TOWN OF CHEBEAGUE ISLAND

2021 COMMUNITY AND MUNICIPAL GREENHOUSE GAS EMISSIONS INVENTORY

JANUARY 2024

Produced by the Chebeague Island Climate Action Team

ACKNOWLEDGEMENTS

The Chebeague Island Climate Action Team (CCAT) would like to thank the many people who assisted with the completion of this Greenhouse Gas (GHG) Inventory. We thank the Chebeague Island Boat Yard, Chebeague Transportation Company, Vinal Energy, Casco Bay Lines, Central Maine Power Company, and EcoMaine for providing data for the inventory. We also thank the Town of Chebeague for providing data related to municipal operations and, along with the Board of Selectmen, for empowering CCAT to complete this important work. Thank you to CCAT Teammate Greta Fleck, who helped develop the CCAT website which is an important tool for communicating the results of the GHG Inventory. We would also like to thank the Southern Maine Planning and Development Commission who developed the *Greenhouse Gas Inventory Protocol for Southern Maine Cities and Towns*. Finally, we would like to thank ICLEI for providing ClearPath training, reviewing the GHG Inventory, and supplying the report template.

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CCAT also has a number of Teammates who are not official members appointed by the Board of Selectmen but participate regularly and are instrumental in moving our work forward.

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COMMUNITY GREENHOUSE GAS (GHG) EMISSIONS INVENTORY

- 2021 community GHG emissions: **4,247.5 MT CO_2e** (metric tons of carbon dioxide equivalent)
- Emission contributions were distributed relatively evenly across transportation, waste, electricity, and heating activities.
- **Transportation was the greatest contributor to community emissions.**
  - 1,383.9 MT CO_2e, 32.6% of total emissions
- Across sub-sectors the greatest contributors to community emissions were:
  - **Burning fuel oil for heating**, 924.7 MT CO_2e, 21.8% of total emissions
  - **Personal car and truck transportation**, 746.3 MT CO_2e, 17.6% of total emissions
  - **Residential electricity use**, 740 MT CO_2e, 17.4% of total emissions
  - **Incinerated municipal solid waste**, 652 MT CO_2e, 15.4% of total emissions

MUNICIPAL GREENHOUSE GAS (GHG) EMISSIONS INVENTORY

- 2021 municipal GHG emissions: **62.4 MT CO_2e**
- **Fuel oil usage for heating buildings was the greatest contributor to municipal emissions.**
  - 34.5 MT CO_2e, 55.3% of municipal emissions
- Across sub-sectors the greatest contributors to municipal emissions were:
  - **Passenger vehicle transportation**, 8 MT CO_2e, 12.8% of municipal emissions
  - **Chebeague Island School electricity**, 7.4 MT CO_2e, 11.9% of municipal emissions
  - **Town Office & Public Safety Building electricity**, 6.2 MT CO_2e, 10% of municipal emissions

Emissions produced by municipal operations account for **1.5%** of total community-wide emissions.

INTRODUCTION

CHEBEAGUE ISLAND CLIMATE ACTION TEAM

In 2022, the Town of Chebeague Island was awarded a Community Action Grant through the Community Resilience Partnership, which is managed by the Governor's Office of Policy Innovation and the Future (GOPIF). The Chebeague Island Climate Action Team (CCAT) is an ad hoc committee established by the Board of Selectmen in 2022 to complete the tasks outlined in the Community Action Grant. These tasks include:

1. Community and Municipal Greenhouse Gas Emissions Inventory
2. Groundwater Sustainability Study
3. Chebeague Island Climate Vulnerability Assessment

This report represents the completion of the first task. The Groundwater Sustainability Study is ongoing, and work on the Chebeague Island Climate Vulnerability Assessment will begin in early 2024. For more information about CCAT, please visit our website: www.chebeaguecat.com.

WHY GREENHOUSE GAS INVENTORIES MATTER

Chebeague Island is already experiencing the impacts of climate change. Strong winter storms are intensifying coastal erosion. The Stone Pier, the island's primary transit point to the mainland, is flooded more regularly due to rising sea levels and storm surges, household wells are impacted by drought and saltwater intrusion, and increasing ocean temperatures are impacting the lobster population and local economy. These trends are expected to worsen in the future, so addressing greenhouse gas emissions—the root cause of climate change—is critical to managing these impacts and ensuring our island community is resilient into the future.

Over the course of the Earth's history, climate conditions have changed in response to natural fluctuations such as volcanoes, solar radiation, and tectonic shifts.[1] These environmental shifts affect the concentration of naturally occurring gasses in the atmosphere including carbon dioxide, methane, and nitrous oxide. These gasses encase the Earth like a blanket, trapping heat that is emitted from the Earth's surface and keeping us toasty warm. This phenomenon is known as the greenhouse effect, and it is why the Earth is inhabitable for humans. However, since the industrial revolution human activities have tipped the greenhouse effect into overdrive, heating up the Earth more rapidly than ever before. The most significant contributor is the burning of fossil fuels for transportation, electricity generation and heating buildings, which introduces large amounts of carbon dioxide and other greenhouse gasses (GHGs) into the atmosphere. The Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report confirms

[1] https://www.nrdc.org/stories/what-are-causes-climate-change

that human activities have unequivocally caused an increase in carbon emissions.[2] The impacts of this runaway greenhouse effect, or global warming, are numerous and varied across the globe. The climate is changing as warmer temperatures melt ice at the poles causing sea levels to rise, affect wind and rainfall patterns causing intensifying storms and drought, and shift wildlife habitats impacting communities and economies.

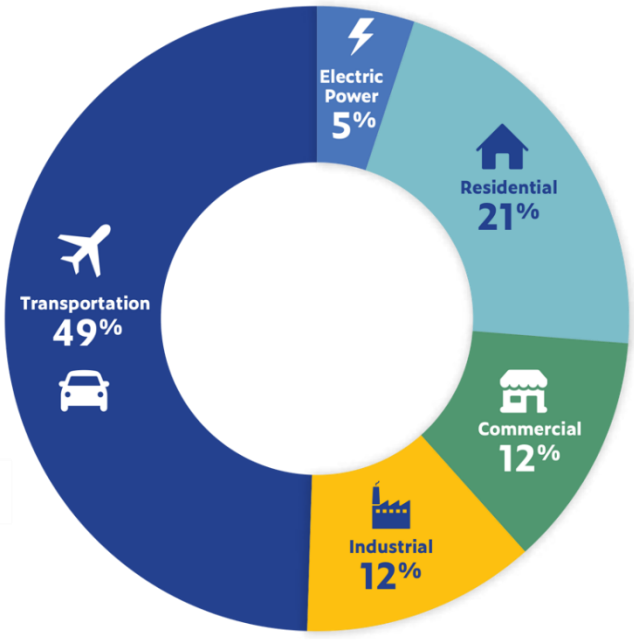
The Town of Chebeague is committed to reducing GHG emissions generated by municipal operations and by the wider community. CCAT conducted this baseline inventory of community wide and municipal GHG emissions to better understand what activities generate the most emissions. The inventory will help the Town determine what climate actions will be most impactful and establish a baseline against which future inventories can be compared. To achieve ambitious emissions reductions and move toward climate neutrality,[3] the Town will need to set a clear goal and act rapidly following a holistic and integrated approach.

CLIMATE ACTION IN MAINE

The Maine Climate Council (MCC) was created in 2019 to develop the State's climate action plan, *Maine Won't Wait*. The plan set a target to **reduce state-wide GHG emissions by 45% by 2030 and at least 80% by 2050**. The governor has also set a goal of reaching **carbon neutrality by 2045**.[4] As of 2019, nearly half of all Maine's carbon dioxide emissions are generated by transportation and a third are generated by heating fuel usage in the residential and commercial sectors.[5] To achieve Maine's targets, we must substantially reduce emissions from transportation and heating activities through municipal-level action.

As part of the planning process, the MCC conducted a comprehensive, scientific review of climate impacts in Maine published in the report, Scientific Assessment of Climate Change and Its Effects in Maine.

Maine Carbon Dioxide Emissions from Fossil Fuel Combustion by Sector (2019)



Data source:
Maine Department of Environmental Protection

[2] IPCC 6th Assessment | Climate Change 2021: The Physical Science Basis

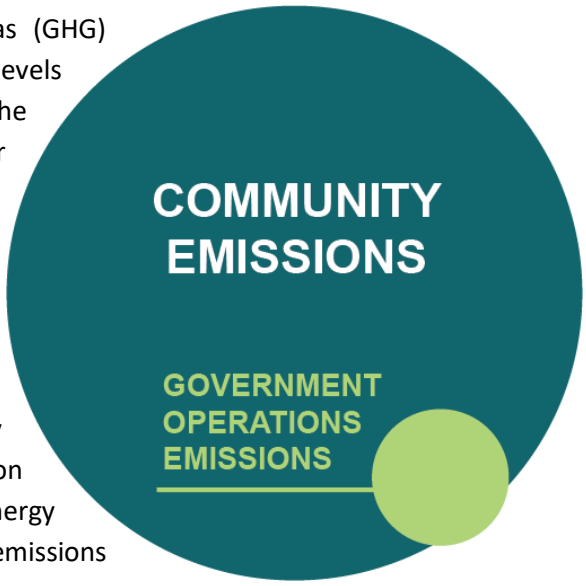
[3] Climate neutrality refers to the idea of achieving net zero greenhouse gas emissions by balancing those emissions so they are equal (or less than) the emissions that get removed through the planet's natural absorption; in basic terms it means we reduce our emissions through climate action. (UNFCCC)

[4] Executive Order, 23 September 2019

[5] Ninth Biennial Report on Progress Toward Greenhouse Gas Reduction Goals

INVENTORY METHODOLOGY

The first step toward achieving tangible greenhouse gas (GHG) emission reductions requires identifying baseline emissions levels and sources and activities generating emissions in the community. CCAT selected **2021 as the baseline year** for GHG emissions monitoring because it represents post COVID-19 pandemic conditions on the island and was the most recent year that CCAT could collect data for.



This report is Chebeague Island's baseline inventory and presents emissions from both the community, and from municipal operations by the Town. The municipal inventory is a subset of the community inventory. For example, data on commercial energy use by the community includes energy consumed by municipal buildings, and community vehicle emissions estimates include emission from municipal vehicles.

This inventory used the approach and methods provided by the *Greenhouse Gas Inventory Protocol for Southern Maine Cities and Towns* (community protocol) developed by the Southern Maine Planning and Development Commission (SMPDC) and the *Local Government Operations Protocol for the Quantification and Reporting Greenhouse Gas Emission Inventories* (municipal protocol) developed by ICLEI. ICLEI's ClearPath tool was used to calculate emissions for both the community and municipal inventories.

Three greenhouse gasses are included in this inventory: **carbon dioxide (CO_2), methane (CH_4)** and **nitrous oxide (N_2O).** In this report GHG emissions are represented in metric tons of carbon dioxide equivalent (MT CO_2e), which are calculated using the Global Warming Potentials (GWP)[6] for methane and nitrous oxide.

The geographic boundary of the inventory is the extent of the Town of Chebeague Island's jurisdictional boundary. Emissions produced outside of the boundary as a direct result of community activity within the boundary, such as the incineration of solid waste are also included in the inventory. It should be noted that some marine transport activities included in the inventory, such as commercial lobster fishing, recreational boating, and barging, likely occur partially outside the boundary.

[6] The Global Warming Potential (GWP) was developed to allow comparisons of the global warming impacts of different gasses. Specifically, it is a measure of how much energy the emissions of 1 ton of a gas will absorb over a given period of time, relative to the emissions of 1 ton of carbon dioxide (CO_2). (EPA)

COMMUNITY EMISSIONS

The community inventory includes emissions from the following activities:

- Electricity usage by the community
- Fuel usage for heating buildings
- On-road and off-road passenger vehicle travel
- Marine fuel usage by commercial and recreational vessels
- Fuel usage by the ferry and barge
- Transportation and disposal of solid waste generated by the community
- Emissions from septic systems

Data Sources

INVENTORY INPUT	SOURCE	NOTES
Heating		
Fuel Oil	CIBY	gallons sold
Kerosene	CIBY	gallons sold
Propane	Vinal Energy	gallons sold Apr-Dec 2021, Jan-Mar usage was estimated using the Apr-Dec per diem usage rate
Electricity		
Residential	CMP	kilowatt-hours used
Commercial	CMP	kilowatt-hours used
Streetlights	CMP	kilowatt-hours used
Transportation		
On-road Passenger Vehicles	CIBY	gallons of gasoline sold
Off-road Vehicles	CIBY, Town	gallons of diesel sold or purchased
Marine Transportation		
Ferry and Barge	CTC	gallons of diesel purchased
Commercial Vessels	CIBY	gallons of marine diesel sold
Recreational Vessels	CIBY	gallons of marine gasoline sold
Municipal Barge Trips	Town	Barge trips for municipal purposes
Waste		
MSW Landfilled	EcoMaine	short tons landfilled
MSW Incinerated	EcoMaine	short tons incinerated
Emissions Intensity Factor	EPA Flight	calculated emissions intensity factors for EcoMaine waste to energy facility
MSW Barge Trips	Town	Barge trips for MSW hauls

CIBY - Chebeague Island Boat Yard, **CMP** - Central Maine Power Company, **CTC** - Chebeague Transportation Company, **MSW** - Municipal Solid Waste, **EPA** - Environmental Protection Agency

Heating Fuel Use

The *Greenhouse Gas Inventory Protocol for Southern Maine Cities and Towns* recommends using census data from the American Community Survey to estimate heating fuel usage within the community. In small communities like Chebeague, American Community Survey data tend to be inaccurate due the small sample size of the survey, so CCAT determined that this method would not be suitable for Chebeague. Chebeaguers heat their homes with a variety of fuels including fuel oil, propane, wood and pellets, and kerosene. Most residents purchase fuel oil or kerosene from the Chebeague Island Boat Yard (CIBY) and propane from Vinal Energy (formerly Maine Island Energy). CCAT worked with these two businesses to obtain aggregated fuel purchases for 2021. Vinal Energy could only provide fuel purchases from April to December of 2021 because prior purchases went through Maine Island Energy, which has since been acquired by Vinal Energy. CCAT estimated propane usage from January to March of 2021 based on the per diem rate of April to December usage. There is a small cohort of residents who purchase fuel oil from an off-island vendor. CCAT was unable to obtain fuel volumes purchased from this vendor, so those emissions are not included in the inventory. Emissions from the burning of wood and pellets are also not included, because CCAT was unable to obtain this data.

On and Off-Road Transportation

The *Greenhouse Gas Inventory Protocol for Southern Maine Cities and Towns* recommends using on-road transportation emission estimates calculated by SMPDC. However, SMPDC only calculated emissions for towns in York County. On Chebeague, gasoline and diesel fuel used by on and off-road vehicles is purchased from CIBY, so CCAT worked with the business manager to obtain aggregated fuel purchases for 2021. The Town purchases diesel fuel for municipal equipment from an off-island vendor. The Town provided aggregated diesel fuel purchases from this vendor for 2021. To calculate methane and nitrous oxide emissions from on-road transportation, ClearPath requires vehicle miles traveled (VMT) in addition to gallons of fuel used. CCAT was unable to estimate VMT for 2021, so methane and nitrous oxide emissions from on-road transportation are not included in this inventory. Many Chebeaguers commute off-island for work, however, emissions related to residents' mainland transportation were not included in this inventory because they were determined to be outside the inventory boundary. These emissions would be accounted for in the GHG inventories of the Towns Chebeaguers commute through. For example, most commuters start their travel in the Town of Yarmouth. Yarmouth recently completed their own GHG inventory which accounts for Chebeaguers' travel within their town boundaries.

Marine Transportation

As an island community, marine transportation accounts for a substantial part of Chebeague's community activities. The island is serviced by two ferry companies, Casco Bay Lines (CBL) and the Chebeague Transportation Company (CTC). CBL operates out of Portland and services all the year-round islands in Casco Bay, transporting passengers and freight to the islands. CCAT communicated with CBL's general manager who confirmed that the City of Portland includes all of the GHG emissions produced by CBL's operations in the City's GHG Inventory. To avoid double counting emissions, CCAT determined that emissions generated by CBL's ferry service would not be included in Chebeague's inventory.

CTC is based on Chebeague and only services Chebeague Island. It is the primary mode of transit between the island and mainland. CTC also operates a seasonal barge service on the island. CCAT coordinated with CTC to obtain aggregated 2021 fuel purchases for the ferry and barge. CTC also operates a shuttle bus service from a mainland satellite parking lot to the dock in Yarmouth. CCAT did not include emissions produced by the shuttle bus service because they were determined to be outside the boundary of the inventory. CCAT also confirmed with the Town of Yarmouth that these emissions are included in Yarmouth's GHG Inventory.

In addition to CTC's barge service, Lionel Plante Associates operates a barge service off of Peaks Island. Lionel Plante services all of the islands in Casco Bay including Chebeague. CCAT contacted Lionel Plante, but they did not respond. The Town tracks the total number of barge trips through Lionel Plante for municipal purposes, which include the transportation of municipal solid waste, recyclables, construction debris, and infrastructure materials. CCAT estimated emissions using the total number of municipal trips and an estimated fuel burn of 141 gallons of marine diesel per trip to Chebeague. Emissions generated by barge trips for municipal solid waste hauls are included in the solid waste category and all other municipal barge trips are included in the marine transportation category. Emissions from Lionel Plante's non-municipal barge trips (mainly for private construction purposes) are not included in this inventory.

Commercial and personal vessel transportation also contributes to Chebeague's community-wide emissions. Most commercial vessels (primarily lobster boats) run on marine diesel which is purchased from CIBY. CIBY provided aggregated marine diesel fuel purchases for 2021, which CCAT used to calculate emissions produced by commercial vessels. CIBY sells some marine diesel fuel to lobstermen from other islands, but the manager assumed that those sales represented a small proportion of all marine diesel fuel purchases so 100% of emissions related to marine diesel fuel usage were attributed to Chebeague. Some lobstermen may purchase marine diesel from off-island vendors, and emissions related to these purchases are not included in the inventory. CIBY also sells marine gasoline, which is primarily used by recreational boaters. Many of CIBY's marine gasoline sales are to off-island boaters, so 50% of emissions related to marine gasoline usage were attributed to Chebeague based on the manager's advice. Many Chebeaguers purchase gasoline for their small, outboard motor vessels from off-island vendors. CCAT was unable to obtain data about these off island purchases, so emissions related to small vessel fuel use not purchased at CIBY are not included in this inventory.

Fugitive Emissions from Septic Systems

There is no municipal wastewater infrastructure on Chebeague, so all households use septic systems. Emissions were calculated using the population based method in ClearPath. The year-round population of Chebeague is 396,[7] but an adjusted annual population of 931 was used assuming a seasonal population of 2,000 for four months of the year.

[7] 2020 U.S. Decennial Census

Municipal Landfill

The Town of Chebeague owns and manages a small, capped landfill located at the Transfer Station. Landfill gas, primarily methane, was monitored at the landfill for over 20 years until 2018. Emissions were negligible over that period, which is why monitoring was suspended in 2018. Due to the lack of current data, and the negligible contribution to the overall inventory, methane emissions from the landfill were not included in this inventory.

Hope Island

Hope Island is a part of the Town of Chebeague but is owned entirely by one private landowner and effectively operates as a separate community. This disconnect made it challenging for CCAT to collect information about emissions generated by Hope Island sources and activities. Additionally, the island was largely uninhabited in 2021 following the death of the owner in 2018. A new owner purchased the island in late 2021. Because of the difficulty in obtaining data and the change of ownership, CCAT determined that emissions related to transportation, heating, and waste activities on Hope Island would not be included in this inventory. Emissions related to electricity usage on Hope Island are included in the inventory because Central Maine Power provides aggregated community electricity usage based on zip code. CCAT hopes to develop a relationship with the new owner of Hope Island so that future GHG inventories can include emissions from the island.

MUNICIPAL EMISSIONS

The following activities are included in the municipal inventory and represent a subset of activities accounted for in the community-wide inventory:

- Electricity and fuel oil consumption by Town facilities
- On-road and off-road vehicle travel

Waste generated by municipal activities is not tracked by the Town, so it was not included in the inventory. The Town does not operate a wastewater facility. See the note above about the Municipal Landfill.

Data Sources

INVENTORY INPUT	SOURCE	NOTES
Heating		
Fuel Oil	Town	gallons purchased
Electricity		
Town Office	CMP	kilowatt-hours used
Public Safety Building	CMP	kilowatt-hours used
Town Garage	CMP	kilowatt-hours used
Chebeague Island School	CMP	kilowatt-hours used
Chandlers Cove	CMP	kilowatt-hours used
Stone Wharf	CMP	kilowatt-hours used
Streetlights	CMP	kilowatt-hours used
Transportation		
On-road Passenger Vehicles	Town	gallons of gasoline purchased
Off-road Vehicles	Town	gallons of diesel purchased

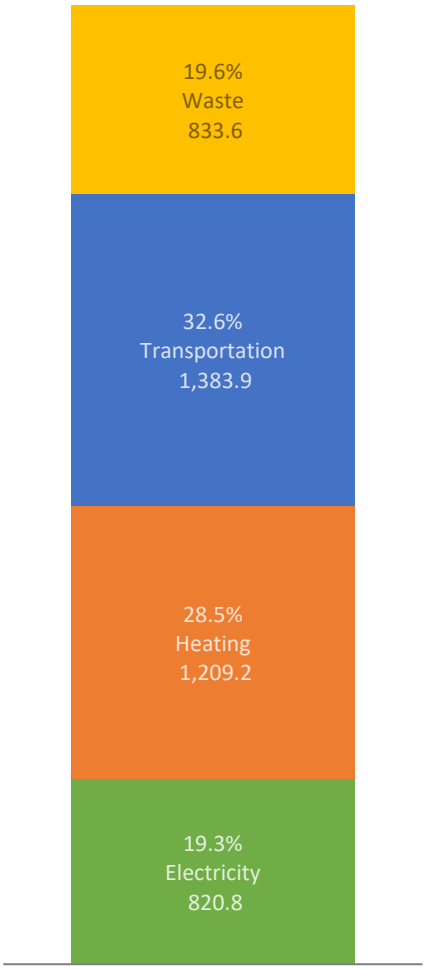
CMP - Central Maine Power Company

COMMUNITY EMISSIONS INVENTORY RESULTS

Chebeague Island's community wide GHG emissions in 2021 were **4,247.5 metric tons of CO_2** equivalent (MT CO_2e). Emissions were distributed relatively evenly across sectors. **Transportation was the greatest contributor to community emissions,** producing 1,383.9 MT CO_2e and representing 32.6% of total emissions. Transportation emissions were split nearly evenly between land-based and marine transportation activities. On and off-road transportation combined contributed 778.8 MT CO_2e (56.2% of transportation emissions) and marine transportation activities combined contributed 605.1 MT CO_2e (43.7% of transportation emissions). The burning of heating fuels was the second greatest contributor to emissions after transportation, producing 1,209.2 MT CO_2e and representing 28.5% of total emissions, followed by emissions from waste (19.6% of total emissions) and electricity (19.3% of total emissions).

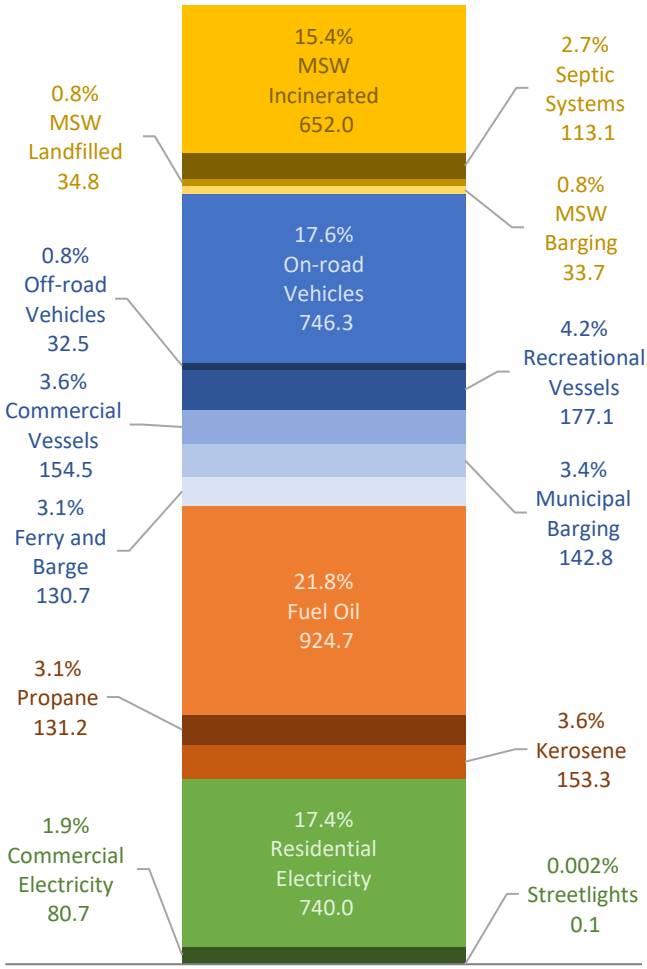
Town of Chebeague Island 2021 Community GHG Emissions by Sector

Total: 4,247.5 Metric Tons CO_2e



Town of Chebeague Island 2021 Community GHG Emissions by Sub-Sector

Total: 4,247.5 Metric Tons CO_2e



Across sub-sectors, the burning of **fuel oil** was the greatest contributor to community emissions, producing 924.7 MT CO_2e and representing 21.8% of total emissions. **On-road vehicle transportation (personal cars and trucks)** was the second greatest contributor (17.6% of total emissions), followed by **residential electricity consumption** (17.4% of total emissions), and **incinerated municipal solid waste** (15.4% of total emissions).

TOWN OF CHEBEAGUE ISLAND 2021 COMMUNITY GHG EMISSIONS

SECTOR	MT CO_2e	% OF SECTOR TOTAL	% OF TOTAL
Electricity	**820.8**		**19.3%**
Residential Electricity	740.0	90.2%	17.4%
Commercial Electricity	80.7	9.8%	1.9%
Streetlights	0.1	0.01%	0.002%
Heating	**1,209.2**		**28.5%**
Fuel Oil	924.7	76.5%	21.8%
Kerosene	153.3	12.7%	3.6%
Propane	131.2	10.9%	3.1%
Transportation	**1,383.9**		**32.6%**
On-road Vehicles	746.3	53.9%	17.6%
Off-road Vehicles	32.5	2.3%	0.8%
Recreational Vessels	177.1	12.8%	4.2%
Commercial Vessels	154.5	11.2%	3.6%
Municipal Barging	142.8	10.3%	3.4%
Ferry and Barge	130.7	9.4%	3.1%
Waste	**833.6**		**19.6%**
MSW Incinerated	652.0	78.2%	15.4%
Septic Systems	113.1	13.6%	2.7%
MSW Landfilled	34.8	4.2%	0.8%
MSW Barged	33.7	4.0%	0.8%
TOTAL	**4,247.5**		

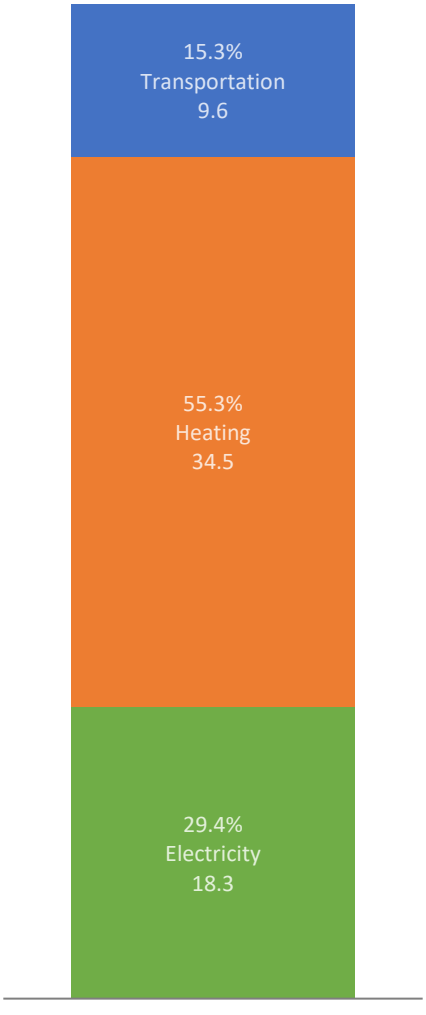
MSW - Municipal Solid Waste

MUNICIPAL EMISSIONS INVENTORY RESULTS

Chebeague Island's municipal GHG emissions in 2021 were **62.4 metric tons of CO_2** equivalent (MT CO_2e), representing 1.5 % of community-wide emissions. **Fuel oil usage for heating municipal buildings was the greatest contributor to municipal emissions,** producing 34.5 MT CO_2e and representing 55.3% of total municipal emissions. Electricity consumption was the second greatest contributor to municipal emissions, generating 18.3 MT CO_2e (29.4% of total municipal emissions), followed by transportation (9.6 MT CO_2e, 15.3% of total municipal emissions).

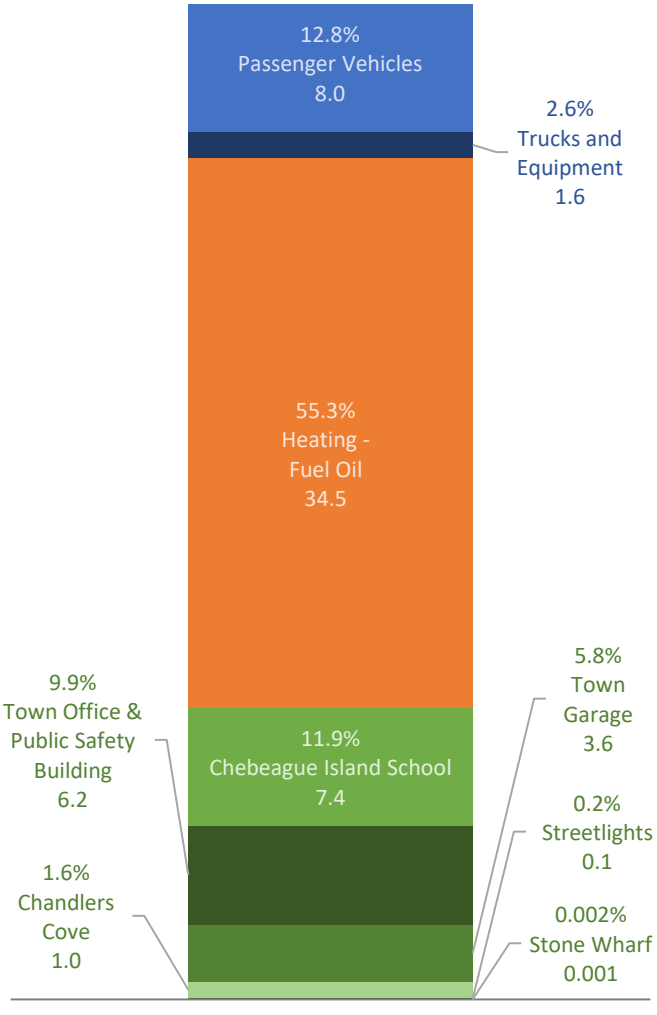
Town of Chebeague Island 2021 Municipal GHG Emissions by Sector

Total: 62.4 Metric Tons CO_2e



Town of Chebeague Island 2021 Municipal GHG Emissions by Sub-Sector

Total: 62.4 Metric Tons CO_2e



Across sub-sectors, emissions from **passenger vehicle transportation** were the second greatest contributor to municipal emissions after the burning of fuel oil, producing 8 MT CO_2e (12.8% of total municipal emissions), followed by **electricity consumption** at the **Chebeague Island School** (11.9% of total municipal emissions), and electricity consumption at the **Town Office and Public Safety Building** (10% of total municipal emissions).

TOWN OF CHEBEAGUE ISLAND 2021 MUNICIPAL GHG EMISSIONS

SECTOR	MT CO_2e	% OF SECTOR TOTAL	% OF TOTAL
Electricity	**18.3**		**29.4%**
Chebeague Island School	7.4	40.5%	11.9%
Town Office & Public Safety Building	6.2	34.0%	10.0%
Town Garage	3.6	19.8%	5.8%
Chandlers Cove	1.0	5.2%	1.5%
Streetlights	0.1	0.5%	0.2%
Stone Wharf	0.0	0.01%	0.002%
Heating	**34.5**		**55.3%**
Fuel Oil	34.5	100%	55.3%
Transportation	**9.6**		**15.3%**
Passenger Vehicles	8.0	83.6%	12.8%
Trucks and Equipment	1.6	16.4%	2.5%
TOTAL	**62.4**		

SOLAR GENERATION

The Town of Chebeague hosts a 62 kilowatt solar array at the Town Garage, which is owned and operated by ReVision Energy. The array is enrolled in the **State of Maine's net energy billing program** and through this program the array generates credits which can be used to reduce the cost of CMP utility bills. As the owner of the array, ReVision receives these credits from CMP and sells them to the Town at a discounted price established by a **Power Purchase Agreement (PPA)**. PPAs are common practice in the U.S. solar industry because they allow host customers to participate in solar without upfront capital, reduce customers' electricity costs, and make it financially feasible for solar developers to build arrays.

Once electricity generated by a solar array enters the grid it cannot be tracked, so it is impossible to know whether the electricity you are using at any given time was produced by a natural gas power plant or a solar array. **Renewable Energy Credits (RECs)** are used to track renewable energy generation on the grid and are used to make credible claims about renewable energy usage. One REC is generated for every one megawatt-hour of renewable energy generated and RECs have a monetary, market-based value. State-level policies, governed by Renewable Portfolio Standards (RPS), require energy supply companies to generate a certain amount of their electricity from renewable sources. In addition to building solar arrays, wind farms, and hydroelectric dams, energy suppliers purchase RECs from other renewable energy generators to comply with RPS requirements. Private companies and institutions can also purchase RECs in order to claim that they use renewable electricity.

Per the terms of the PPA between the Town of Chebeague and ReVision, ReVision retains ownership of the RECs generated by the Town Garage solar array. This means that **the Town cannot claim to use the renewable energy produced by the array,** and so the GHG emission reduction benefits associated with the solar array are not included in this inventory. However, the solar array demonstrates **the Town's commitment to increasing renewable energy production** on the electricity grid.

CCAT presents the total electricity generation and GHG emissions reduction that this array contributes to Maine's electricity grid to quantify the Town's committee to renewable energy. Based on ReVision's 2021 annual generation report to the Town, the solar array generated **71,754 kilowatt hours,** which is equivalent to approximately **10 Maine households' annual electricity consumption**[8] and represents an **18 MT CO2e** reduction in GHG emissions on the Maine electricity grid.

71,754 kWhs

TOWN GARAGE 2021 SOLAR GENERATION

18 MT CO_2e

ASSOCIATED GHG EMISSIONS REDUCTION ON MAINE'S ELECTRICITY GRID

Town of Chebeague's solar array. Photo from Google Maps.

[8] https://www.maine.gov/energy/electricity-prices

CARBON SEQUESTRATION

The United States Geological Survey defines carbon sequestration as "the process of capturing and storing atmospheric carbon dioxide. It is one method of reducing the amount of carbon dioxide in the atmosphere with the goal of reducing global climate change."[9] Natural carbon sinks, such as forests, are places where carbon is stored more quickly than it is emitted, resulting in net carbon sequestration.

ICLEI's Land Emissions and Removals Navigator (LEARN) online tool was used to calculate annual carbon sequestration within the Town of Chebeague. The tool uses national land cover data, analyzes land cover changes over time, and calculates carbon removals and emissions associated with these changes. Annual carbon sequestration was calculated based on land cover data from 2001 to 2019 and included Great Chebeague, Little Chebeague, Hope Island, and the outer islands.

Great Chebeague, Little Chebeague, and the outer islands remained largely forested over this 18-year period. There were pockets around Great Chebeague where forested areas were cleared. These areas are clustered around roads and appear to be where new houses have been built. Hope Island had the largest area of cleared forest, and in general is much less forested than the other islands. Based on these land cover changes from 2001 to 2019, Chebeague's net annual carbon sequestration is **3,961 MT CO2e per year.** This represents **93% of Chebeague's annual 2021 community-wide GHG emissions.** It is important to note that this estimated carbon sequestration does not discount the GHG inventory because Chebeague's forests are not registered carbon offsets. However, this information highlights the importance of preserving existing green space and forests and remaining conscious of the environmental impacts of clearing land for development.

TOWN OF CHEBEAGUE ISLAND ANNUAL CARBON SEQUESTRATION

(based on 2001-2019 land cover change)

	MT CO_2e per year
Carbon Removals Total	**-4,183**
Undisturbed Forest	-3,207
Non-Forest to Forest	-75
Trees Outside of Forests	-901
Carbon Emissions Total	**222**
Forest Disturbances	124
Forest to Settlement	29
Forest to Wetland	17
Forest to Grassland	43
Trees Outside of Forests	9
Net Carbon Sequestration	**-3,961**

[9] https://www.usgs.gov/faqs/what-carbon-sequestration

NEXT STEPS

CCAT's next steps after completing the three Community Action Grant tasks, will be identifying implementable strategies to reduce emissions on Chebeague. The results of this baseline GHG emissions inventory for 2021 indicate that the burning of fuel oil to heat buildings and on-road passenger vehicle transportation are the two activities that contribute most to both community and municipal GHG emissions. CCAT will explore strategies that the Town and community can take to reduce fuel oil consumption, vehicle emissions, and vehicle miles traveled. Strategies could include:

- Working with Efficiency Maine to install more heat pumps on the island.
- Hosting a WindowDressers workshop to improve energy efficiency.
- Conducting an energy audit of the Chebeague Island School, Town Office, and Public Safety Building to identify opportunities for increased efficiency.
- Incorporating energy efficiency into the Town Office/Public Safety building renovations.
- Creating on-island transit options, such as an electric powered bus service.
- Re-establishing a free, community bike share program.
- Exploring alternative, on-island transportation options for seasonal residents.

Maine State policy dictates that by 2030 80% of Maine's electricity will come from renewable sources, and by 2050 100% of Maine's electricity will come from renewable sources.[10] This means that even if Chebeague does nothing to reduce emissions from electricity consumption, emissions will fall to zero by 2050. The Town and community can help the State reach this goal by reducing electricity consumption, installing solar panels, and participating in community solar. Addressing municipal solid waste will be important as well. Emissions from municipal solid waste, including barging waste off-island, account for 17% of total emissions. CCAT is interested in working with the Town and community to identify opportunities for curbing municipal solid waste to reduce both emissions and Town costs. We are looking forward to working with the community on this exciting next phase of climate action!

[10] https://www.maine.gov/energy/initiatives/renewable-energy/renewable-portfolio-standards