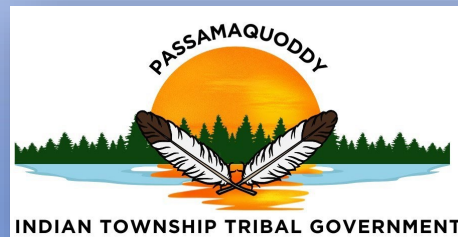


Draft Priority  
Climate Action Plan  
Passamaquoddy Indian Township



# Draft Tribal Priority Climate Action Plan

## Authors:

Martin Dana, Environmental Director  
Trevor White, Asst. Environmental Director

## Contact:

207-796-6158

This project has been funded by the United States Environmental Protection Agency (EPA) under assistance

Agreement **5D00A00843**. The contents of this document do not necessarily reflect the views and policies of the EPA, nor does the EPA endorse trade names or recommend the use of commercial products that may be mentioned in this document.

## Acknowledgements:

Indian Township Tribal Chief, Vice Chief and Council  
Indian Township Community and Elders  
Indian Township Clinic  
Indian Township Economic Planning Department  
Indian Township Finance Department  
Indian Township Fire and EMS Department  
Indian Township Forestry Department  
Indian Township Housing Department  
Indian Township Police Department  
Indian Township Public Works

## Definitions:

PCAP:	Priority Climate Action Plan
QAPP:	Quality Assurance Project Plan
PIT:	Passamquoddy Indian Township
PM:	Project Manager
CO <sub>2e</sub>	Carbon Dioxide Equivalent
EV	Electric Vehicle
LIDAC	Low Income and Disadvantaged Community
CEJS	Climate and Economic Justice Screening Tool
CAP	Criteria Air Pollutant
MT CO <sub>2e</sub>	Metric Tons CO <sub>2</sub> Equivalent

## Table of Contents:

List of Tables .....	6
Supporting Documents .....	6
Executive Summary .....	7
Introduction.....	7
Indian Township (PCAP) Greenhouse Gas Inventory .....	14
GHG Priority Reduction Measures .....	28
Lidac Statement .....	34
Benefits Analysis .....	39
Authority to Implement .....	40

## List of Figures:

Passamaquoddy Tribal Lands .....	8
Passamaquoddy Lands Location Maps .....	11
Basket – Sylvia Gabriel .....	13
Passamaquoddy US Route One .....	15
Passamaquoddy Peter Dana Point .....	16
Indian Township Wastewater Lagoon .....	27
LIDAC zone – Washington County .....	35

## List of Tables:

Net Diesel/Gasoline Emissions by Sector (CO <sub>2</sub> e).....	18
Energy Use Summary – Diesel/Petrol Mobile Combustion .....	18
Fuel and Energy (MMBtu) Use by Sector – Heating .....	20
Emissions by Sector (MT CO <sub>2</sub> e) – Heating .....	20/22
Tribal Homes Estimated Annual Usage .....	23
Electrical Emissions by Sector .....	24
Priority Reduction Measures Table EV’s .....	28
Insulation, Woodstove Upgrades, Windows, Solar .....	31
Solid Waste Packer Truck .....	32
Solar Panels Install .....	33

## Supporting Documents

*Eel die off report: see appendix 1*

## Executive Summary:

The Passamaquoddy Tribe in northern Maine is tied closely to the land and its resources. Today its members embrace the modern lifestyle, but combine this with the ways of the past, through spiritual, cultural and sustenance ways. Tribal elders see the ways the climate has changed from when they were young, ice forms later and the ice out is much earlier, limiting ice fishing days. The range of the brown ash is moving northwards, and will continue, until no brown ash is able to be collected and pounded to produce beautiful baskets. Sustenance foods such as moose now suffer from large winter tick infestations that would normally die off in hard winters, to where fewer calves are surviving the winter. Invasive species such as variable leaved water milfoil now have a foothold in lakes surrounding the tribe, and early ice outs are allowing more sunlight to reach the bottom giving these pests an early start to the growing season. Because of these changes the Tribe perhaps has more to lose and greater gains to be had by reducing GHG emissions, and stopping the global increase in temperatures. The attached report gives a small snapshot into the Tribe and their daily struggle to flourish in this environment.



Indian Township's history is closely aligned with the Tribal Community's natural resources and their 12,500+-year history of life within the region. Hunting, trapping, and fishing in these watersheds were divided among families, and the early Passamaquoddy fully occupied their tribe's territory. During the 1800s the Passamaquoddy living at Sipayik, or Pleasant Point, subsisted chiefly by fishing and sealing. Logging was the mainstay at Indian Township supplemented by hunting, fishing, trapping, basket making and guiding. Later in the century, the Passamaquoddy worked in logging and lumbering with side occupations in fur trading, and the making of snowshoes, ax handles, canoe paddles and canoes.

All of these activities would have been closely aligned with a stable unchanging climate.

## Natural Resources

Today Indian Township has abundant water resources. Surface waters which include a number of streams and a portion of several great ponds (lakes). Of particular importance to the tribe are the four lakes: Big, Long, and Lewey Lakes and Grand Falls Flowage. All four lakes are part of the St Croix watershed, forming the southern boundary of Indian Township with the neighboring towns of Baileyville and Princeton, and the unorganized territories of Fowler and Big Lake Townships. Overall, the water quality in Indian Township waterways is good. However changing weather patterns are affecting summer turbidity from heavy precipitation events leading to increased water column temperatures and increased stress and mortality of species, [appendix 1](#). The waters of Indian Township are now under a greater threat from the discovery, in the fall of 2019, of large communities of the invasive variable – leaved watermilfoil (VWM), *Myriophyllum heterophyllum*.

Rich in natural resources that contribute greatly to quality of life and the community's economy. Indian Township has many natural resources, including extensive wildlife habitat. The Bald eagle, a species of special concern; the Black tern, an endangered species; and the Tomah mayfly, a threatened species, are found on the reservation. Natural resources on Indian Township are protected through a variety of federal, state and tribal regulations, and through public and private land conservation efforts.

The Indian Township deer wintering yard is the second largest in the county at 10,000 to 13,000 acres in size. This habitat extends to the west into Grand Lake Stream and south into Princeton. This is the last remaining historic older growth coniferous high-closure canopy in the county. It is the most important wildlife habitat on Indian Township and serves as the refuge for wintering deer for the entire area.

Blueberries, wreath production, timber harvesting and maple syrup processing are the major agricultural and forestry uses in Washington County and on the tribes extended trust lands. All of these uses are present in Indian Township and support a number of jobs in the local economy. About seventy-five per cent of Indian Township is forested with a red spruce-balsam, fir-eastern hemlock forest that also includes patches dominated by, heart-leaved paper birch, red maple, white pine, and extensive areas of forested wetlands. There are several large sections of designated forestland within Indian Township. There are no soils in Indian



Township listed as farmland or as farmland of statewide significance. The most significant agricultural activity in Indian Township is back yard gardens.

## Transportation

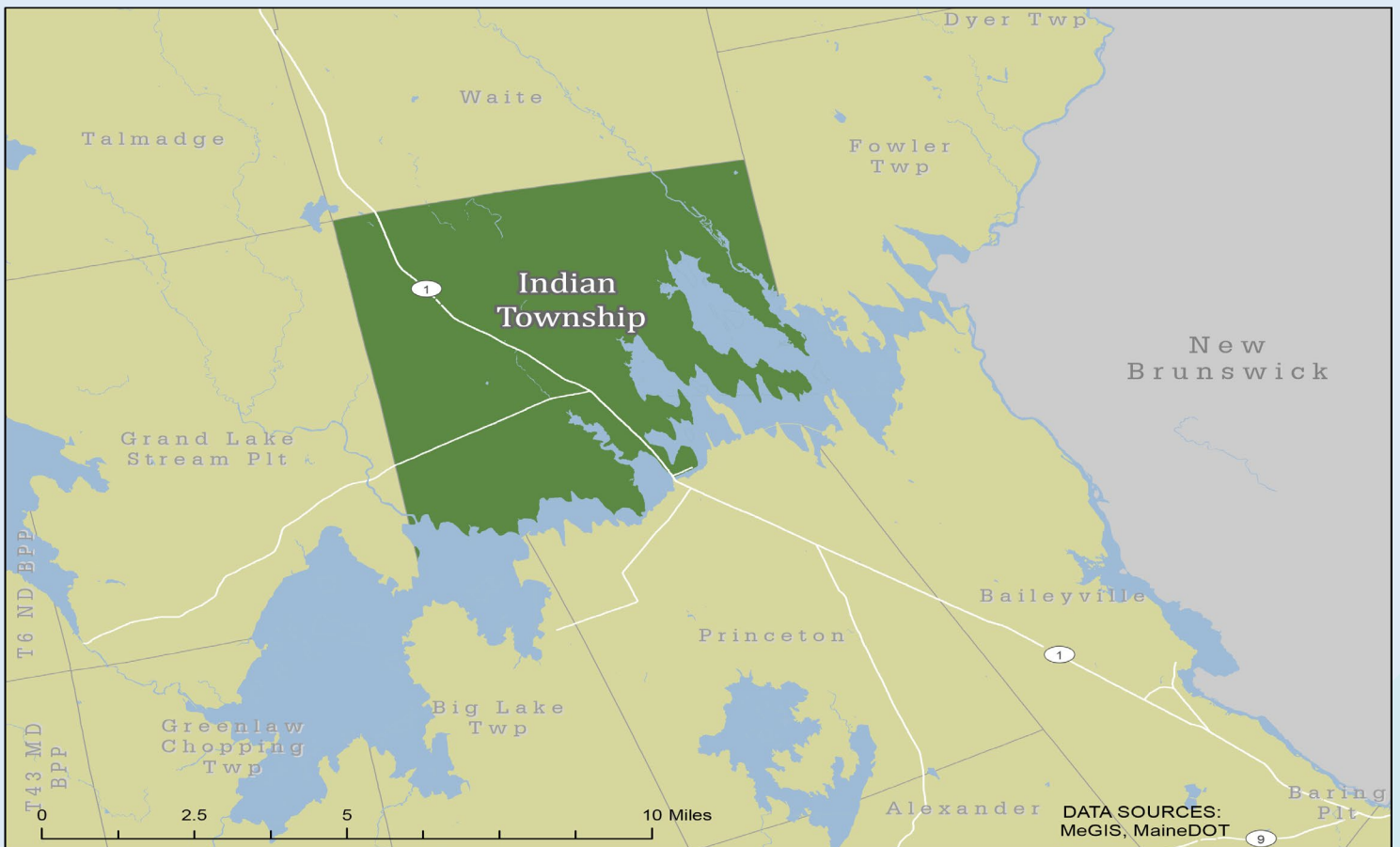
The primary transportation linkage in Indian Township consists of US Route 1 (US-1), which bisects the reservation from southeast to northwest, and serves as the primary transportation corridor for passenger vehicles and freight traffic. The two other major roads running through the reservation are Grand Lake Stream Road and Peter Dana Point Road. Indian Township and the entire region are reliant on Route 1 as the primary means of transportation movement. Overall, roadways in Indian Township are in fair to good condition.

Sidewalks are located along the section of Route 1. A recreational biking, walking and ATV trail now connects to this and runs through the woods out to the end of the Pit road which is close to Peter Dana Point. It is hoped in the future to add a sidewalk from the end of the Pit road and traverse through the community.

Over the next 20 years, as funding permits, the Tribe proposes to improve their transportation network to provide better connections between existing and future residential neighborhoods and businesses, public facilities, tribal lands, and recreational facilities. These connections will likely include new roadways, sidewalks, and multi use trails. Investments in critical transportation infrastructure will help to ensure the future of the Indian Township Reservation as a stable and prosperous community where tribal members can live, work, and thrive.

# Map 1: Location

Indian Township Comprehensive Plan Update (2014)



## Public Facilities

Indian Township maintains a variety of public facilities and services including a Tribal Government office, a 24-hour Fire Department, an Ambulance and Rescue system, Police Department, Warden Service, Dispatch Department, Tribal Health Center, a Recreation Center, and Tribal trails and parks. The Indian Township ambulance service provides 24-hour emergency assistance to other communities on a contract basis. The Police department will answer calls when needed anywhere in the county. Indian Township has a mutual aid agreement with the Washington County

Most of Indian Township is served by public water and public sewerage. The wastewater aerobic water treatment lagoon and spray irrigation system is fed by multiple lift stations and pumps throughout the reservation.

## The Changing Climate

The Passamaquoddy Tribe by their own oral history trace their roots back to the last ice age over 12,000 years ago. As such the tribe has seen vast climate changes since that time as the ice retreated, but today these changes are being concentrated and coming at a much faster pace. Stories abound in the form of citizen science from interviewed Tribal elders of the changes being seen.

These climate changes threaten the spiritual, and the economic livelihoods of Tribal members. Temperature rises negatively impact the health and geographical range of brown ash and sweet grass. As the Brown Ash's range moves further north so this impacts the ability of the Passamaquoddy basket to gather these materials, and to continue a traditional craft. Both the ash and the sweetgrass are pivotal to the making of Passamaquoddy ash baskets.



Made by Slyvia Gabriel 2004

Temperature rises have also led to shorter ice seasons. Later ice over and documented earlier ice out dates reduce the number of days that tribal members can fish for land locked salmon and white perch. This smaller ice season allows more time for algae growth and can result in more turbidity and less oxygen in the water column which leads to stressed species.. From a safety perspective this also means that the ice is generally thinner, and can lead to break throughs resulting in death by drowning or hypothermia.

Water temperature rises along with less ice can also lead to a much more beneficial environment for invasive species growth as their habitat moves north. A case in point is the discovery of the variable watermilfoil (VWM), *Myriophyllum heterophyllum* in surrounding tribal waters. Earlier ice out gives this invasive more open water days to get a jump on the growing season and impact both tribal fisheries and spiritual activities.

Ticks have also seen an explosion in numbers within the State of Maine. Along with the ticks come various diseases such as Lyme disease, anaplasmosis, babesiosis, *Borrelia miyamotoi* disease, and Powassan encephalitis all found in the State of Maine. Moose are the most important sustenance species and populations are declining rapidly. 2023 was the lowest moose harvest on record with only 38 moose taken during the sustenance season. Moose thrive in deep snow and cold temperatures. The lack of snow and cold also allows the winter tick population to thrive.

Winter ticks are the number one factor affecting moose populations such that in some areas calves may suffer a 50% mortality rate due to weight and blood loss. Recent climate change in the form of shorter, milder winters has allowed winter ticks to thrive. Despite their name, winter ticks can't survive cold winters without a host. Late falls give nymphs extra time to find one, and early springs give females abundant leaf litter to lay their eggs in. <https://www.maine.gov/ifw>

Increased temps and lack of snow will affect most if not all of the Passamaquoddy sustenance and ceremonial wildlife.

Some examples: snowshoe hare and ruffed grouse depend on cold temperatures and deep snow. They have adapted to thrive in these conditions. The changing climate has decreased their numbers. Hares have evolved to have huge hind feet to stay on top of snow and avoid predators. Lack of snow gives the predators the advantage. Ruffed grouse will often roost under the snow. This allows them to conserve energy because of the insulating properties of snow. This also helps them avoid predation. They are the two most important small game sustenance species for the tribe.

Anadromous fish and resident cold-water fish are also affected by the warming climate. Brook trout populations are on the decline due to warming water. Anadromous alewife and eel are also negatively impacted by the warming temperatures.

These species will eventually be absent from Passamaquoddy lands as their geographic range shifts to the north. Other non-native wildlife has already started to encroach. Possums and grey fox are now present in central and eastern Maine, *Passamaquoddy wildlife department*.

#### LIDAC statement

The Passamaquoddy Tribe is considered a Low Income Disadvantaged Community (LIDAC) in totality. As such any activities to improve the lives through quality employment and through health directly benefit a LIDAC community.

A case in point is the life expectancy on the reservation currently stands at 49 years. The country with the lowest rate in the world in Lesotho, Africa at 50 years!

## Indian Township PCAP Greenhouse Gas Inventory (GHG)

A greenhouse gas (GHG) inventory is a list of emission sources and the associated emissions quantified using standardized methods <https://www.epa.gov>.

## Scope

The scope of this GHG inventory was kept to the boundaries of the reservation itself. There are two areas of concentration within the reservation that are applicable for this inventory. One is along US Route One, a mixed use area of tribal housing, the tribal government administration building, tribal service buildings, a tribal recreation building and one large commercial lot. The second area of concentration is the area known as Peter Dana Point. This again is primarily a tribal housing area, but there is also the tribal clinic, a K through 8 tribal school and the public works building. There are no commercial lots in this area.



Indian Township Reservation north west of the US Route One Bridge



Peter Dana Point

Under this project, PIT will identify, evaluate, and utilize existing data resources to develop a tribal inventory of the major sources of anthropogenic greenhouse gas (GHG) emissions within the Indian Township reservation, and use that inventory data to help develop a primary climate action plan (PCAP). There are five steps

1. Develop a comprehensive GHG inventory for the largest anthropogenic sources within the reservation,
2. Develop options for reducing these emissions within the reservation,
3. Develop estimates or ranges of estimates for reductions achievable under each option,
4. Develop uncertainty analyses for each option's emissions reduction estimate, and
5. Present these analyses and options in technical reports that can be used to develop the Comprehensive Climate Action Plan.

**First Step: Develop a comprehensive GHG inventory for the largest anthropogenic sources within the reservation,** What are we concerned about here and why?

What are greenhouse gases? First and foremost there are two types of greenhouse gases. anthropogenic, or human caused such as burnt gasoline, and then there is natural emissions such as methane from the breakdown of organic matter in bogs. We are only concerned with the anthropogenic type here.

Facts: Earth's temperature has risen by an average of 0.11° Fahrenheit (0.06° Celsius) per decade since 1850, or about 2° F in total.

- The rate of warming since 1982 is more than three times as fast: 0.36° F (0.20° C) per decade.
- 2023 was the warmest year since global records began in 1850 by a wide margin.
- It was 2.12 °F (1.18 °C) above the 20th-century average of 57.0°F (13.9°C).
- It was 2.43 °F (1.35 °C) above the pre-industrial average (1850-1900).
- The 10 warmest years in the historical record have all occurred in the past decade (2014-2023).

According to the [2017 U.S. Climate Science Special Report](#), if yearly emissions continue to increase rapidly, as they have since 2000, models project that by the end of this century, global temperature will be at least 5 degrees Fahrenheit warmer than the 1901-1960 average, and possibly as much as 10.2 degrees warmer. If annual emissions increase more slowly and begin to decline significantly by 2050, models project temperatures would still be at least 2.4 degrees warmer than the first half of the 20<sup>th</sup> century, and possibly up to 5.9 degrees warmer.

<https://www.climate.gov>

What pollutants are we emitting that cause these temperature increases:

The list below are generally agreed to be the major causes of this warming trend.

- **Carbon dioxide (CO<sub>2</sub>)**

There are both natural and anthropogenic sources of carbon dioxide emissions. Natural sources include decomposition, ocean release and respiration. Anthropogenic sources come from activities like cement production, deforestation as well as the burning of fossil fuels like coal, oil and natural gas <https://www.che-project.eu>

- **Methane (CH<sub>4</sub>)**

Methane is also produced naturally, and from anthropogenic activities. Methane (CH<sub>4</sub>) is a hydrocarbon that is a primary component of natural gas. Methane is also a greenhouse gas (GHG), so its presence in the atmosphere affects the earth's temperature and climate system. Methane is emitted from a variety of anthropogenic (human-influenced) and natural sources. Anthropogenic emission sources include landfills, oil and natural gas systems, agricultural activities, coal mining, stationary and mobile combustion, wastewater treatment, and certain industrial processes. Natural production is from many natural sources but one of the largest is from wetlands and decaying vegetation.

Methane is the second most abundant anthropogenic GHG after carbon dioxide (CO<sub>2</sub>), accounting for about [16 percent of global emissions](#). Methane is more than 28 times as potent as carbon dioxide at trapping heat in the atmosphere. Over the last two centuries, methane concentrations in the atmosphere have more than doubled, largely due to human-related activities. Because methane is both a powerful greenhouse gas and short-lived compared to



carbon dioxide, achieving significant reductions would have a rapid and significant effect on atmospheric warming potential <https://www.epa.gov/gmi/importance-methane>

- **Nitrous oxide (N<sub>2</sub>O)**

In 2021, nitrous oxide (N<sub>2</sub>O) accounted for 6% of all U.S. greenhouse gas emissions from human activities. Human activities such as agriculture, fuel combustion, wastewater management, and industrial processes are increasing the amount of N<sub>2</sub>O in the atmosphere. Nitrous oxide is also naturally present in the atmosphere as part of the Earth's nitrogen cycle and has a variety of natural sources. Nitrous oxide molecules stay in the atmosphere for an average of 121 years before being removed by a sink or destroyed through chemical reactions. The impact of 1 pound of N<sub>2</sub>O on warming the atmosphere is 265 times that of 1 pound of carbon dioxide. <https://www.ipcc.ch/report/ar5/wg1/>

- **Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), Sulfur hexafluoride (SF<sub>6</sub>)**

Hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride are synthetic, powerful greenhouse gases that are emitted from a variety of household, commercial, and industrial applications and processes. Fluorinated gases (especially hydrofluorocarbons) are sometimes used as substitutes for stratospheric [ozone-depleting substances](#) (e.g., chlorofluorocarbons, hydrochlorofluorocarbons, and halons). Fluorinated gases are typically emitted in smaller quantities than other greenhouse gases, but they are potent greenhouse gases. With [global warming potentials \(GWPs\)](#) that typically range from thousands to tens of thousands, they are sometimes referred to as high-GWP gases because, for a given amount of mass, they trap substantially more heat than CO<sub>2</sub>. <https://www.epa.gov/ghgemissions/overview-greenhouse-gases>

## Passamaquoddy Tribe inventory of GHG emissions.

### Mobile combustion

The tribal inventory of mobile combustion sources was calculated using the Local GHG Inventory Tool – Community Module. <https://www.epa.gov/statelocalenergy/forms/download-local-greenhouse-gas-inventory-tool-and-sign-updates>

It is a requirement for all tribes using this tool to have an approved QAPP. Indian Township's QAPP was approved and signed November 2, 2023.

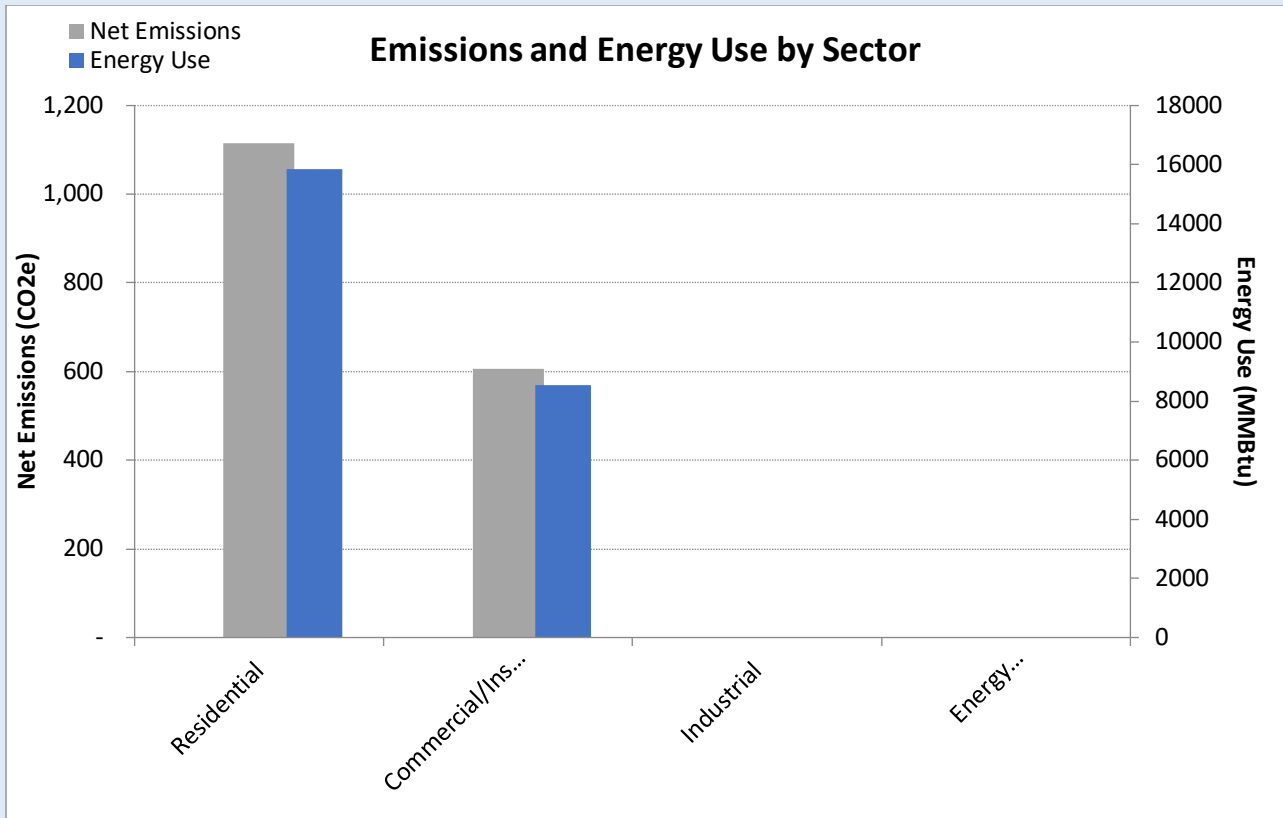
The project manager (PM) accessed invoices from the tribal finance office for all government departments for both gasoline and diesel vehicles over the 2022 calendar year. The departments records audited were as follows:

EMS Ambulance  
 Public Works Department  
 Tribal Community Service Vans  
 Mealsite Delivery Van  
 Warden Service  
 Tribal Health Clinic Vans  
 Tribal Housing Dept Trucks  
 Tribal Police Dept  
 Tribal Fire Department  
 Wildlife Department  
 Environmental Dept  
 Forestry Dept.

Also private vehicle drivers mileage over 2022 was accessed from vehicle registration documents on file at the tribal clerks office.

Net Diesel/Gasoline Emissions by Sector (CO <sub>2</sub> e)				
	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	TOTAL
<b>Residential</b>	1,115	-	-	1,115
<b>Commercial/Institutional</b>	605	-	-	605
<b>Industrial</b>	-	-	-	-
<b>Energy Generation</b>	-	-	-	-
Total Mobile Emissions	1,721	-	-	<b>1,721</b>

Energy Use Summary						
	Gasoline	Diesel	Biodiesel (B5)	Biodiesel (B20)	Ethanol (E85)	
Units	Gallons	Gallons	Gallons	Gallons	Gallons	
<b>Residential</b>	124,736	1,969	-	-	-	126,705
<b>Commercial/Institutional</b>	57,726	9,659	-	-	-	67,385
<b>Industrial</b>	-	-	-	-	-	-
<b>Energy Generation</b>	-	-	-	-	-	-
-	182,462	11,628	-	-	-	<b>194,090</b>

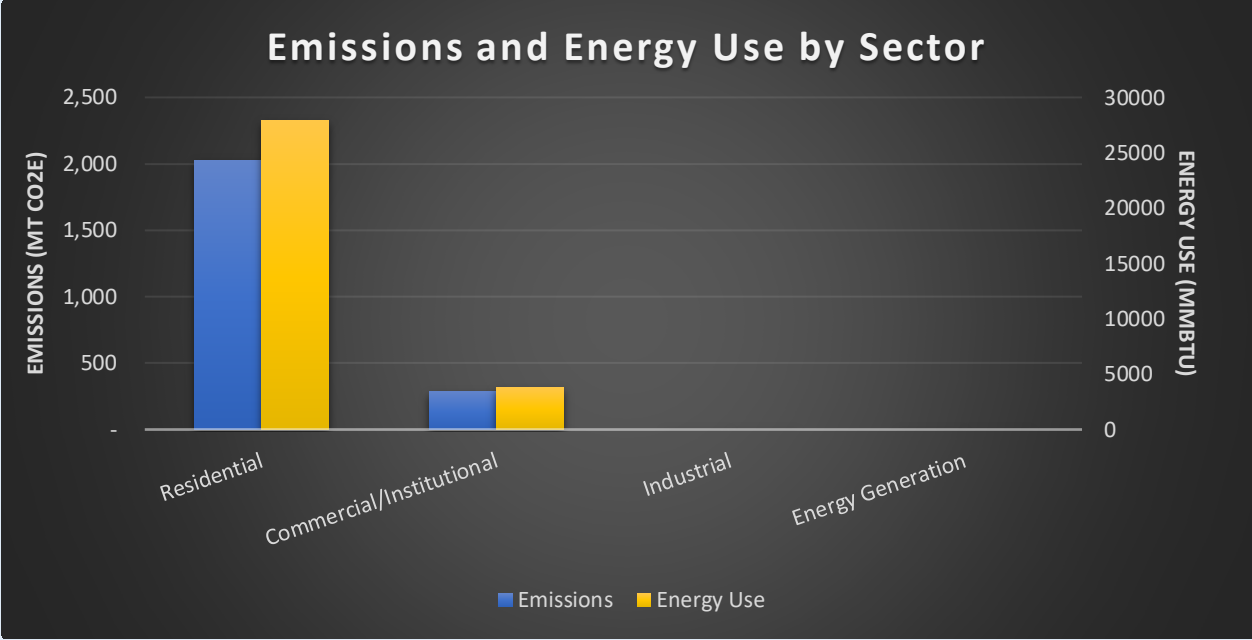


### Stationary GHG Emissions Inventory – Heating

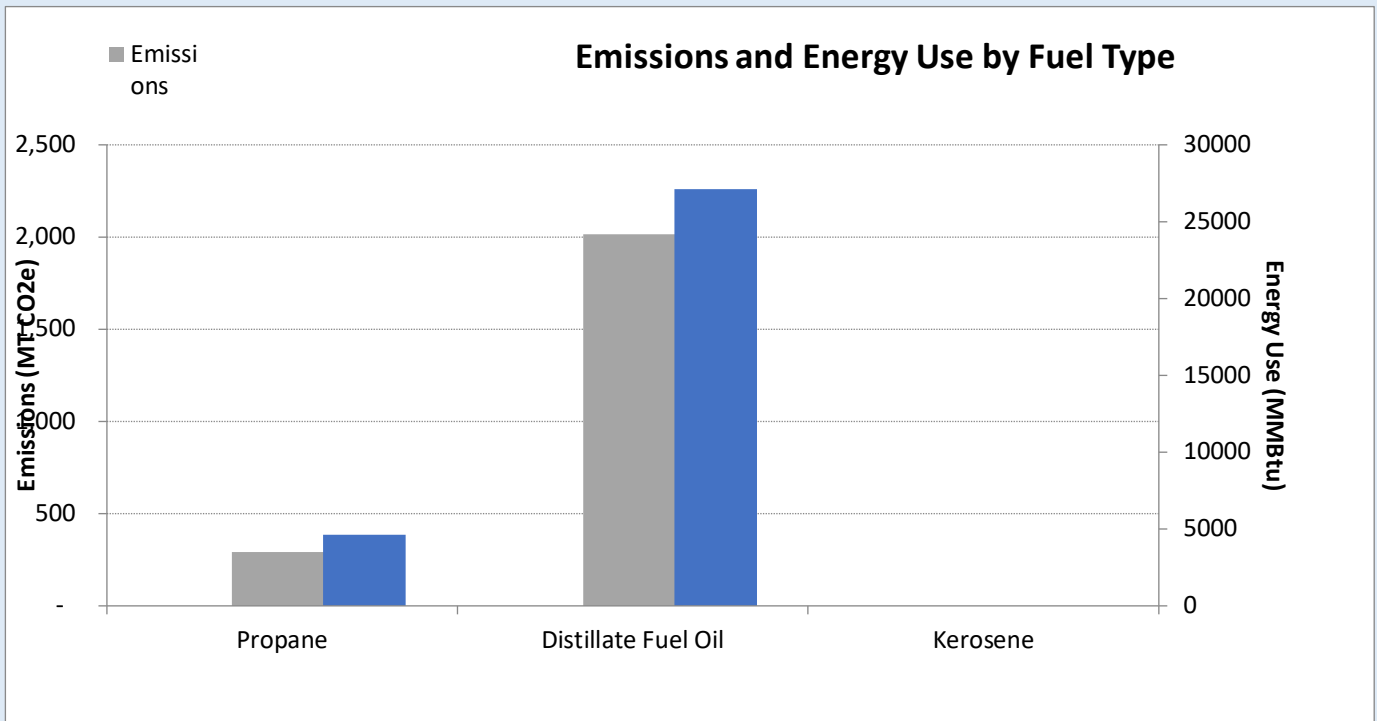
Stationary units data was again accessed for tribal government buildings from copies of distillate fuel oil, or number 2 heating oil and propane bills under file in the finance office. Private homes usage was obtained from Tammaro Oil, the largest propane and oil supplier for the reservation. Obviously these numbers are to be considered an estimate as we were unable to obtain private homeowner bills for oil and propane consumption.

Fuel and Energy (MMBtu) Use by Sector				
Sector	mcf	gal	tons	Energy Use
Residential	-	218,197	-	27,894
Commercial/Institutional	-	27,893	-	3,822
Industrial	-	-	-	-
Energy Generation	-	-	-	-
<b>Total Stationary Combustion Energy Use</b>	-	246,090	-	<b>31,716</b>

Emissions by Sector (MT CO <sub>2</sub> e)				
Sector	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	Total
Residential	2,017	2	5	2,024
Commercial/Institutional	282	0	1	283
Industrial	-	-	-	-
Energy Generation	-	-	-	-
<b>Total Stationary Combustion Emissions</b>	<b>2,299</b>	<b>2</b>	<b>6</b>	<b>2,307</b>



Emissions by Fuel Type				
Fuel Type	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	TOTAL
Natural Gas	-	-	-	-
Diesel	-	-	-	-
Gasoline	-	-	-	-
LPG	-	-	-	-
Propane	290	0	1	291
Butane	-	-	-	-
Residual Fuel Oil No. 5	-	-	-	-
Residual Fuel Oil No. 6	-	-	-	-
Jet Fuel	-	-	-	-
Digester Gas	-	-	-	-
Distillate Fuel Oil	2,010	2	5	2,016
Kerosene	-	-	-	-
Residential Coal	-	-	-	-
Commercial Coal	-	-	-	-
Industrial Coal	-	-	-	-
Electric Power Coal	-	-	-	-
<b>Total Emissions from Stationary Fuel Combustion</b>	<b>2,299</b>	<b>2</b>	<b>6</b>	<b>2,307</b>



Fuel and Energy Use by Type			
Fuel Type	Fuel Consumed		Energy Use (MMBtu)
Natural Gas	0	mcf	-
Diesel	0	gal	-
Gasoline	0	gal	-
LPG	0	gal	-
Propane	50,629	gal	4,607.24
Butane	0	gal	-
Residual Fuel Oil No. 5	0	gal	-
Residual Fuel Oil No. 6	0	gal	-
Jet Fuel	0	gal	-
Digester Gas	0	tons	-
Distillate Fuel Oil	195,461	mcf	27,108.58
Kerosene	0	mcf	-
Residential Coal	0	mcf	-
Commercial Coal	0	mcf	-
Industrial Coal	0	mcf	-
Electric Power Coal	0	mcf	-
<b>Total Stationary Fuel Consumed</b>			<b>31,715.82</b>

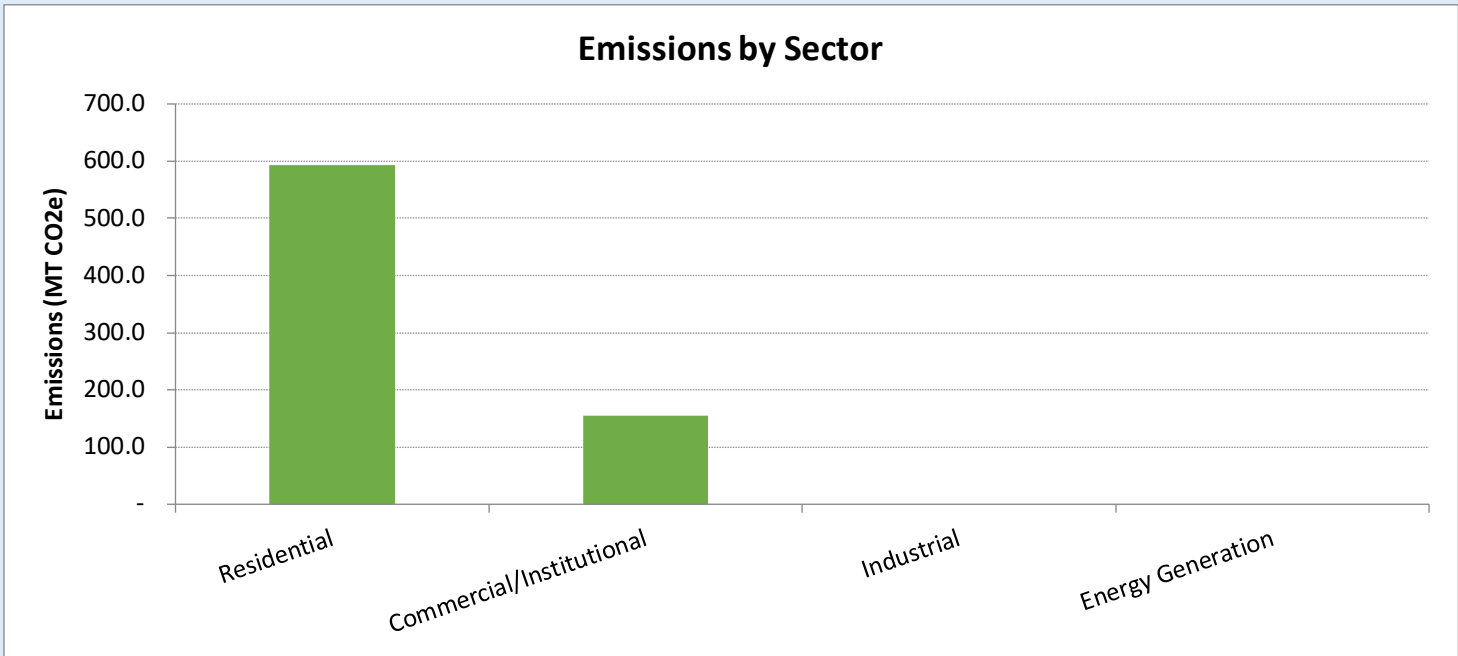
## Tribal inventory of electric power consumption (indirect) GHG emissions.

The PM accessed tribal government departments invoices from the finance office for electric usage supplied by the Eastern Maine Electric Cooperative, Calais, Maine. Electric usage for private homes had to be mostly estimated as these bills were not available. However, it is agreed by the State of Maine Governor’s Energy Office that the average electrical use for a 1,000 square foot home is 550 KwH. We also had an electrical bill for one private home of 500 square feet that equated to an average usage of 190 KwH use per annum, and another bill for a 2200 square foot home that equated to 1058 KwH. Other home annual usages were pro-rated from these figures.

Tribal Homes Estimated Annual Electrical Usage			
Square Feet	KwH / month	Number of homes	Annual usage
500	190	10	22800
600	262	5	15720
700	334	1	4008
800	406	4	19488
900	478	53	304008
1000	550	76	501600
1100	583	11	76956
1200	616	39	288288
1300	649	5	38940
1400	682	24	196416
1500	715	13	111540
1600	748	9	80784
1700	781	2	18744
1800	814	5	48840
2000	880	29	306240
2200	1058	1	12696
2500	1325	10	159000
2700	1587	1	19044
3000	1763	10	211560

*Reproduced below are scope 2 emissions from grid electricity usage using the location based method.*

*Electricity use by sector shows the total amount of grid purchased electricity usage and does not include kWh purchased through contractual instruments (e.g., REC’s, PPA’s). Emissions are calculated by each utility entered on the Electricity-Entry tab, by sector, using exclusively the eGRID emissions rate.*



Electricity Use by Sector (in kWh)	
Sector	kWh
Residential	2,436,672
Commercial/Institutional	638,367
Industrial	-
Energy Generation	-
<b>Total Electricity Use</b>	<b>3,075,039</b>

Emissions by Sector (in CO <sub>2</sub> e)				
	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	Total
Residential	590.3	0.7	1.6	592.7
Commercial/Institutional	154.6	0.2	0.4	155.3
Industrial	-	-	-	-
Energy Generation	-	-	-	-
<b>Total Emissions from Electricity Use</b>	<b>744.9</b>	<b>0.9</b>	<b>2.1</b>	<b>748.0</b>



### Tribal GHG emissions from water

All water on the reservation is provided to homes and offices from drilled wells on the reservation. GHG emissions from pumps are counted in the electrical usage from the public works department.

### Tribal inventory of GHG emissions and sinks from urban forestry.

By definition - "Urban forestry is defined as *the planting, maintenance, care and protection of tree populations in urban settings*", There is no urban forestry on Indian Township.

### Tribal inventory of GHG emissions from other sectors.

#### Agriculture and Land Management

There have been a couple of past attempts to farm land on Indian Township but these have both failed. One was a cranberry operation and the other was hemp. At this time no other operations are planned so GHG emissions are zero.

#### Solid Waste Management

The Tribe has a weekly pickup of trash from the public works department. There is almost zero recycling on the reservation due to economies of scale. There is a small amount of bottle recycling on the reservation. At the transfer station white goods are collected and picked up sporadically for their scrap metal value. The GHG emissions resultant from power used by the transfer station have been counted. Solid waste is picked up curb side weekly throughout the reservation. This is then transported to Calais and then crosses the border into Canada where it is trucked to a landfill operated by the Southwest New Brunswick Service Commission. This is a round trip of 120 miles. GHG emissions from fuel used have been counted.

#### Inventory of Waste Water treatment GHG emissions

The wastewater treatment on Indian Township is by an aerobic lagoon system. Wastewater is transported to the lagoons through a number of different lift stations to accommodate terrain. Electric pumps are used to lift water, and these emissions have been counted in the electric power consumption data from the Public Works department. Once at the lagoon site water is first held in aerating ponds until it meets the necessary BOD requirements before moving to large settlement ponds. From here it is sprayed into the woods for absorption into the soil.



### Indian Township Wastewater Lagoon

It is well understood that wastewater lagoons and aerobic aeration ponds are a significant contributor to Carbon Dioxide (CO<sub>2</sub>), Methane (CH<sub>4</sub>) and Nitrous Oxide (N<sub>2</sub>O) emissions. In fact methane emissions from waster found have been found to contribute 5% of the global methane emissions. *M. El-Fadel, M. Massoud, MEWM, EP 144, 177 (2001)*. While methane emissions are a significant contributor to GHG emissions the determination of this data for Indian Township is beyond the scope of this inventory at this time.

## GHG Priority Reduction Measures

### Transportation – Mobile Sources

The transportation sector as shown in this report pumps out a considerable amount of CO<sub>2</sub> to the atmosphere, in this case 1115 mt CO<sub>2e</sub> so this would certainly be considered a priority to reduce.

In a location that is extremely rural motorized transport is essential for accessing food and healthcare. The distance to Calais hospital is 25 miles, for a more serious problem or treatment for cancer, then the journey is 91 miles to Bangor. Added into that is the weather, which while it

is changing, we still see brutally cold temperatures during the winter. There is a minor van service operated by the clinic that is available to persons of limited income, or if they are unable to drive due to a physical ailment. This van service is also used for deliveries of vital medicines to persons of limited means. Also due to Indian Township's location many persons within the tribe rely heavily on 4x4 trucks to access their camps or to hunt and fish where a more economical smaller more efficient car is impracticable.

So to reduce mobile emissions in this community would be extremely challenging. However, as technology changes and the efficiency and practicality of electric vehicle improves then these options will become more desirable. The challenge is getting people to accept electric cars as a viable means of transportation within this community, and getting the necessary infrastructure in place for charging. The biggest complaint heard is the stress felt by the driver of constantly worrying about the range of the vehicle and where can it be plugged in to recharge. Then add in to the mix the cold temperatures and sacrificing the range for heat. If you run out of a charge you can't sit at the side of the road and keep warm. One can see an uphill battle in convincing people to change. Currently, the closest charging station is at the Baileyville Big Stop approximately 14 miles south of the reservation.

Private small vehicle ownership would most likely be the area to impact initially. But here there are only a total of 29 passenger vehicles, so the impact would be minor. The next largest segment would be the SUV market, but currently EV SUV options are limited. The final segment would be the 4X4 truck market which would be the most difficult to impact because old opinions die hard amongst people that use trucks for working in the woods. But with the new For EV truck on the market these opinions get lost in all the benefits of this and other truck models coming to market in 2024.

The one area that would be extremely difficult to convert to electric vehicles are the emergency services which encompass the Police, fire, ambulance and warden services. Even though these services have a relatively small number of vehicles their impact is large. One big reason for this is that vehicles are left idling so that they are ready to go at moments notice. Fuel usage during winter months is three times as much as during the summer as vehicles may be idling all night.

Proposed measures to promote acceptance:

- A multi bay EV charging station at or near to the Tribal Office that is supplemented with solar power.
- EV charging outlets at homes powered by solar.
- Financial incentives to convert to an electric vehicle upon the relinquishment of their gasoline powered vehicle.

Multi Bay EV Charging Station	
Implementing Agency	Indian Township Passamaquoddy Tribe
Geographic Location	Govt. Admin Building Car Park
Funding Sources	US Dept. of Energy Grant
Metrics	Project construction plans followed by construction reports and final report
Sector	Mobile Data
Cost	\$350,000
Annual estimated GHG and criteria air pollutant emission reductions	112 metric tons of CO <sub>2</sub>

Household EV Charging Stations	
Implementing Agency	Indian Township Passamaquoddy Tribe
Geographic Location	Indian Township Homes
Funding Sources	US Dept. of Energy Grant
Metrics	Project construction plans followed by construction reports and final report
Sector	Mobile Data
Cost	\$7500 per home X 160 homes \$1,200,000
Annual estimated GHG and criteria air pollutant emission reductions	112 metric tons CO <sub>2</sub>

## Stationary Units / Electricity Usage Data

Stationary units in private homes or commercial buildings are powered by a combination of wood, No.2 home heating oil, or distillate fuel oil, propane and/or electricity.

## **Tribal homes**

All of the homes on the reservation have been built in phases as funding has been made available. A large percentage of the homes are in the 1000 to 1200 square feet range. As such many of the homes were built when older construction codes were in place and combined with a lack of oversight many of these lack proper insulation, have old ill-fitting windows and inefficient heating systems. This results in unnecessary GHG impacts and health impacts from mold and poor air quality.

### **Reduction Measure**

All homes will need an energy audit to determine heat loss. Homes should be re-insulated dependent upon the structure and accessibility of the home. Measures could include blown in insulation in the attics and walls, foam insulation applied to the ceiling rafters of the basement. New energy efficient windows. The replacement of old inefficient oil boilers. Upgrading old woods stoves to ne EPA compliant stoves. Upgrading appliances to newer more efficient models and the installation of hybrid water heaters along with the installation of mini split heat pumps to heat the homes efficiently. Also, a Tesla PowerWall 3 and integrated rooftop solar system strategy solar roof system capable of producing 640kW DC and coupled with 1,350kWh of collective storage capacity is also expected to significantly reduce emissions.

## **Tribal Government Offices**

Tribal Government Offices, such as the administration building, health clinic, housing etc are generally of a much newer construction and generally seem to be well built and well insulated, however it is recommended that an energy audit be performed on these buildings as well.

Currently it is proposed that the Tribal administration building and the Tribal clinic be connected to solar, note, all solar for this community must be ‘behind the meter’, no solar fields are allowed.

The Tribe is also seeking further funding and preferential pricing to install heat pump split units in all tribal administration buildings.

Household Blown in Insulation/foam	
Implementing Agency	Indian Township Passamaquoddy Tribe
Geographic Location	Indian Township Homes
Funding Sources	US Dept. of Energy Grant
Metrics	Project construction plans followed by construction reports and final report
Sector	Stationary data
Cost	Average home 1200 sqft \$7500
Annual estimated GHG and criteria air pollutant emission reductions	1.5 metric tons CO <sub>2</sub> per household

Household Woodstove upgrade to EPA stove	
Implementing Agency	Indian Township Passamaquoddy Tribe
Geographic Location	Indian Township Homes
Funding Sources	US Dept. of Energy Grant
Metrics	Final report
Sector	Stationary Data
Cost	\$1500 per home X 70 homes \$105,000
Annual estimated GHG and criteria air pollutant emission reductions	1 metric ton CO <sub>2</sub> per household

Household Window Relacement	
Implementing Agency	Indian Township Passamaquoddy Tribe
Geographic Location	Indian Township Homes
Funding Sources	US Dept. of Energy Grant
Metrics	Project construction plans followed by construction reports and final report
Sector	Stationary Data

Cost	\$20,000 per home X 160 homes \$3,200,000
Annual estimated GHG and criteria air pollutant emission reductions	3.5 metric tons CO <sub>2</sub> per household

Household Solar and Tesla Power Wall 3	
Implementing Agency	Indian Township Passamaquoddy Tribe
Geographic Location	Indian Township Homes
Funding Sources	US EPA IRA grant
Metrics	Project construction plans followed by construction reports and final report
Sector	Stationary Data
Cost	\$32000 per home X 100 homes \$3,200,000
Annual estimated GHG and criteria air pollutant emission reductions	1.5 metric tons CO <sub>2</sub> per household

## Solid Waste

There are two areas of solid waste that must be dealt with here in this report.

- Recycling. There is currently very little in the way of recycling on the reservation. The reason for this is economies of scale and a lack of equipment. There have been efforts in the past to recycle, which have included cardboard recycling and clothes for re-use. Both of these failed. There is one site in Princeton called Brown's recycling but this facility is set up for large collections of waste from manufacturing facilities and particularly the chip mill at Baileyville. The only recycling that does occur on the reservation is the collection and recycling of white goods that are held at the transfer station until a large enough load is available for pick up.

- Solid Waste is collected every Monday with a trash packer truck. This truck covers all homes on the reservation as well as the tribal government administrative offices. This truck is then driven to the Southwest New Brunswick Service Commission landfill in Canada. This round trip journey equates to a 96 mile trip. The emissions from the diesel fuel used here have been counted in the Local GHG Inventory Tool - Community Module. Electric garbage trucks are gaining more popularity and with ranges of around 230 miles this may fit very well into the tribal solid waste program.

Solid Waste EV Packer Truck	
Implementing Agency	Indian Township Passamaquoddy Tribe
Geographic Location	Indian Township Reservation
Funding Sources	US EPA IRA grant
Metrics	RFP to manufacturers followed by final report
Sector	Solid Waste/ Mobile Units
Cost	\$700,000
Annual estimated GHG and criteria air pollutant emission reductions	60 metric tons CO <sub>2</sub> annually

## Tribal Wastewater System

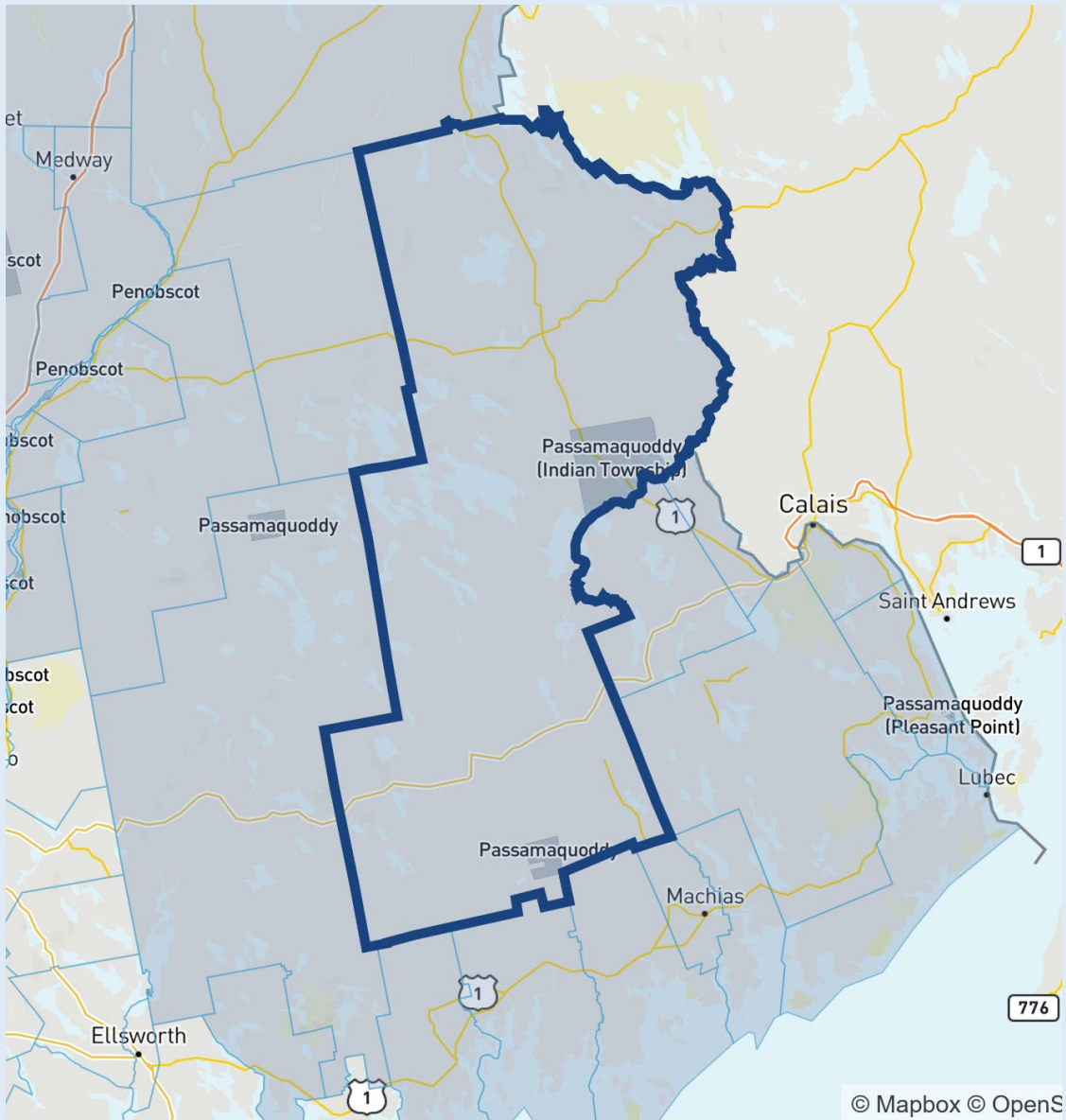
As previously mentioned, the tribe’s wastewater system is an aerobic lagoon system fed by aerated ponds. Wastewater is transferred to these ponds using electric powered lift pumps. Certainly, installing solar panels and a Tesla Power Wall 3 at the site of these lift pumps will remove the GHG emissions at these sites.



Lift Station Solar Panels and Tesla Power Wall 3	
Implementing Agency	Indian Township Passamaquoddy Tribe
Geographic Location	Indian Township Homes
Funding Sources	US EPA IRA grant
Metrics	Project construction plans followed by construction reports and final report
Sector	Stationary Data
Cost	\$35,000 per lift stations X 7 \$245,000
Annual estimated GHG and criteria air pollutant emission reductions	1.5 metric tons CO <sub>2</sub> per household

### **LIDAC statement**

The Passamaquoddy Tribe at Indian Township is a Low Income and Disadvantaged Community (LIDAC) and the reservation itself is situated in the LIDAC designated county of Washington County, Maine.



*Washington County LIDAC with Indian Township shown - EPA's Climate and Economic Justice Screening Tool (CEJST)*

The following selected list from the CEJST makes for some quite depressing reading, It is for Washington County as a whole and so Indian Townships figures are much worse. But one in particular that stands above others, that is not spelled out in this list, is that the adult life expectancy on the reservation stands at 49 years. Worldwide the only other country that comes close to this is Lesotho in southern Africa at 50 years.

The following are extracts from CEJST for Washington County. Figures for the reservation are likely to be worse.

- Low income

People in households where income is less than or equal to twice the federal poverty level, not including students enrolled in higher ed

86<sup>th</sup>

above 65<sup>th</sup> percentile

- Energy cost

Average annual energy costs divided by household income

99<sup>th</sup>

above 90<sup>th</sup> percentile

- Low income

People in households where income is less than or equal to twice the federal poverty level, not including students enrolled in higher ed

86<sup>th</sup>

above 65<sup>th</sup> percentile

- Asthma

Share of people who have been told they have asthma

94<sup>th</sup>

above 90<sup>th</sup> percentile

- Diabetes

Share of people ages 18 years and older who have diabetes other than diabetes during pregnancy

86<sup>th</sup>

not above 90<sup>th</sup> percentile

- Heart disease

Share of people ages 18 years and older who have been told they have heart disease

96<sup>th</sup>

above 90<sup>th</sup> percentile

- Low life expectancy

Average number of years a person can expect to live

47<sup>th</sup>

not above 90<sup>th</sup> percentile

AND **see note above**

- Low income

People in households where income is less than or equal to twice the federal poverty level, not including students enrolled in higher ed

86<sup>th</sup>

above 65<sup>th</sup> percentile

- Housing cost

Share of households making less than 80% of the area median family income and spending more than 30% of income on housing

24<sup>th</sup>

not above 90<sup>th</sup> percentile

- Lack of indoor plumbing

Share of homes without indoor kitchens or plumbing

91<sup>st</sup>

above 90<sup>th</sup> percentile

- Lead paint

Share of homes that are likely to have lead paint

56<sup>th</sup>

not above 90<sup>th</sup> percentile

AND

- Low income

People in households where income is less than or equal to twice the federal poverty level, not including students enrolled in higher ed

86<sup>th</sup>

above 65<sup>th</sup> percentile

- Low income

People in households where income is less than or equal to twice the federal poverty level, not including students enrolled in higher ed

86<sup>th</sup>

above 65<sup>th</sup> percentile

- Diesel particulate matter exposure

Amount of diesel exhaust in the air

1<sup>st</sup>

not above 90<sup>th</sup> percentile

- Transportation barriers

Average of relative cost and time spent on transportation

88<sup>th</sup>

not above 90<sup>th</sup> percentile

- Low income

People in households where income is less than or equal to twice the federal poverty level, not including students enrolled in higher ed

86<sup>th</sup>

above 65<sup>th</sup> percentile

- Low median income

Comparison of median income in the tract to median incomes in the area

82<sup>nd</sup>

not above 90<sup>th</sup> percentile

- Poverty

Share of people in households where income is at or below 100% of the Federal poverty level

83<sup>rd</sup>

not above 90<sup>th</sup> percentile

- Unemployment

Number of unemployed people as a part of the labor force

80<sup>th</sup>

not above 90<sup>th</sup> percentile

AND

- High school education

Percent of people ages 25 years or older whose high school education is less than a high school diploma

14%

Any investment in reducing GHG emissions on the reservation will not only help to achieve the goal of reducing GHG emissions but will also pay massive dividends in providing a better standard of living as well as more income producing jobs.

## Benefits Analysis

The benefits analysis for the Passamaquoddy proposed GHG reduction activities. The Passamaquoddy Tribe does not have any access to specific tribal data at this time to be able to identify base year estimates of each co-pollutant, including criteria pollutants (and/or precursors), air toxics, or hazardous air pollutants. We will therefore use samples from EPA’s National Emissions Inventory <https://awsedap.epa.gov/public/single/> to source data for Washington County Maine, of which the tribe is completely within its boundary.

Washington County, Maine	Pollutant	Pollutant Type	Emissions (Tons)
Electrical Generation from New Brunswick Power to Easter Maine Coop			No data available
Long & Short Haul Heavy/Light Duty Diesel/Petrol Trucks	Carbon Dioxide	GHG	62372
	CH <sub>4</sub>	GHG	1.3003
	N <sub>2</sub> O	GHG	1.203
Passenger Trucks/Cars non-diesel	Carbon Dioxide	GHG	119679
	CH <sub>4</sub>	GHG	6.37
	N <sub>2</sub> O	GHG	2.145
Solid Waste Truck	Carbon Dioxide	GHG	1103
	CH <sub>4</sub>	GHG	0.2050
	N <sub>2</sub> O	GHG	0.00238

## Tribal GHG possible reduction benefits

Building	Emissions MT's			Equivalency
	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	
Tribal Stationary Unit Buildings Institutional	283	0	1	Equivalent to 655 barrels of oil burned
Tribal Stationary Unit Buildings Residential	2,024	2	5	Equivalent to 4686 barrels of oil burned
Tribal Mobile Data Institutional	605	-	-	
Tribal Mobile Data Residential	1115	-	-	
Electricity Use – Institutional	590			
Electricity Use – Residential	155	0.7	1.6	

The environmental benefits to tribal members from reductions of ghg emission are many and far reaching. Lowering ghg emissions will help to slow climate changes and slow the migration of species as well as invasive species on their track northwards. Vital species that are essential to the very existence of the tribe, on a sustenance level, spiritual level and cultural level will remain for generations to co-exist with.

Health benefits will also be improved through a reduction in inhalable particles that can be the cause of upper respiratory diseases, as well as asthma of which Maine has some of the highest rates in the country. Benefits will be lower hospital admissions and clinic visitations. Inhalable particles will be also be significantly reduced from the changeover from combustion engines to electric vehicles as well as significant reductions in wood and oil particulates from home heating systems as they are changed over to solar to run split unit heat pumps. These benefits will also equate to longer life spans, and as the reader will recall the current life span on Indian Township is 49 years!

From an economic stand point changing over to solar and heat pumps will provide employment opportunities for tribal members for solar panel crews and heat pump crews.

## **Authority to Implement:**

The duly elected Tribal Chief and Vice Chief and the six members of the tribal council are recognized as the overarching authority of the Tribe at Indian Township and as such are authorized by the electors to act for the best benefits of the Passamaquoddy Tribe at Indian Township.