate a staff person or hire external consultant to be responsible for updating the emissions inventory and associated costs savings on an annual basis to track progress.</p>	<b>N/A</b>	<b>N/A</b>	<b>Engineering</b>	<b>Ongoing</b>	<ul style="list-style-type: none"> <li>Great task for students</li> </ul>	<b>1</b>

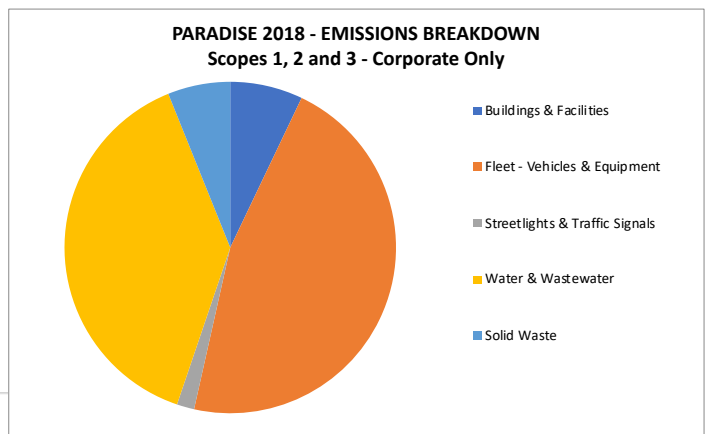
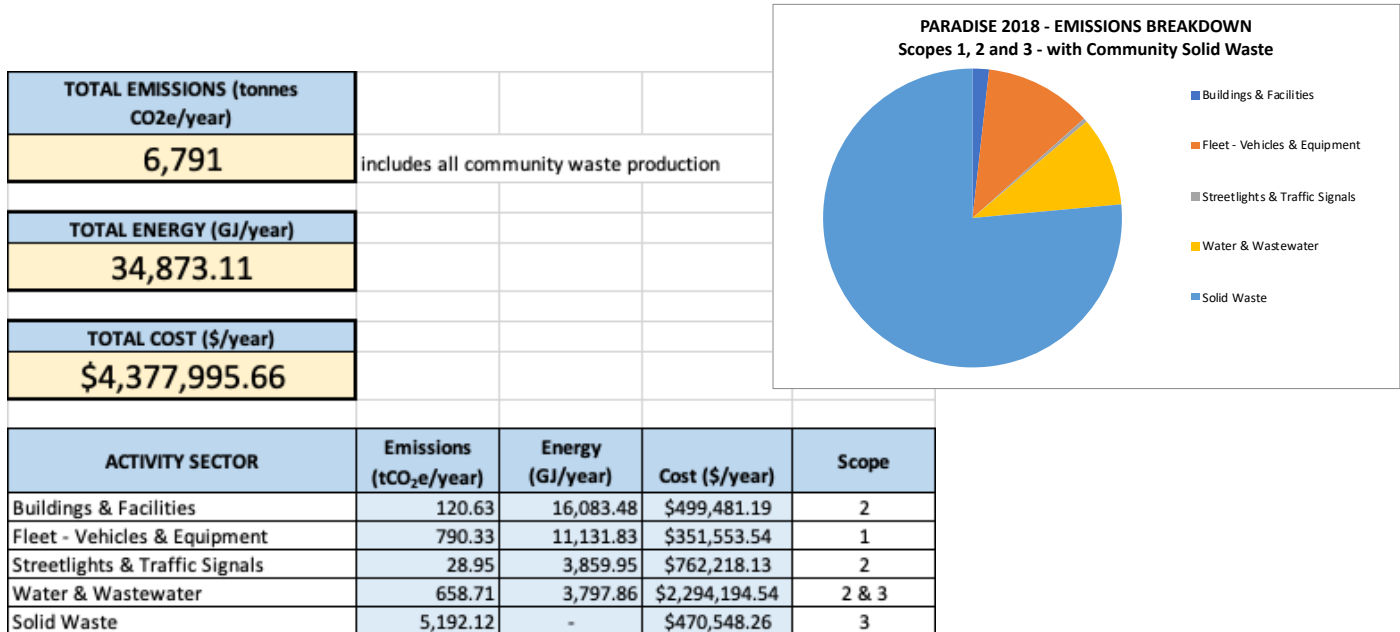
FCM Climate Change Staff Grant	Watch to see if this program reopens to get a dedicated staff person to execute initiatives		FCM	Engineering	2020-2021	•	2
Carbon Offset Purchasing - ie. Carbon Neutral Town Hall	<p>Consider purchasing carbon offsets as part of the Town's overall emissions reduction plan. Purchasing 1 carbon offset allows the Town GHG inventory to be reduced by 1 ton of CO2 equivalent.</p> <p><a href="https://offset.climateneutralnow.org/howtooffset">https://offset.climateneutralnow.org/howtooffset</a></p> <p>Carbon offsets are generated right here in Newfoundland and Labrador, and the sales of these offsets support local businesses and municipalities to encourage investment in low-carbon infrastructure.</p> <p><a href="http://sharpmgmt.ca/">http://sharpmgmt.ca/</a></p> <p>For example, the Town of Paradise could offset the emissions from the Town Hall for around \$900, if purchasing local offsets for \$25/tCO2e</p>	TBD	N/A	Engineering	2030	<ul style="list-style-type: none"> <li>Aligns with strategic plan goal to become carbon neutral (adopted Dec 2019)</li> <li>Focus on actual GHG reductions first, then offset remainder</li> </ul>	3
Public Engagement on Climate Change and GHGs	Share GHG inventory results with residents using infographics, highlight Town participation in the T2050 project, educate re: climate change causes and impacts, ways that residents and businesses can reduce their footprint (local food, recycling and composting, water conservation, electrification, etc.)	TBD	N/A	Engineering & Communications	2021	• Emma to make a T2050 summary page at the end of the project	1
Incorporate Eco-Assets (natural infrastructure, watershed, etc.) into the Town Asset Management Strategy	Include natural assets in existing asset management program in next scope of work	TBD	FCM		2025	<ul style="list-style-type: none"> <li>Consider once asset manager in place and asset management review is underway</li> <li>Coordinate with Dr. Joe Daraio re. watershed modeling – let Emma/Ashley know if you want to connect</li> </ul>	2

<b>Municipal Plan Review</b>	<p>Review/update municipal plan and development regulations to ensure no preclusions to, or to encourage or require:</p> <ul style="list-style-type: none"> <li>▪ Tree planting</li> <li>▪ Renewable energy generation</li> <li>▪ Green roofs</li> <li>▪ Tiny homes</li> <li>▪ Efficient or net-zero construction</li> </ul> <p>Review all aspects of plan with specific attention paid to sustainability, energy, renewables, and integrated capital asset management</p>	<b>N/A</b>	<b>N/A</b>	<b>Planning</b>		<ul style="list-style-type: none"> <li>• Updated recently (2017), reviewed continuously</li> <li>• Keep these items in mind</li> <li>• Planning will review this document (Climate Action Plan) to ensure alignment</li> </ul>	
<b>Food Security Committee/Working Group</b>	<p>Facilitate the creation of a community committee or working group to discuss food security actions in Paradise. Group can consider project and policy recommendations such as:</p> <ul style="list-style-type: none"> <li>▪ Require preference of locally sourced food in procurement processes</li> <li>▪ Review agricultural zoning/development regulations to encourage farming and urban gardens</li> <li>▪ Establish a farmer’s market on Saturday or Sunday at Paradise Park (Utilize Food First NL Best Practices Toolkit)</li> <li>▪ Encourage food processing industries to come to the area</li> <li>▪ Incentivize businesses to use and provide local food</li> <li>▪ Establish a community garden (Utilize Food First NL Best Practices Toolkit) <ul style="list-style-type: none"> <li>○ possibly incorporate with community composting program</li> </ul> </li> </ul>	<b>TBD</b>	<p><b>Local Food Infrastructure Fund (Agriculture and Agri-Food Canada) – up to \$250,000 grant available (continuous submissions)</b></p> <p><b>Community Healthy Living Fund (Prov. of NL) – up to \$10,000 per program (max 3 programs) – Deadline November 30<sup>th</sup></b></p>	<b>Planning</b>		<ul style="list-style-type: none"> <li>• Jennifer Penney likely interested</li> <li>• Example – Bulk buying program in Bauline</li> <li>• Since the COVID-19 pandemic, the Town has been receiving calls inquiring about a community garden</li> </ul>	<b>1</b>

# APPENDIX A – GHG EMISSIONS INVENTORY

On the following pages is a tabulated version of the Town of Paradise GHG Emissions Inventory for 2019. All raw data exists within a detailed and annotated spreadsheet and can be provided upon request. All data will be logged within the PCP Milestone Tool, <https://pcptool.ca/> for consistency across inventoried years, and participation with the like-minded cohort which make up the PCP member communities.

The Town elected to conduct a corporate emissions inventory, wherein the inventory boundary is set as those building, facilities, fleet and equipment which are owned and operated by the Town. This emissions protocol was chosen based on the understanding that change starts at ‘home’ and the Town has the most influence over their own assets.



<b>TOTAL EMISSIONS (tonnes CO2e/year)</b>				
<b>1,702</b>	excludes all community waste, and estimates corporate Town waste at 2% of community			
<b>ACTIVITY SECTOR</b>	<b>Emissions (tCO<sub>2</sub>e/year)</b>	<b>Energy (GJ/year)</b>	<b>Cost (\$/year)</b>	<b>Scope</b>
Buildings & Facilities	120.63	16,083.48	\$499,481.19	2
Fleet - Vehicles & Equipment	790.33	11,131.83	\$351,553.54	1
Streetlights & Traffic Signals	28.95	3,859.95	\$762,218.13	2
Water & Wastewater	658.71	3,797.86	\$2,294,194.54	2 & 3
Solid Waste	103.84		\$470,548.26	3

The GHG Emissions Inventory was completed following the guidance set out in the Greenhouse Gas Protocol international standard on municipal emissions inventories from the World Resources Institute. This standard also aligns with the ISO 14064-1 Greenhouse Gases protocols for conducting GHG emissions inventories.

- Scope 1 – fuels burned directly as part of municipal operations (mandatory inclusion)
- Scope 2 – purchased electricity (mandatory inclusion)
- Scope 3 – all other emissions (optional inclusion)

According to the FCM PCP protocol for municipalities, the Town's emissions included the following five categories. Important assumptions and methods used within each category are mentioned below:

#### Buildings and Facilities – Scope 2

- There are no fuels used at Town facilities
- All electricity data (kWh and costs) was obtained from Newfoundland Power
  - The emissions factor (0.000027 tCO<sub>2</sub>e/kWh) for NL was taken from: *National Inventory Report 1990-2018 – Part 3: Greenhouse Gas Sources and Sinks in Canada, Canada's Submission to the United Nations Framework Convention on Climate Change*. Environment and Climate Change Canada. 2020. Page 61, Table A13-2.

#### Fleet – Scope 1

- All fuel amounts and costs were obtained from fuel supplier invoices in the Town's files
- The Town decided to exclude emissions associated with employee travel (optional Scope 3)
- Metrobus offers some public transit services in Paradise, however, since the Town does not directly own or operate these buses, the associated emissions were excluded from the Corporate inventory.
  - Emissions factors were taken from:
    - *A Guidance Document for Reporting Greenhouse Gas Emissions for Large Industry in Newfoundland and Labrador*. Government of Newfoundland and Labrador Office of Climate Change. 2017. Page 23, Table 5-2.;
    - *PCP Protocol: Canadian Supplement to the International Emissions Analysis Protocol*. FCM & ICLEI. Page 12, Table 2.
    - IPCC AR5 GWP values were used.

#### Streetlights and Traffic Signals – Scope 2

- Annual kWh used by streetlights was estimated using per-streetlight annual kWh values from:
  - *NL Power Schedule of Rates, Rules and Regulations*. October 2019. Section II. 3. (Page 17), and an inventory of Town streetlights provided by NL Power.
- An inventory of all Town streetlights and the electricity costs were provided by Newfoundland Power
  - The emissions factor (0.000027 tCO<sub>2</sub>e/kWh) for NL was taken from: *National Inventory Report 1990-2018 – Part 3: Greenhouse Gas Sources and Sinks in Canada, Canada's Submission to the United Nations*

### Water and Wastewater – Scope 2 & 3

- The Town of Paradise purchases potable water from the City of St. John’s (Bay Bulls Big Pond Water Treatment Plant). Similarly, the Town pays for around 44% of the Town wastewater to be treated at the Riverhead Wastewater Treatment Facility, also owned and operated by the City of St. John’s. Paradise accounts for 4.64% of the total wastewater treated at the Riverhead facility. Paradise has no direct control over the operation of either water treatment facility, however, this water and wastewater treatment were included in the Town GHG emissions inventory as a Scope 3 item because it is understood that the Town has some influence over the water consumption habits of its residents.
  - Emissions factors for Bay Bulls Big Pond Water Treatment Plant and Riverhead Wastewater Treatment Facility were developed in coordination with the City of St. John’s; they were calculated by an experienced professional employed by the City of St. John’s specifically for these facilities.
- The Town of Paradise recently built its own wastewater treatment facility on St. Thomas Line that will service 56% of the population. This treatment facility is still undergoing commissioning; wastewater was in bypass (ocean outfall disposal) during 2018. The 2018 electricity consumption of the new treatment plant was included, as well as the ocean outfall emissions considering 56% of the population (or around 12,000 people).
- These wastewater emissions are classified as Scope 3 and are included to illustrate the impact that municipal wastewater systems have on the overall Town emissions. Although the wastewater is generated by the community as a whole, the Town is responsible for the wastewater treatment methods used, which is the variable that can be controlled to reduce emissions.
- Emissions factors and calculation methodology were taken from:
  - All electricity data (kWh and costs) was obtained from Newfoundland Power
    - The emissions factor (0.000027 tCO<sub>2</sub>e/kWh) for NL was taken from: *National Inventory Report 1990-2018 – Part 3: Greenhouse Gas Sources and Sinks in Canada, Canada’s Submission to the United Nations Framework Convention on Climate Change*. Environment and Climate Change Canada. 2020. Page 61, Table A13-2
  - Emissions factors and calculation methodology for ocean outfall were taken from:
    - *2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories*. Intergovernmental Panel on Climate Change. 2019. Volume 5, Chapter 6 – Wastewater Treatment and Discharge.;
    - *National Inventory Report 1990-2018 – Part 2: Greenhouse Gas Sources and Sinks in Canada, Canada’s Submission to the United Nations Framework Convention on Climate Change*. Environment and Climate Change Canada. 2020. Section A3.6.4.;
    - *Global Protocol for Community-Scale GHG Emissions Inventories*. World Resources Institute & ICLEI. 2014. Section 8.6.
    - IPCC AR5 GWP values were used.

### Solid Waste – Scope 3

- All municipal solid waste generated by the Town of Paradise is transported to and processed at Robin Hood Bay Landfill and Recycling Facility. The Robin Hood Bay Waste Management Facility is owned and operated by the City of St. John's. Paradise has no direct control on operation of the Landfill Facility.
- The solid waste volume for the entire community was included in the overall Town GHG emissions inventory as a Scope 3 item because it is understood that the Town has some measure of influence over the residents' recycling, composting and waste management habits.
- Emissions associated with recycling volumes were excluded in accordance with the PCP Protocol.
- To better see the distribution of the Town's corporate emissions, the volume of corporate waste was estimated to be 2% of the total community waste volume. Data related to specific corporate waste volumes is unknown.
  - The Methane Commitment Model from the PCP Protocol was used for the emissions calculation.
    - *PCP Protocol: Canadian Supplement to the International Emissions Analysis Protocol*. FCM & ICLEI. Page 22.
  - The IPCC AR5 GWP was used for methane (28).
  - The Degradable Organic Carbon Content (DOC) was taken as 0.2, as stated for NL in:
    - *National Inventory Report 1990-2018 – Part 2: Greenhouse Gas Sources and Sinks in Canada, Canada's Submission to the United Nations Framework Convention on Climate Change*. Environment and Climate Change Canada. 2020. Table A.3.6-4, page 172
  - The fraction of methane recovered in the landfill gas (0.623) was provided by the City of St. John's; it was calculated by an experienced professional employed by the City of St. John's specifically for the Robin Hood Bay Landfill facility.

**BUILDINGS & FACILITIES - Electricity**

	<b>Year</b>	<b>2019</b>				<b>TOTAL BUILDING ELECTRICITY EMISSIONS (tonnes CO2e/year)</b>		<b>TOTAL BUILDING ELECTRIC ENERGY (GJ/year)</b>		<b>TOTAL BUILDING ELECTRICITY COST (\$/year)</b>
	<b>Emissions Factor (EF)</b>	0.000027	t CO <sub>2</sub> e/kWh			<b>120.63</b>		<b>16,083.48</b>		<b>\$499,481.19</b>
	<b>EF Source</b>	National Inventory 2020, p. 61, Table A13-2								
	<b>Energy Data Source</b>	NL Power bills								

BUILDING NAME	CIVIC ADDRESS	NF POWER ACCOUNT NAME	NF POWER ACCOUNT #	BLDG AREA (m <sup>2</sup> )	ELECTRICAL (kWh/year)	ENERGY (GJ/year)	COST (\$/year)	EUI (GJ/m <sup>2</sup> )	ELECTRICAL EMISSIONS (tCO <sub>2</sub> e)
Paradise Double Ice Complex	1 Sarah Davis Way			11553	3,418,560.00	12306.82	\$367,940.38	1.07	92.30
Diane Whalen Soccer Hut	McNamara Drive			216	39,524.00	142.29	\$5,612.22	0.66	1.07
Town Hall	28 McNamara Drive			2446	847,800.00	3052.08	\$102,604.43	1.25	22.89
Peter Barry Duff Memorial Park	Topsail Pond Road			206	35,329.00	127.18	\$5,121.24	0.62	0.95
Milton Road Softball Hut	62Milton Road			253	8,700.00	31.32	\$1,901.51	0.12	0.23
STL Community Centre	2 Neary Road			270	39,600.00	142.56	\$6,364.43	0.53	1.07
Paradise Park Stage/Concession	5 Sarah Davis Way				78,120.00	281.23	\$9,936.98	#DIV/0!	2.11



<b>FLEET</b>								
	<b>Year</b>	<b>2019</b>			<b>TOTAL FLEET EMISSIONS (tonnes CO2e/year)</b>	<b>TOTAL FLEET ENERGY (GJ/year)</b>	<b>TOTAL FLEET COST (\$/year)</b>	
	<b>Fuel Data Source</b>	Fuel supplier receipts			<b>790.33</b>	<b>11,131.83</b>	<b>\$351,553.54</b>	
<b>LOCATION/SUPPLIER/VEHICLE</b>	<b>FUEL TYPE (Select)</b>	<b>VOLUME (L)</b>	<b>ENERGY (GJ/year)</b>	<b>COST (\$/year)</b>	<b>EMISSIONS (tCO<sub>2</sub>e)</b>			
Diesel Vehicles	Diesel	223657.1	8651.06	\$266,628.84	620.14			
Gas Vehicles	Gasoline	71574.4	2480.77	\$84,924.70	170.19			

STREET LIGHTS & TRAFFIC SIGNALS						
	Year	2019				TOTAL LIGHTING EMISSIONS (tonnes CO2e/year)
	Emissions Factor (EF)	0.000027	t CO <sub>2</sub> e/kWh			28.95
	EF Source	National Inventory 2020, p. 61, Table A13-2				
	Energy Data Source	NL Power bills				
						TOTAL LIGHTING ENERGY (GJ/year)
						3859.95
						TOTAL LIGHTING COST (\$/year)
						\$762,218.13
SITE	NF POWER ACCOUNT NAME	NF POWER ACCOUNT #	ELECTRICAL (kWh/year)	ENERGY (GJ/year)	COST (\$/year)	ELECTRICAL EMISSIONS (tCO <sub>2</sub> e)
St Thomas Line Crosswalk			2364	8.51	\$490.03	0.06
Milton Road Softball Lights			41820	150.55	\$6,033.94	1.13
Topsail-Trails End Intersection			12264	44.15	\$1,765.38	0.33
Topsail-Paradise Road			12264	44.15	\$1,766.38	0.33
Peter Barry Duff Lights			2	0.01	\$278.72	0.00
Topsail-McNamara			916	3.30	\$265.02	0.02
Karwood-Topsail			9204	33.13	\$1,371.20	0.25
Karwood Crosswalk			504	1.81	\$250.48	0.01
Topsail Road Town Sign			190	0.68	\$301.18	0.01
McNamara Soccer Lights			8640	31.10	\$2,079.62	0.23
Topsail-TCH			3660	13.18	\$656.77	0.10
Arena Sign			8869	31.93	\$1,418.09	0.24
1690 Topsail Road Crosswalk			1236	4.45	\$344.72	0.03
St. Thomas Line-Topsail Road			3120	11.23	\$587.54	0.08
McNamara Drive Crosswalk			2760	9.94	\$541.02	0.07
Sgt Donald Lucas - Topsail Rd			3504	12.61	\$636.96	0.09
Kenmount-Brougham			1260	4.54	\$347.28	0.03
100W HPS* Post Top Street Lights (Qty: 114)			51756	186.32		1.40
100W HPS Cobrahead Street Lights (Qty: 1787)			811298	2920.67		21.91
150W HPS Cobrahead Street Lights (Qty: 92)			65688	236.48		1.77
250W HPS Cobrahead Street Lights (Qty: 10)			12600	45.36	\$741,570.25	0.34
LED Fixture 100W Equivalent Street Lights (Qty: 39)			8502	30.61		0.23
LED Fixture 150W Equivalent Street Lights (Qty: 4)			1160	4.18		0.03
LED Fixture 250W Equivalent Street Lights (Qty: 1)			475	1.71		0.01
Kenmount-Karwood			1260	4.54	\$347.28	0.03
St. Thomas Line			6891	24.81	\$1,166.27	0.19
				0.00	0.00	0.00
				0.00	0.00	0.00

\*Annual kWh per streetlight estimated using values from NL Power Schedule of Rates, Rules and Regulations II. 3. (Page 17)

**WATER & WASTEWATER - TREATMENT**

Year	2019		TOTAL WATER EMISSIONS (tonnes CO2e/year)	TOTAL WATER ENERGY (GJ/year)	TOTAL WATER COST (\$/year)
Electricity Emissions Factor (EF)	0.000027	t CO <sub>2</sub> e/kWh	658.71	3,797.86	\$2,294,194.54
EF Source	National Inventory 2020, p. 61, Table A13-2				
Data Source	City of St. John's, NL Power Invoices				

TYPE	TOTAL VOLUME TREATED AT FACILITY* (m <sup>3</sup> )	VOLUME CONTRIBUTED BY TOWN (%)	EMISSIONS CREATED PER VOLUME (tCO2e/m <sup>3</sup> )	COST (\$/year)	TOTAL EMISSIONS FOR TOWN (tCO2e)
BBBB Potable Water Produced*	21,636,757	13.83%	0.0000360	\$1,951,213.64	107.72
RHWTF Wastewater Treated*	48,403,397	4.35%	0.000091	\$198,872.82	191.60
Wastewater - Ocean Outfall**					330.90
Wastewater - Septic Systems**					0.00

\*Total treated volumes, volume contributed by Town, and emissions factors provided by the City of St. John's

\*\*Calculated according to IPCC 2019 Chapter 6 methodology

TYPE	NF Power Account #	VOLUME (m <sup>3</sup> /year)	Electrical (kWh/year)	ENERGY (GJ/year)	EMISSIONS CREATED PER VOLUME (tCO2e/m <sup>3</sup> )	COST (\$/year)	TOTAL EMISSIONS (tCO2e/year)
STL Wastewater Treatment Plant ***		2,739,375	330640	1190.304	0.0000033	\$40,749.01	8.93

\*\*\*Note that the STL plant was in bypass in 2019, except for some commissioning (ocean outfall emissions calculated above)

**WATER & WASTEWATER - DELIVERY**

SITE/PHYSICAL ASSET	NF POWER ACCOUNT NAME	NF POWER ACCOUNT #	BLDG AREA (m <sup>2</sup> )	PRIMARY HEATING	ELECTRICAL (kWh/year)	ENERGY (GJ/year)	COST (\$/year)	ELECTRICAL EMISSIONS (tCO <sub>2</sub> e)
Janals Road				Electric	2080	7.49	\$692.53	0.06
Camrose Drive				Electric	40860	147.10	\$7,644.22	1.10
Archibald Drive				Electric	2569	9.25	\$643.32	0.07
Karwood Drive				Electric	2530	9.11	\$759.81	0.07
Irving Drive				Electric	7586	27.31	\$1,271.60	0.20
Venton Drive				Electric	1380	4.97	\$455.02	0.04
Starlight Drive				Electric	4120	14.83	\$949.11	0.11
Lift Station 10				Electric	415520	1495.87	\$53,803.94	11.22
Maverick Place				Electric	3150	11.34	\$596.62	0.09
Kenmount Road				Electric	3210	11.56	\$845.29	0.09
Whalen Crescent				Electric	1259	4.53	\$438.00	0.03
Topsail @ Woodstock				Electric	51420	185.11	\$7,463.79	1.39
Deborah Lynn Heights				Electric	1978	7.12	\$532.87	0.05
McNamara Drive				Electric	960	3.46	\$294.60	0.03
Kestral Drive				Electric	20390	73.40	\$329.87	0.55
Laurie Road				Electric	899	3.24	\$394.49	0.02
Southview Drive				Electric	1071	3.86	\$407.82	0.03
Stormont Street				Electric	11950	43.02	\$2,057.47	0.32
Greensfield Street				Electric	1076	3.87	\$416.53	0.03
Paradise Road				Electric	5320	19.15	\$1,113.28	0.14
Donna Road				Electric	117880	424.37	\$17,378.35	3.18
555 STL PRV				Electric	4608	16.59	\$871.45	0.12
442 STL PRV				Electric	7927	28.54	\$1,299.60	0.21
380 STL PRV				Electric	8404	30.25	\$1,359.15	0.23
248 STL PRV				Electric	3898	14.03	\$768.11	0.11
Topsail Road PRV				Electric	2277	8.20	\$572.23	0.06



## APPENDIX B – THE PARADISE CONTEXT

### B.1 BEING A LEADER IN CLIMATE ACTION:

The Town of Paradise's Vision is: To create a Paradise for everyone; a prosperous, independent, inclusive, and self-sufficient community, that is sustainable for generations to come. The Town adopted their 2016-2026 Municipal Plan in 2017 and are in the process of updating their Strategic Plan for 2019-2022. The Town has also developed an Integrated Community Sustainability Plan, Active Transportation Plan, Traffic Improvement Plan, and Stormwater Master Plan. Their commitment to climate action is confirmed by their decision to join a cohort of six municipalities as a partner in the Federation of Canadian Municipalities (FCM) Municipalities for Climate Innovation Program (MCIP) Transition 2050 (T2050) Partnership Grant Initiative. Through this program, Town staff have received training regarding climate science, greenhouse gas emissions mitigation, and climate change adaptation, and have participated in a collaborative workshop with experienced facilitators and like-minded community leaders.

The 2016-2026 Municipal Plan identifies the following policy objectives germane to this plan:

- Buildings and Infrastructure:
  - o Promote cost effective, environmentally sustainable approaches to infrastructure development through coordinated intermunicipal and regional land use planning
  - o Encourage measures that reduce energy consumption in the design of developments, sites and buildings
  - o Continue to improve stormwater management in the Town through implementation of the Town's Stormwater Management Plan, taking into account increased stormwater flows that are predicted as a result of climate change
  - o Reduce water consumption by requiring low-flow water fixtures in new construction and renovations
- Transportation:
  - o Evaluate the potential for increasing modal share of transit, cycling, and other means of transportation within the Northeast Avalon as a means of reducing the reliance on the automobile as the primary mode of travel
  - o Utilize the results of the Metrobus Transit Pilot Project to determine the feasibility of implementing a public transit system in the Town
  - o Encourage car sharing as a means of reducing traffic volumes by identifying areas and specific sites for the establishment of park and ride parking lots for commuters
- Waste:
  - o Continue reducing waste in the region by implementing waste reduction initiatives and programs at the local level such as recycling programs and water conservation measures

The Town of Paradise has been a member of FCMs Partners for Climate Protection (PCP) program since 2006, but has up to now, not moved along the Milestone program. This document marks the completion of Milestone 3 requirement.

The Milestones of the PCP Program are as follows:

- Milestone 1 – GHG Emissions Inventory
  - (see Appendix A)
- Milestone 2 – Set Emissions Reductions Target
  - (see Appendix B, Section B.4)
- Milestone 3 – Create a Local Climate Action Plan
  - (this document)

- Milestone 4 – Implement the Local Action Plan
  - One or more projects identified in this document

- Milestone 5 – Monitor Progress and Report Results
  - I.e. record the changes in the organization and track GHG emissions and project progress annually

The Town is aiming to achieve Milestone 4 as a result of participating in the FCM T2050 Initiative.

## B.2 TOWN CONTEXT

The Town of Paradise is one of Atlantic Canada’s fastest-growing municipalities and has the youngest average-aged population in Newfoundland and Labrador. It is part of the Northeast Avalon Region and is located just minutes from the Capital City of St. John’s. The population is approximately 21,389, housed in approximately 8,662 homes. Growth rates were 20.9% for the 2016 census. The Town has a population density of approximately 723 pers/km<sup>2</sup>.

Paradise owns and operates the following:

BUILDING AND FACILITIES	TRAFFIC LIGHTS + STREET LIGHTS	WATER AND WASTEWATER CHAMBERS
<ul style="list-style-type: none"> <li>▪ Paradise Double Ice Complex</li> <li>▪ Diane Whalen Soccer Hut</li> <li>▪ Town Hall</li> <li>▪ Peter Barry Duff Memorial Park</li> <li>▪ Milton Road Softball Hut</li> <li>▪ STL Community Center</li> <li>▪ Paradise Park Stage/Concession</li> </ul>	<p>Traffic Lights:</p> <ul style="list-style-type: none"> <li>▪ Topsail -Trails End Intersection</li> <li>▪ Topsail Rd – Paradise Rd</li> <li>▪ Topsail Rd – McNamara</li> <li>▪ Karwood-Topsail Rd</li> <li>▪ Topsail-TCH</li> <li>▪ St. Thomas Line – Topsail Rd</li> <li>▪ Kenmount-Brougham</li> <li>▪ Sgt Donald Lucas – Topsail Rd</li> </ul> <p>Area Lights:</p> <ul style="list-style-type: none"> <li>▪ Milton Road Softball Lights</li> <li>▪ Peter Barry Duff Lights</li> <li>▪ McNamara Soccer Lights</li> </ul> <p>Pedestrian Lights:</p> <ul style="list-style-type: none"> <li>▪ St. Thomas Line Crosswalk</li> <li>▪ Karwood Crosswalk</li> <li>▪ 1690 Topsail Road Crosswalk</li> <li>▪ McNamara Drive Crosswalk</li> </ul> <p>Signs:</p> <ul style="list-style-type: none"> <li>▪ Arena Sign</li> <li>▪ Topsail Road Town Sign</li> </ul> <p>Streetlights</p>	<ul style="list-style-type: none"> <li>▪ St. Thomas Line Wastewater Treatment Plant (STL WWTP)               <ul style="list-style-type: none"> <li>○ 555 STL PRV</li> <li>○ 442 STL PRV</li> <li>○ 380 STL PRV</li> <li>○ 248 STL PRV</li> <li>○ Topsail Road PRV</li> </ul> </li> </ul> <p>Pumphouses or lift stations at the following locations:</p> <ul style="list-style-type: none"> <li>▪ Janals Road</li> <li>▪ Camrose Drive</li> <li>▪ Archibald Drive</li> <li>▪ Karwood Drive</li> <li>▪ Irving Drive</li> <li>▪ Venton Drive</li> <li>▪ Starlight Drive</li> <li>▪ Lift Station 10</li> <li>▪ Maverick Place</li> <li>▪ Kenmount Road</li> <li>▪ Whalen Crescent</li> <li>▪ Topsail @ Woodstock</li> <li>▪ Deborah Lynn Heights</li> <li>▪ McNamara Drive</li> <li>▪ Kestral Drive</li> </ul>

	<p>FLEET VEHICLES AND EQUIPMENT</p> <ul style="list-style-type: none"> <li>▪ Light Duty Vehicles</li> <li>▪ Heavy Duty Vehicles</li> <li>▪ Construction Equipment</li> <li>▪ Snow Clearing</li> <li>▪ Garbage Trucks</li> <li>▪ Small equipment, e.g. trimmers, mowers, generators, chainsaws, etc.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Laurie Road</li> <li>▪ Southview Drive</li> <li>▪ Stormont Street</li> <li>▪ Greensfield Street</li> <li>▪ Paradise Road</li> <li>▪ Donna Road</li> </ul>
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The Town of Paradise purchases potable water from the City of St. John’s (Bay Bulls Big Pond Water Treatment Plant). Similarly, the Town pays for around 44% of the Town wastewater to be treated at the Riverhead Wastewater Treatment Facility, also owned and operated by the City of St. John’s. Paradise accounts for 4.64% of the total wastewater treated at the Riverhead facility. Paradise has no direct control over the operation of either water treatment facility, however, this water and wastewater treatment were included in the Town GHG emissions inventory as a Scope 3 item because it is understood that the Town has some influence over the water consumption habits of its residents.

Paradise recently built its own wastewater treatment facility on St. Thomas Line that will service 56% of the population. This treatment facility is still undergoing commissioning; wastewater was in bypass (ocean outfall disposal) during 2018 and 2019. The 2019 electricity consumption of the new treatment plant was included, as well as the ocean outfall emissions considering 56% of the population (or around 12,000 people). These wastewater emissions are classified as Scope 3 and are included to illustrate the impact that municipal wastewater systems have on the overall Town emissions. Although the wastewater is generated by the community as a whole, the Town is responsible for the wastewater treatment methods used, which is the variable that can be controlled to reduce emissions.

All municipal solid waste generated by the Town of Paradise is transported to and processed at Robin Hood Bay Landfill and Recycling Facility. The Robin Hood Bay Waste Management Facility is owned and operated by the City of St. John’s. Paradise has no direct control of operation of the Landfill Facility. Solid waste was included in the overall Town GHG emissions inventory as a Scope 3 item – because it is understood that the Town has some measure of influence over the residents’ recycling, composting and waste management habits.

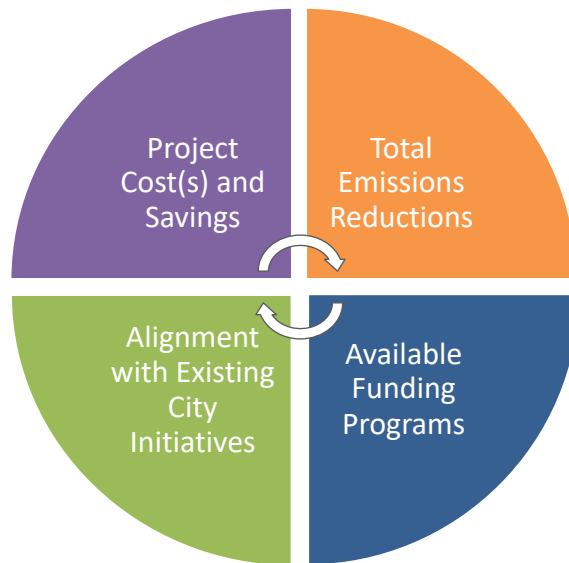
All electricity is supplied by Newfoundland Power (NF Power), which purchases electricity from NL Hydro and is generated by a combination of large scale hydro (Churchill Falls), medium scale wind (at St. Lawrence and Fermeuse), and combustion of bunker ‘C’ fossil fuel at Holyrood Generating Station. In 2022 it is anticipated that Muskrat Falls large scale hydro will be brought online, and Holyrood Generating station will be decommissioned. There is anticipated to be a significant increase in cost of electricity concurrent with a significant decrease in emissions. Newfoundland does not have natural gas infrastructure.

Provincially, Newfoundland and Labrador has released the ‘Made in Newfoundland and Labrador Approach to Carbon Pricing’ which outlines the provincial approach to emissions reduction programs and carbon pricing. Municipalities are exempt from the carbon tax, and are not required to participate in the cap and trade system of large industry regulated by the *Management of GHG Act*.

Specifically for the context of this project, the Town is among a cohort of five other communities spanning across the island of Newfoundland. Although each community will address their specific needs, there is a desire among the partner communities to leverage the benefits of participating in a joint capacity and building towards a greater cumulative impact.

### B.3 RISK AND OPPORTUNITY ANALYSIS:

To arrive at the targeted GHG emissions reduction recommendations, the T2050 consultant, in coordination with Town Staff, conducted an iterative Risk and Opportunities Analysis to identify key projects which would simultaneously optimize for the criteria shown in Figure 1.



To develop data with which to evaluate each of these criteria for the five municipal emissions categories, the following research was undertaken:

1. Benchmarking exercise for select Town owned and operated building assets (in GJ/m<sup>2</sup> and compared against National Energy Use Database (NEUD) data for buildings of similar use categories in similar climates). See Table B.3 - 1.
2. Research on emissions reductions options for each of the five municipal categories – based on the expertise of the staff person and available case studies for similar context and size of municipality. See Table B.3 - 2.
3. Inventory of existing City initiatives. See Table B.3 - 3.
4. Research into existing (and expected) funding programs and available grid-connection opportunities. See Table B.3 - 4.



TABLE B.3 - 1 – BENCHMARKING OF CITY OWNED AND OPERATED BUILDINGS (SELECT BUILDINGS SHOWN)

BUILDING NAME	Building EUI	Canadian Average	Atlantic Average	Above Average (+) Below Average (-)
	GJ/m2	GJ/m2	GJ/m2	+/-
Paradise Double Ice Complex	0.88	1.62	1.33	-
Town Hall	1.32	1.12	0.92	+
STL Community Centre	0.48	1.19	0.99	-

TABLE B.3 - 2 – EMISSIONS REDUCTIONS RESEARCH – KEY OPTIONS

<p>FLEET –</p> <ul style="list-style-type: none"> <li>▪ Driver training</li> <li>▪ Vehicle and Equipment Improvement (installation of specific technologies e.g. driver awareness gauges, oil recycling filters, anti-idling tech)</li> <li>▪ Replacement with electric and/or PHEV (good quality used but in-warranty electric vehicles are available locally)</li> <li>▪ Carpooling programs (corporate/internal or community-wide)</li> <li>▪ Public transit system – explore micro-transit systems and technologies</li> </ul>	<p>BUILDINGS AND FACILITIES –</p> <ul style="list-style-type: none"> <li>▪ Fuel switching</li> <li>▪ Energy efficiency through e.g. long term improvements and integration of capital asset management strategy</li> <li>▪ Energy efficiency through building commissioning and improved controls</li> <li>▪ Renewable energy installations</li> </ul>	<p>WATER AND WASTEWATER –</p> <ul style="list-style-type: none"> <li>▪ Water conservation campaigns – public programs and internal to the organization</li> <li>▪ Water metering – residential and/or commercial</li> <li>▪ Leak detection of water sewer infrastructure</li> <li>▪ Eco-asset management and low-impact development strategies</li> </ul>
<p>STREET LIGHTS AND TRAFFIC SIGNALS –</p> <ul style="list-style-type: none"> <li>▪ LED street lights and traffic signals</li> <li>▪ Solar street lights and traffic signals</li> <li>▪ Replacement over the long term with traffic circles</li> </ul>	<p>MUNICIPAL SOLID WASTE –</p> <ul style="list-style-type: none"> <li>▪ Composting programs</li> <li>▪ Recycling programs</li> <li>▪ Support of locally grown and sold, e.g. farmer’s markets (less packaging)</li> <li>▪ Support of re-usable bags/bins programs</li> <li>▪ Ban of single-use plastics</li> <li>▪ Increased municipal taxes for garbage beyond a limit</li> <li>▪ Community Free Store</li> </ul>	<p>OTHER –</p> <ul style="list-style-type: none"> <li>▪ Improved walkability</li> <li>▪ Land Use Mapping</li> <li>▪ Green roofs</li> <li>▪ Car Free Zones</li> <li>▪ Food security initiatives</li> </ul>

TABLE B.3 - 3 - EXISTING CITY INITIATIVES

<p><b>RECYCLING</b></p> <ul style="list-style-type: none"> <li>• Curbside recycling offered</li> <li>• Green Depot available in the community for drop-off of recyclables (beverage containers, electronics)</li> <li>• Participation in the Recycle My Cell program via the Canadian Wireless Telecommunications Association. Old cell phones and accessories can be dropped off at the Town Hall</li> </ul>	<p><b>PUBLIC &amp; ACTIVE TRANSPORTATION</b></p> <ul style="list-style-type: none"> <li>• Partners with Metrobus to provide service from the Paradise Double Ice Complex to the Avalon Mall in St. John’s on weekdays during peak hours, and on Saturdays</li> <li>• Active Transportation and Traffic Improvement plans in place</li> </ul>
<p><b>WATER CONSERVATION</b></p> <ul style="list-style-type: none"> <li>• Permanent water conservation order in place</li> </ul>	<p><b>COMPOSTING</b></p> <ul style="list-style-type: none"> <li>▪ Paradise participates in the Backyard Compost Bin Distribution Program offered by MMSB (Multi-Materials Stewardship Board)</li> </ul>
<p><b>ENERGY EFFICIENCY</b></p> <ul style="list-style-type: none"> <li>• Investment in LEED Silver Double Ice Complex</li> </ul>	<p><b>COMMUNITY CLEAN UP</b></p> <ul style="list-style-type: none"> <li>▪ Hosts Curby Clean-Up month whereby residents and businesses are encouraged to clean up neighbourhoods and public spaces. Gloves, bags, and sticks provided</li> </ul>

TABLE B.3 - 4 – FUNDING AND FINANCIAL OPPORTUNITIES

<p><b>FLEET –</b></p> <ul style="list-style-type: none"> <li>▪ NRCan SmartDriver in the City Course</li> <li>▪ LCELF Freight Transportation Fuel Efficiency Program</li> <li>▪ FCM GMF – Reduce fossil fuel use in fleets</li> <li>▪ FCM GMF – Transportation networks and commuting options</li> <li>▪ ICIP – Public Transit</li> </ul>	<p><b>BUILDINGS AND FACILITIES –</b></p> <ul style="list-style-type: none"> <li>▪ NL Power – Net Metering</li> <li>▪ FCM GMF – Retrofit of municipal facilities</li> <li>▪ FCM GMF – New construction of energy-efficient facilities</li> <li>▪ FCM GMF – Energy recovery or district energy</li> <li>▪ Take Charge NL Town Challenge</li> <li>▪ Take Charge NL Business Efficiency Program</li> </ul>	<p><b>WATER AND WASTEWATER –</b></p> <ul style="list-style-type: none"> <li>▪ FCM GMF – Stormwater quality</li> <li>▪ FCM GMF – Wastewater systems</li> <li>▪ FCM GMF – Water Conservation</li> <li>▪ FCM GMF – Septic wastewater systems</li> <li>▪ MCW</li> </ul>
<p><b>STREET LIGHTS AND TRAFFIC SIGNALS –</b></p> <ul style="list-style-type: none"> <li>▪ NF Power Pilot projects</li> </ul>	<p><b>MUNICIPAL SOLID WASTE –</b></p> <ul style="list-style-type: none"> <li>▪ MMSB – Community Waste Diversion Fund</li> <li>▪ MMSB – Backyard Composting Bin Distribution Program</li> <li>▪ FCM GMF – Waste Diversion</li> <li>▪ FCM GMF – Waste stream management</li> </ul>	<p><b>OTHER –</b></p> <ul style="list-style-type: none"> <li>▪ ACOA – Innovative Communities Fund (ICF)</li> <li>▪ ACOA – Canadian Experiences Fund (CEF)</li> <li>▪ Local Food Infrastructure Fund</li> <li>▪ FCM GMF – Signature Initiative</li> </ul>

		<ul style="list-style-type: none"> <li>▪ FCM GMF – Brownfield site redevelopment</li> <li>▪ FCM GMF – Renewable energy production on a brownfield</li> <li>▪ FCM - Sustainable Neighbourhood Action Plan</li> <li>▪ ICIP – Green Infrastructure</li> <li>▪ MCW</li> <li>▪ Local Food Infrastructure Fund – Agriculture and Agri-Foods Canada</li> <li>▪ Community Healthy Living Fund (Prov. of NL)</li> </ul>
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## B.4 GHG EMISSIONS REDUCTION TARGETS

Via the risk and opportunities analysis described herein and the resulting Climate Action Plan; Town emissions projections and project reduction estimations; the realities of climate science; and international, national, and provincial commitments, the Town of Paradise has adopted the following GHG emissions reduction targets:

- ➔ 5-15% below 2018 levels by 2023
- ➔ 40-55% below 2018 levels by 2030
- ➔ Net-zero by 2050

The actions that will contribute to the achievement of these targets are outlined by emissions category in the tables below. While a bottom-up approach was taken to ensure the targets are achievable, an expanded target range was specified to ensure sufficient ambition – reflecting the urgency of the climate crisis and striving toward the reductions scientifically required to limit global warming to 1.5°C.

The actions identified for the 2023 and 2030 time periods are expected to result in annual cost savings<sup>1</sup> for the Town of **\$340,000 and \$961,000**, respectively, compared to the 2018 baseline year.

Actions beyond 2030 required to reach the net-zero goal by 2050 will be determined upon annual review of this plan and assessment of opportunities. Progress toward achieving these reduction targets will be monitored annually. The targets may be modified at any time to reflect economic, political, technological, or social circumstances.

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<sup>1</sup> Considering current electricity and fuel prices. Due to the uncertainty associated with projecting these costs, the annual savings estimated are a conservative estimate. The annual savings are cumulative – the 2030 savings amount includes the 2023 savings as the annual savings are continuous

<b>By 2023</b>					
<b>Project</b>	<b>Potential Annual GHG Change (- or +)</b>	<b>Potential Annual \$ Change (- or +)</b>	<b>Assumptions</b>	<b>Category % GHG Change from Baseline</b>	<b>Total % GHG Change from Baseline</b>
<b>Buildings &amp; Facilities</b>					
Solar at Paradise Park Phase 1	-2.89	-\$14,962.50	Utilize FCM Brownfield funding - pilot projects up to \$500K. Estimate considers \$300K in solar panels	-2.71	-0.04
Youth Centre Retrofit	-0.95	-\$3,561.73	ie. Youth center accounts for 5% of arena load and retrofit improves efficiency by 25%	-0.89	-0.01
				0.00	0.00
				0.00	0.00
				0.00	0.00
<b>Current change from baseline</b>	<b>14.28</b>			<b>13.43</b>	<b>0.22</b>
<b>Category Total</b>				<b>9.82</b>	
<b>Fleet - Vehicles &amp; Equipment</b>					
Efficient Driver Training	-168.37	-\$74,484.85	20% efficiency improvement	-20.00	-2.61
				0.00	0.00
				0.00	0.00
				0.00	0.00
<b>Current change from baseline</b>	<b>-51.5</b>			<b>-6.12</b>	<b>-0.80</b>
<b>Category Total</b>				<b>-26.12</b>	
<b>Streetlights &amp; Traffic Signals</b>					
				0.00	0.00
				0.00	0.00
				0.00	0.00
				0.00	0.00
<b>Current change from baseline</b>	<b>1.05</b>			<b>3.77</b>	<b>0.02</b>
<b>Category Total</b>				<b>3.77</b>	
<b>Water &amp; Wastewater</b>					
Commerical/Institutional Conservation Policy	-33.99	-\$103,137.93	Reduce treated volumes by 5%	-5.00	-0.53
Leak Detection & Repair	-33.99	-\$103,137.93	Reduce treated volumes by 5%	-5.00	-0.53
Expected Change in Volumes	6.80	\$20,627.59	1% due to population growth	1.00	0.11
WW Treatment Improvement	-212.43		Difference between ocean outfall and primary treatment w/ sludge composting	-31.25	-3.29
				0.00	0.00
<b>Current change from baseline</b>	<b>-21.0</b>			<b>-3.09</b>	<b>-0.32</b>
<b>Category Total</b>				<b>-43.34</b>	
<b>Solid Waste</b>					
Small Scale Composting	-119.3	-\$10,612.01	ie. Purchase of Novid 542 composting machine	-2.48	-1.85
Increase Recycling Rates	-478.4	-\$29,974.89	Increase baseline recycling/waste reduction rate by 150% to reach about 16% of total MSW being recycled/diverted	-9.95	-7.40
Expected Change in MSW	48.1	\$4,303.19	1% due to population growth	1.00	0.74
				0.00	0.00
				0.00	0.00
<b>Current change from baseline</b>	<b>386.52</b>			<b>8.04</b>	<b>5.98</b>
<b>Category Total</b>				<b>-3.39</b>	
<b>TOTAL CHANGE FROM BASELINE</b>					<b>-10.31</b>
<b>TOTAL COST SAVINGS</b>		<b>-\$339,871.83</b>	<b>*Does not include additional (positive) costs due to growth</b>		

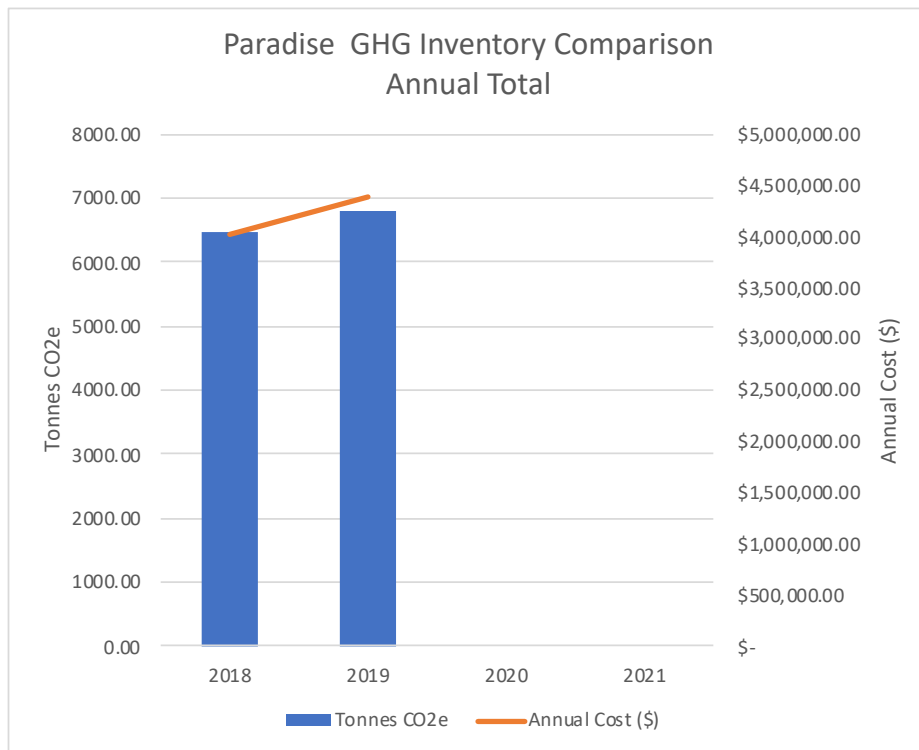
<b>By 2030</b>					
<b>Project</b>	<b>Potential GHG Change</b>	<b>Potential \$ Change</b>	<b>Assumptions</b>	<b>Category % GHG Change from Baseline</b>	<b>Total % GHG Change from Baseline</b>
<b>Buildings &amp; Facilities</b>					
Net Zero Town Hall/Municipal Building	-24.15	-\$101,826.43	For now as an estimate, consider baseline Town Hall is gone and new building is net-zero (100% renewable energy powered)	-22.71	-0.37
				0.00	0.00
				0.00	0.00
				0.00	0.00
				0.00	0.00
				0.00	0.00
Category Total + previous period				<b>-12.89</b>	
<b>Fleet - Vehicles &amp; Equipment</b>					
Electrification of Fleet + increased efficiency	-210.46	-\$93,106.06	25% fuel reduction	-25.00	-3.26
				0.00	0.00
				0.00	0.00
				0.00	0.00
				0.00	0.00
Category Total + previous period				<b>-51.12</b>	
<b>Streetlights &amp; Traffic Signals</b>					
LED Upgrades	-2.2	-\$59,651.22	10% existing streetlights replaced with LEDs (80% more efficient)	-8.00	-0.03
				0.00	0.00
				0.00	0.00
				0.00	0.00
				0.00	0.00
Category Total + previous period				<b>-4.23</b>	
<b>Water &amp; Wastewater</b>					
Commerical Water Metering	-33.99	-\$103,137.93	Reduce treated volumes by an additional 5%	-5.00	-0.53
Leak Detection & Repair	-33.99	-\$103,137.93	Reduce treated volumes by an additional 5%	-5.00	-0.53
Expected Change in Volumes	6.80	\$20,627.59	An additional 1% due to population growth	1.00	0.11
WW Treatment Improvement	-66.19		Change from primary to secondary treatment (reach 90% organics removal, composted)	-9.74	-1.02
				0.00	0.00
				0.00	0.00
Category Total + previous period				<b>-62.08</b>	
<b>Solid Waste</b>					
Community Composting	-1351.3	-\$120,232.28	Organic waste of entire community diverted from landfill	-28.12	-20.91
Increase Recycling Rates	-637.9	-\$39,966.51	Increase baseline recycling/waste reduction rate by an additional 200%, reaching about 30% of MSW being recycled/diverted	-13.27	-9.87
Expected Change in MSW	48.1	\$4,303.19	An additional 1% due to population growth	1.00	0.74
				0.00	0.00
				0.00	0.00
				0.00	0.00
Category Total + previous period				<b>-43.79</b>	
<b>TOTAL CHANGE FROM BASELINE + previous period</b>					<b>-45.99</b>
<b>TOTAL COST SAVINGS + previous period</b>		<b>-\$960,930.20</b>	<b>*Does not include additional (positive) costs due to growth</b>		

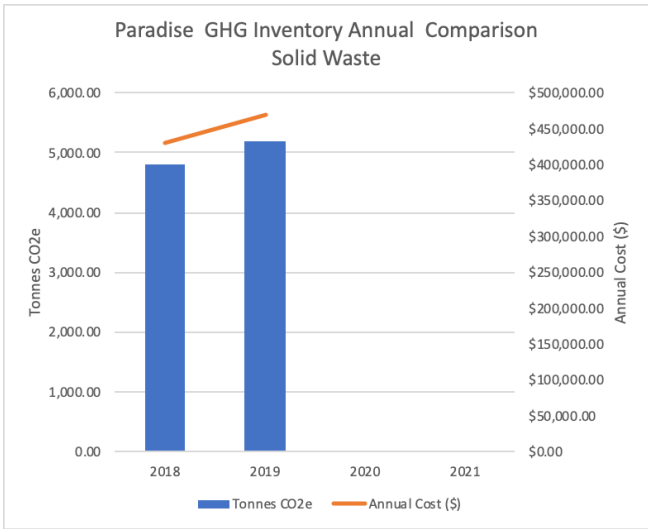
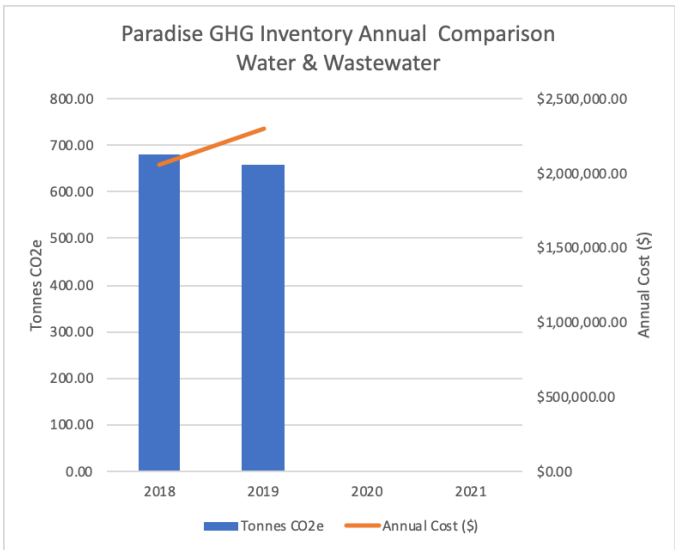
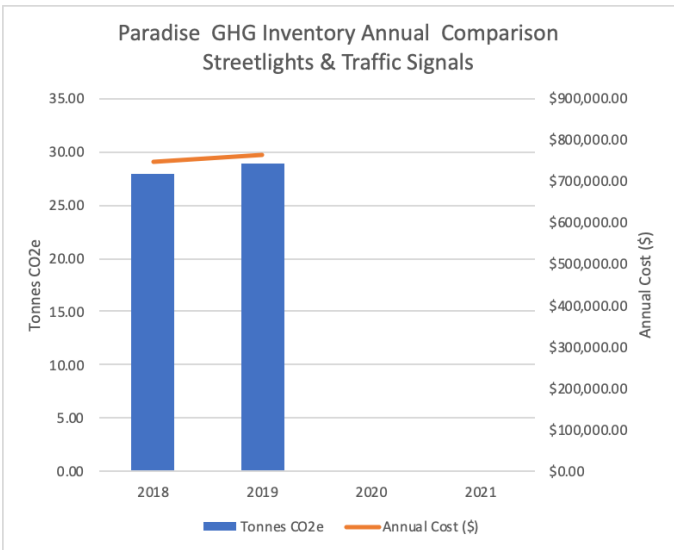
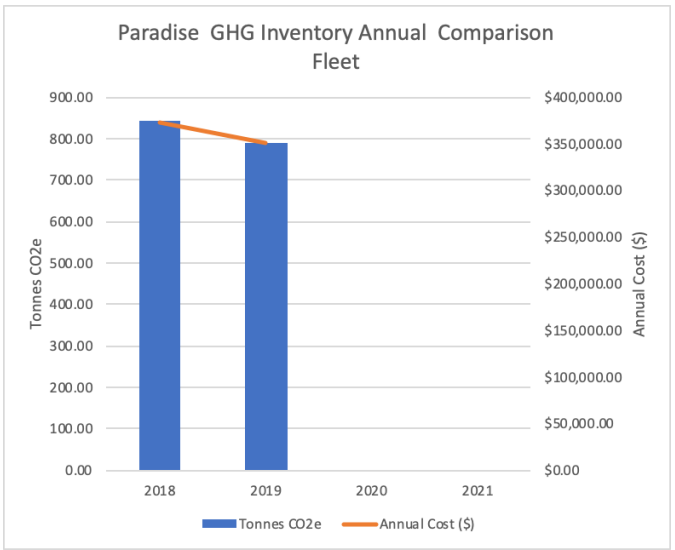
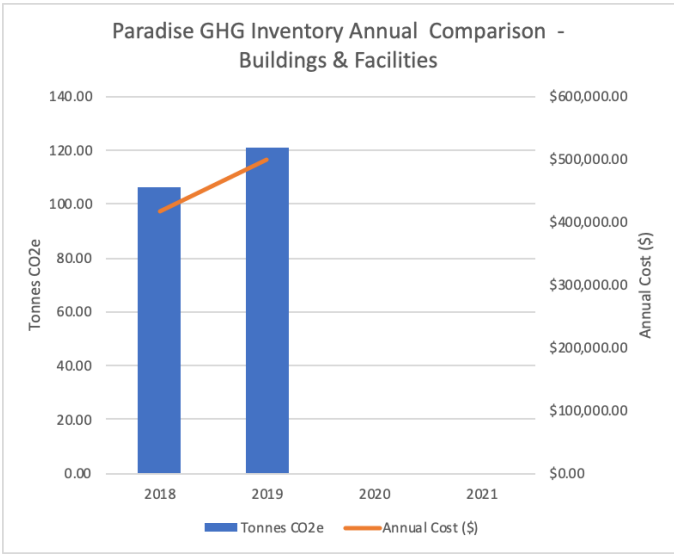
## B.5 GHG EMISSIONS REDUCTIONS TO DATE

The Town of Paradise has completed GHG inventories for the years 2018 and 2019. 2018 is taken as the baseline year. Compared to the 2018 baseline, the Town of Paradise’s 2019 corporate emissions have changed by the following amounts in each category:

BUILDINGS AND FACILITIES	TRAFFIC LIGHTS AND STREET LIGHTS	WATER AND WASTEWATER	FLEET, VEHICLES AND EQUIPMENT	SOLID WASTE
<b>+13.4 %</b> <b>+14.28 tCO2e</b>	<b>+3.8 %</b> <b>+1.05 tCO2e</b>	<b>-3.1%</b> <b>-20.99 tCO2e</b>	<b>-6.1 %</b> <b>-51.49 tCO2e</b>	<b>+8.0%</b> <b>+386.52 tCO2e</b>
ISO – Scope 2	ISO – Scope 2	ISO – Scope 2	ISO – Scope 1	ISO – Scope 3

Compared to the baseline year of 2018, the Town of Paradise’s 2019 corporate GHG emissions have increased by **329.37 tCO2e** or **5.1%** overall. This is primarily due to an increase in the amount of municipal solid waste collected and landfilled, and increased energy consumption at the Double Ice Complex. Despite this overall increase, the Town did see a notable 6% decrease in emissions in their fleet sector – also the only sector that saw a decrease in costs.





## APPENDIX C – CLIMATE SCIENCE

Climate change refers to a change in weather patterns over a long period of time. A defining characteristic of climate change is an increase in the global average air temperature, termed global warming. The climate change that we are experiencing today is occurring at a rate unprecedented in geological history, and scientists are virtually certain that it has been caused by human activity (primarily the burning of fossil fuels and land use). This is evident in the correlation between atmospheric carbon dioxide concentrations (currently at the highest level experienced in millions of years) and global average temperature. This change in our atmospheric composition has and will affect the climate in different parts of the world differently. Extreme temperatures and precipitation; weather events such as floods, droughts, wildfires, and hurricanes; sea level rise, ocean acidification, and biodiversity loss are observed changes that are projected to continue and intensify for centuries to come. The degree to which these changes occur is now up to us.

The Intergovernmental Panel on Climate Change (IPCC)<sup>1</sup> is the United Nations body for assessing the science related to climate change. They provide policymakers with knowledge and guidance regarding climate change projections, implications and potential future risks, as well as adaptation and mitigation options. The 5<sup>th</sup> assessment report released in 2013 is the most recent extensive climate analysis. The 6<sup>th</sup> assessment report is expected in 2022.

The United Nations Framework Convention of Climate Change (UNFCCC or UN Climate Change)<sup>2</sup> is the entity tasked with supporting the response to the threat of climate change, based on the IPCC scientific assessments. The UNFCCC is the parent treaty of the Paris Agreement of 2015 and the Kyoto Protocol of 1997. The objective of each of these global agreements is to “stabilize greenhouse gas (GHG) concentrations in the atmosphere at a level that will prevent dangerous human interference with the climate system, in a time frame which allows ecosystems to adapt naturally and enables sustainable development”.

The IPCC released a special report in October 2018 titled “Global Warming of 1.5°C”. A 1.5°C increase in global average temperature above pre-industrial levels is considered a critical threshold beyond which the impacts of climate change on ecosystems and society will be far more significant. The report describes how a jump from 1.5°C to 2°C may be the difference between the ability and inability to adapt. Human activities are estimated to have already increased global average temperature by 0.8°C to 1.2°C above pre-industrial levels (as of 2018). At current emissions levels, we are on track to exceed 2°C of warming, reaching as high as 4°C by 2100 if climate policies do not become more ambitious.

To avoid warming beyond 1.5°C, the IPCC states that global net GHG emissions must decline by about 45% from 2010 levels by 2030, reaching net zero emissions around 2050. To limit warming below 2°C, emissions must decline by 25% by 2030 and reach net zero by 2070. These scientifically determined pathways must guide the emissions reduction targets of countries, municipalities, and organizations alike in order to prevent unmanageable global climate change.

Canada, as a signatory of the Paris Agreement, has committed to reducing GHG emissions by 30% below 2005 levels by 2030 and achieving net-zero by 2050. Newfoundland and Labrador has aligned with this federal target. Municipalities in Newfoundland and Labrador and across Canada must play their part as members of the global community to ensure a liveable, equitable, and sustainable future for all.

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<sup>1</sup> <https://www.ipcc.ch/>

<sup>2</sup> <https://unfccc.int/>