CITY OF NEW BEDFORD, MA

2017 COMMUNITY GREENHOUSE GAS EMISSIONS INVENTORY METHODOLOGY REPORT

SUMMARY OF RESULTS

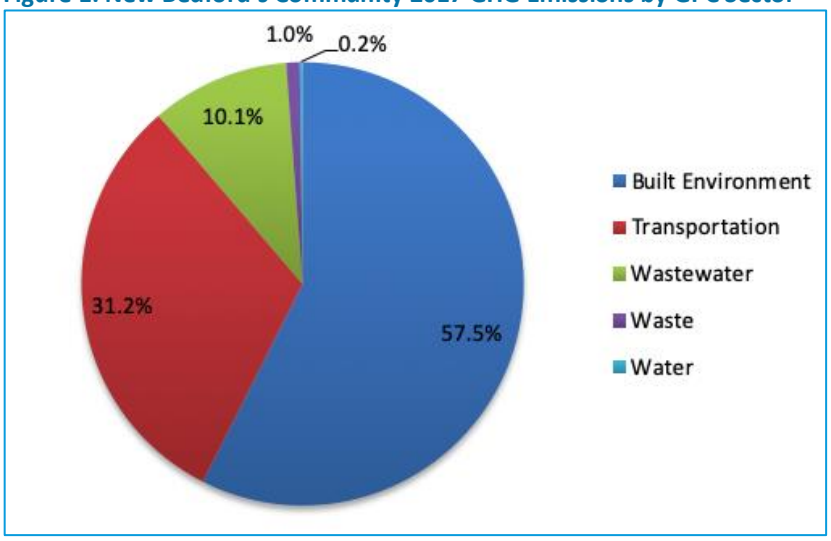
The purpose of this document is to provide a summary of the results and methodologies used in the development of the 2017 Community Greenhouse Gas Emissions Inventory for New Bedford, MA.

Emissions totaled approximately 801,044 $MTCO_2e$ in 2017. Buildings were the largest source of emissions, accounting for approximately 460,255 $MTCO_2e$ (57.5% of total emissions). Transportation, including on-road vehicles, air transportation and marine vessels accounted for approximately 250,288 $MTCO_2e$ (31.2% of total emissions). Wastewater accounted for 80,983 $MTCO_2e$ (10.1% of total emissions). Waste accounted for 8,800 $MTCO_2e$ (1.0%) of total emissions. Water treatment and delivery accounted for 1,660 $MTCO_2e$ (0.2% of total emissions). A summary of the updated greenhouse gas (GHG) inventory results is provided in **Table 1** and **Figure 1**.

Table 1. New Bedford Community 2017 Greenhouse Gas ($MTCO_2e$) Emissions by Source

Source	Metric Tons ($MTCO_2e$)	Percent of Total Emissions
Built Environment	460,255	57.5%
Transportation	250,288	31.2%
Wastewater	80,983	10.1%
Waste	7,858	1.0%
Water	1,660	0.2%
Total	801,044	--

Figure 1. New Bedford's Community 2017 GHG Emissions by GPC Sector



An Excel workbook, New Bedford Community GHG Emissions Inventory FINAL.xlsx, was used to calculate greenhouse gas emissions for each sector in order to meet calculation and reporting guidance for both ICLEI's Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions (Community Protocol) and the Global Protocol for Community-Scale Greenhouse Gas Emissions (GPC). This report has generally organized GHG emissions in accordance to the sectors outlined in the Community Protocol. Water and Wastewater have been reported as independent sectors. The sectors included in this report are: Built Environment, Transportation, Solid Waste, Water, and Wastewater. Each tab in the Excel workbook contains the activity data, data sources, methodologies, and greenhouse gas emissions calculations. All emissions factors and sources are also included on individual sector tabs or in the "Factors and Conversions" tab. This document provides a summary of the methodologies used for each sector, along with the data and emissions factor sources. For additional information, refer to the Excel workbook.

A summary of the results and methodologies used is provided in **Table 2**.

Table 2. Summary of 2017 GHG Inventory Data and Methodologies

Sector	Sub-sector	Protocol	Source	Activity Data	Units	$MTCO_2e$
Built Environment	Residential Buildings	USCP	Electricity	187,235,863	kWh	58,416
Built Environment	Commercial and Institutional Buildings and Facilities	USCP	Electricity	346,754,043	kWh	87,832
Built Environment	Residential Buildings	USCP	Natural Gas	22,668,118	therms	120,401
Built Environment	Commercial and Institutional Buildings and Facilities	USCP	Natural Gas	30,088,878	therms	159,816
Built Environment	Residential Buildings	USCP	Propane	8,177	gallons	47
Built Environment	Residential Buildings	USCP	Fuel Oil No.2	2,642,321	gallons	27,650
Built Environment	Commercial and Institutional Buildings and Facilities	USCP	Fuel Oil No.2	188,205	gallons	1,928
Built Environment	Fugitive Emissions from Oil and Natural Gas Systems	USCP	Fugitive Natural Gas	1,470,369	therms	4,165
Transportation	On-road Transportation: Buses	USCP	Gasoline	348,536	VMT	932
Transportation	On-road Transportation: Light Trucks	USCP	Gasoline	131,163,715	VMT	67,577
Transportation	On-road Transportation: Passenger Vehicles	USCP	Gasoline	245,324,727	VMT	92,846
Transportation	On-road Transportation: Buses	USCP	Diesel	583,142	VMT	1,655
Transportation	On-road Transportation: Heavy Trucks	USCP	Diesel	21,860,619	VMT	79,781
Transportation	On-road Transportation: Light Trucks	USCP	Diesel	5,262,742	VMT	2,833
Transportation	On-road Transportation: Passenger Vehicles	USCP	Diesel	1,214,479	VMT	480

Transportation	Aviation	USCP	Aviation Gas	148,329	gallons	1,264
Transportation	Aviation	USCP	Jet Fuel	295,096	gallons	2,904
Transportation	Waterborne Navigation	USCP	Gasoline	1,713	gallons	15
Solid Waste	Solid Waste Disposal	USCP, CARB	Landfilled Waste	30,117	tons	7,858
Water	Commercial and Institutional Buildings and Facilities	USCP	Electricity	4,708,410	kWh	1,469
Water	Commercial and Institutional Buildings and Facilities	USCP	Natural Gas	35,970	therms	191
Wastewater	Wastewater Treatment and Discharge	USCP	Wastewater Treatment	104,582	population served	74,756
Wastewater	Incineration and Open Burning	USCP	Biosolid Incineration	6,575	tons	1,767
Wastewater	Commercial and Institutional Buildings and Facilities	USCP	Electricity	10,981,039	kWh	3,426
Wastewater	Commercial and Institutional Buildings and Facilities	USCP	Natural Gas	194,768	therms	1,035

BACKGROUND

The New Bedford community GHG emissions inventory was prepared by Kim Lundgren Associates, Inc. (KLA) following the GPC[1] and Community Protocol. The GPC is adopted by communities around the world to ensure that GHG reports are relevant, complete, consistent, transparent, and accurate. The GPC provides recommendations on what activities and sources should be included in a GHG inventory for any community worldwide, as well as a general framework for the types of data to collect and calculations to be used. The GPC recognizes that country specific GHG protocols may have calculation methods more applicable to communities in that country. US-specific calculation methods in the New Bedford Community Inventory were obtained or adapted from the Community Protocol. Methods from the Intergovernmental Panel on Climate Change (IPCC) were used when no guidance was available from the GPC or Community Protocol. Additional emission factors were sourced from the U.S. EPA or other relevant sources. Where possible, local data was used to calculate emissions.

Three primary greenhouse gases are included in the GHG inventory: carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Each of these gases has a unique lifespan and effect on the atmosphere, thus a common unit of "CO_2 equivalent" (CO_2e) is used to describe the gases in like-terms. The multiplier that converts a metric ton of CH_4 or N_2O to a metric ton CO_2e is called its global warming potential (GWP). The science behind our understanding of the effect of these gases is constantly evolving. The IPCC collects data from climate scientists and publishes Assessment Reports detailing the latest research on the effect of GHGs on the atmosphere. While newer IPCC reports are available, many US agencies such as the EPA use GWPs from the IPCC's Fourth Assessment report. The 2015 US National GHG Inventory Report as well as the State of Massachusetts' 2016 Statewide GHG Emissions Level Report use GWPs from the IPCC's

[1] http://ghgprotocol.org/greenhouse-gas-protocol-accounting-reporting-standard-cities

Fourth Assessment report (AR4). This inventory likewise uses AR4[2] in order to be consistent with these state and national inventories as well as the United Nations Framework Convention on Climate Change (UNFCCC). The primary GWPs used for this inventory are listed in **Table 3.**

Table 3. Activities That Release GHGs into Our Atmosphere and their Global Warming Potential[3]

Greenhouse Gas	Source Activity	GWP
Carbon dioxide (CO_2)	Burning fossil fuels	1
Methane (CH_4)	Burning fossil fuels, agriculture activities, landfills, wastewater treatment practices	25
Nitrous oxide (N_2O)	Burning fossil fuels, agricultural activities, industrial activities, landfills	298

METHODOLOGY

This section outlines the methods used to calculate emissions for each sector of the community inventory and details fuel use and emissions by source.

BUILT ENVIRONMENT

The Built Environment sector is comprised of emissions that result from energy consumption in the residential, commercial, and industrial buildings of New Bedford. Emissions were calculated on the basis of the city's electricity, natural gas, fuel oil and propane use following methodologies in the Community Protocol. Fugitive emissions from natural gas pipelines within the city boundary were calculated based on total natural gas consumption.

Electricity use from residential, commercial and industrial customers was obtained from the utility provider Eversource. Emissions from electricity were calculated using a 2017 Independent System Operator (ISO) New England[4] CO_2 factor in conjunction with 2016 NEWE New England Region factors for CH_4 and N_2O[5] from EPA's eGRID. 2016 eGRID emission factors were used as a proxy for 2017. ISO New England does not publish CH_4 or N_2O factors.

The blended ISO New England and eGRID electricity emission factor used to calculate emissions for New Bedford's community electricity use in 2017 is 687.83 lbs. CO_2e/MWh.

Natural gas activity data was obtained from the City. Large, medium and small natural gas users were bundled together. Natural gas emissions factors from EPA's Mandatory Reporting Rule[6], last published in November 2015, and updated in March 2018, were used to calculate natural gas emissions.

The amount of fugitive natural gas from distribution attributable to the City of New Bedford was determined using a Harvard University study conducted in 2015 finding that 2.7% of all natural gas

[2] http://www.ipcc.ch/report/ar4/
[3] The 100-year time horizon GWPs used in this report are from the IPCC AR4.
[4] https://www.iso-ne.com/system-planning/system-plans-studies/emissions
[5] https://www.epa.gov/sites/production/files/2018-02/documents/egrid2016_summarytables.pdf
[6] https://www.epa.gov/sites/production/files/2018-03/documents/emission-factors_mar_2018_0.pdf

distributed in the Boston area is leaked and released into the atmosphere.[7] Total natural gas distributed to New Bedford (including community consumption and leaked gas) was used to calculate the emissions from leaked natural gas based on guidance provided in Chapter 4 of the 2006 IPCC Guidelines for Greenhouse Gas Inventories.[8] IPCC emission factors for fugitive natural gas from distribution based on total throughput were used to determine the associated GHG emissions with this source.

The original electricity and natural gas usage data provided by Eversource and the City was assumed to include energy used to treat and distribute potable water and to treat wastewater without itemizing usage from these sources. The City separately provided energy usage data for water and wastewater treatment from municipal operations. This information was used to itemize energy usage for water and wastewater treatment. To avoid double counting, the energy usage reported for water and wastewater treatment was subtracted from the overall community total and reported as separate line items under those source categories in this report.

Fuel oil and propane activity data was estimated using information from the New Bedford Assessor's Office and U.S. Energy Information Agency average fuel consumption for the Northeast. A fuel use intensity value (gallons consumed / household) based on the age and size of the homes was estimated. Emission factors for fuel oil were obtained from the EPA Mandatory Reporting Rule, last published in November 2015 and updated in March 2018.

TRANSPORTATION

The Transportation sector is comprised of emissions from on-road vehicle travel from cars, trucks and buses as well as emissions from the New Bedford airport from marine vessels owned by the City. Emissions were calculated based on publicly available data from the Southeast Regional Planning and Economic Development District (SRPEDD), bus VMT from the Southeastern Regional Transit Authority (SRTA) and from airplane and marine vessel fuel usage provided by the City following methodologies in the Community Protocol.

Activity data for cars and trucks in the form of vehicle miles travelled (VMT) was estimated based on data obtained from the SRPEDD 2016 Transportation Plan.[9] VMT was attributed to New Bedford based on population of the city relative to population within the SRPEDD. Michele Paul, Director of Resilience and Environmental Stewardship for the City of New Bedford, provided total daily mileage for SRTA bus service within the SRPEDD area.

Total on-road VMT from cars and trucks was attributed to diesel and gasoline-powered vehicles according to national averages for on-road vehicles as provided by the Community Protocol. Similarly, the types of vehicles on the road in New Bedford (heavy duty, light duty, passenger vehicles) were assumed to conform to national averages as provided by the Community Protocol. Bus VMT was provided separately by the City and was not subdivided into different bus types. VMT from cars, trucks and buses was used to

[7] https://www.seas.harvard.edu/news/2015/01/boston-s-natural-gas-infrastructure-releases-high-levels-of-heat-trapping-methane
[8] https://www.ipcc-nggip.iges.or.jp/public/2006gl/
[9] http://www.srpedd.org/rtp

calculate emissions from CH_4 and N_2O with emission factors obtained from the U.S. EPA's Emission Factors for Greenhouse Gas Inventories last updated March 2018. [10] For passenger vehicles and trucks, assumptions about the percent of trips that occur completely inside and inside the city, as well as trips beginning and ending inside or outside the city, were applied to refine and adjust the total VMT relevant for this GHG report. All bus VMT was assumed to occur within the community boundary.
To estimate emissions from CO_2, VMT was converted to fuel use using fuel efficiencies for each vehicle type obtained from the U.S Department of Energy's Alternative Fuel Data Center.[11] CO_2 emission factors for each fuel were obtained from the U.S. EPA's Emission Factors for Greenhouse Gas Inventories last updated March 2018.

The New Bedford Regional Airport provided fuel consumption data for planes fueled in New Bedford. All airplane fuel use was attributed to New Bedford. Typically, emissions from airplanes are split between the departure and arrival cities. Since fuel consumption was used instead of VMT, KLA assumed that airplanes re-fueled at their destination and that this would equal the fuel used in New Bedford. Emission factors for each fuel were obtained from the U.S. EPA's Emission Factors for Greenhouse Gas Inventories published in November 2015 and updated in March 2018.

The New Bedford Port Authority provided fuel use for marine vessels. All fuel use for City-owned marine vessels was attributed to the community of New Bedford. Emission factors for each fuel were obtained from the U.S. EPA's Emission Factors for Greenhouse Gas Inventories published in November 2015 and updated in March 2018.

WASTE

The Waste sector is comprised of methane emissions that result from the decomposition of municipal solid waste (MSW) generated in the residential, commercial and industrial sectors and deposited in a landfill in the inventory year. While these emissions occur over time, they are attributed to the year in which the waste was generated and deposited.

Yearly waste deposition was obtained from Scott Alfonse of the Greater New Bedford Regional Refuse Management District. The characterization of this waste was estimated using the State of Massachusetts Summary of Waste Combustor Class II Recycling Program Waste Characterization Study.[12] Emissions were determined using emission factors from the California Air Resources Board Landfill Tool v3 and methodologies adapted from the Community Protocol.

Alternative Daily Cover (ADC), material laid on top of landfilled waste to control odors, vectors, fires, litter and scavenging, was estimated using state averages for ratios of ADC/MSW calculated from MassDEP's 2011 Solid Waste Master Plan.[13] Emissions from ADC were determined using emission factors from the California Air Resources Board Landfill Tool v1.3 and methodologies adapted from the Community Protocol.

[10] https://www.epa.gov/sites/production/files/2018-03/documents/emission-factors_mar_2018_0.pdf
[11] https://www.afdc.energy.gov/data/categories/fuel-consumption-and-efficiency
[12] https://www.mass.gov/guides/solid-waste-master-plan
[13] https://www.mass.gov/files/documents/2016/08/rr/11swdata.pdf

WATER TREATMENT AND DELIVERY

The Water Treatment and Delivery sector comprises emissions that result from electricity and natural gas used in facilities related to water treatment, well water extraction, pumping stations, and other related facilities throughout the community during the inventory year.

Electricity and natural gas activity data from water treatment were provided by the City of New Bedford. Emissions from electricity were calculated using a 2017 ISO New England[14] CO_2 factor in conjunction with 2016 NEWE New England Region factors for CH_4 and N_2O[15] from EPA's eGRID. 2016 eGRID emission factors were used as a proxy for 2017. ISO New England does not publish CH_4 or N_2O factors.

The blended ISO New England and eGRID electricity emission factor used to calculate emissions for New Bedford's community electricity use in 2017 is 687.83 lbs. CO_2e/MWh.

Natural gas emissions factors from the EPA's Mandatory Reporting Rule, last updated in March 2018, were used to calculate natural gas emissions for 2017.[16]

Electricity and natural gas usage from water treatment were subtracted from total community electricity and natural gas use to avoid double counting and over-representing GHG emissions.

WASTEWATER TREATMENT

The Wastewater Treatment sector comprises emissions that result from electricity and natural gas used to treat and convey wastewater throughout the community during the inventory year. It also includes process, fugitive, and biosolid incineration emissions that result from the treatment and combustion of organic materials resulting from wastewater treatment.

Electricity and natural gas activity data from wastewater treatment were provided by the City of New Bedford. Emissions from electricity were calculated using a 2017 ISO New England[17] CO_2 factor in conjunction with 2016 NEWE New England Region factors for CH_4 and N_2O[18] from EPA's eGRID. 2016 eGRID emission factors were used as a proxy for 2017. ISO New England does not publish CH_4 or N_2O factors.

The blended ISO New England and eGRID electricity emission factor used to calculate emissions for New Bedford's community electricity use in 2017 is 687.83 lbs. CO_2e/MWh.

Natural gas emissions factors from the EPA's Mandatory Reporting Rule, last updated in March 2018, were used to calculate natural gas emissions for 2017.[19]

[14] https://www.iso-ne.com/system-planning/system-plans-studies/emissions
[15] https://www.epa.gov/sites/production/files/2018-02/documents/egrid2016_summarytables.pdf
[16] https://www.epa.gov/sites/production/files/2018-03/documents/emission-factors_mar_2018_0.pdf
[17] https://www.iso-ne.com/system-planning/system-plans-studies/emissions
[18] https://www.epa.gov/sites/production/files/2018-02/documents/egrid2016_summarytables.pdf
[19] https://www.epa.gov/sites/production/files/2018-03/documents/emission-factors_mar_2018_0.pdf

Electricity and natural gas usage from wastewater treatment were subtracted from total community electricity and natural gas use to avoid double counting and over-representing GHG emissions.

Facility-specific data on New Bedford's wastewater treatment plant and the population it serves was provided by Jim Costa from the City of New Bedford. Total population served by New Bedford's wastewater treatment plant was applied in standard equations from the Community Protocol to determine CH_4 and N_2O process and fugitive emissions. Facility-specific data on biochemical oxygen demand (BOD5) and type of nitrogen processes (no nitrification/denitrification) was used to calculate process and fugitive emissions from wastewater treatment with equations and methodologies from the Community Protocol.

Emissions from biosolid incineration were estimated using data on the total amount of sludge produced in 2017, provided by Jim Costa from the City of New Bedford. Emissions were calculated using methods from the Community Protocol that were adapted to calculate emissions from dry weight of biosolids rather than wet weight. Dry weight emission factors for CH_4 were obtained from the Biosolids Emissions Assessment Model (BEAM).[20] Dry weight emission factors for N_2O were obtained from the IPCC 2006 Chapter 5: Incineration and Open Burning of Waste.[21] Jim Costa indicated that all biosolids are incinerated at Synagro facilities which are located outside of New Bedford's community boundary.

NEW BEDFORD GHG PROJECTIONS

The City has set GHG emissions reduction targets of 35% below 2017 levels by 2030 and 100% below 2017 levels (net zero emissions) by 2050.[22] The emissions forecast presented here will help New Bedford accurately assess the amount of GHGs to be reduced and account for any changes that will occur under a business as usual scenario. The two most common drivers of emissions under a business as usual scenario are population and employment, where emissions per person are held constant. The projection below assumes a population increase between 2010 and 2020 by 0.03% per year and then begins to increase at a higher rate of 0.31% per year between 2020 and 2040. Population changes between 2010 and 2020 were estimated using population figures from American Fact Finder. Population changes between 2020 and 2040 were estimated using population forecasts from SRPEDD's 2016 Regional Transportation Plan (RTP).[23] The number of jobs is modeled to decrease by 0.11% between 2010 and 2020 according to employment numbers and forecasted employment in the SPREDD 2016 RTP. Jobs are expected to decrease by 0.06% between 2020 and 2040. Population and employment trends forecasted by the SRPEDD out to 2040 were assumed to carry forward to 2050. Many GHG sources and activities are assumed to respond to the change of both population and employment so an additional growth rate was estimated using the U.S. Census, American Fact Finder and SRPEDD 2016 RTP. Yearly percentage changes are expressed in compound annual growth rates (CAGR).

[20] https://www.ccme.ca/files/Resources/waste/biosolids/beam_final_report_1432.pdf
[21] https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/5_Volume5/V5_5_Ch5_IOB.pdf
[22] http://www.newbedford-ma.gov/environmental-stewardship/wp-content/uploads/sites/39/New_Bedford_FACTSHEET_Climate_FEB_05.pdf
[23] http://www.srpedd.org/manager/external/ckfinder/userfiles/resources/Transportation/RTP%202016/2016%20RTP%20Final%20Amended%2003-15-16%20and%208-21-18.pdf

Table 4. New Bedford Community Projected Growth Rates

Indicator	CAGR
Population 2017 - 2020	0.03%
Population 2020 - 2050	0.31%
Jobs 2017 - 2020	-0.11%
Jobs 2020 - 2050	-0.06%
Population + Jobs 2017 - 2020	0.12%
Population + Jobs2020 - 2050	0.21%

BUSINESS AS USUAL EMISSION FORECAST

Under the business as usual scenario, emissions are forecast to be 847,405 $MTCO_2e$ in 2050. The City's target for 2050 is zero $MTCO_2e$. **Figure 2** shows the GHG baseline, business as usual forecast, and a trajectory to achieve 100% net zero emissions by 2050.

Figure 2. New Bedford GHG Emissions (MTCO2e) Projections to 2050

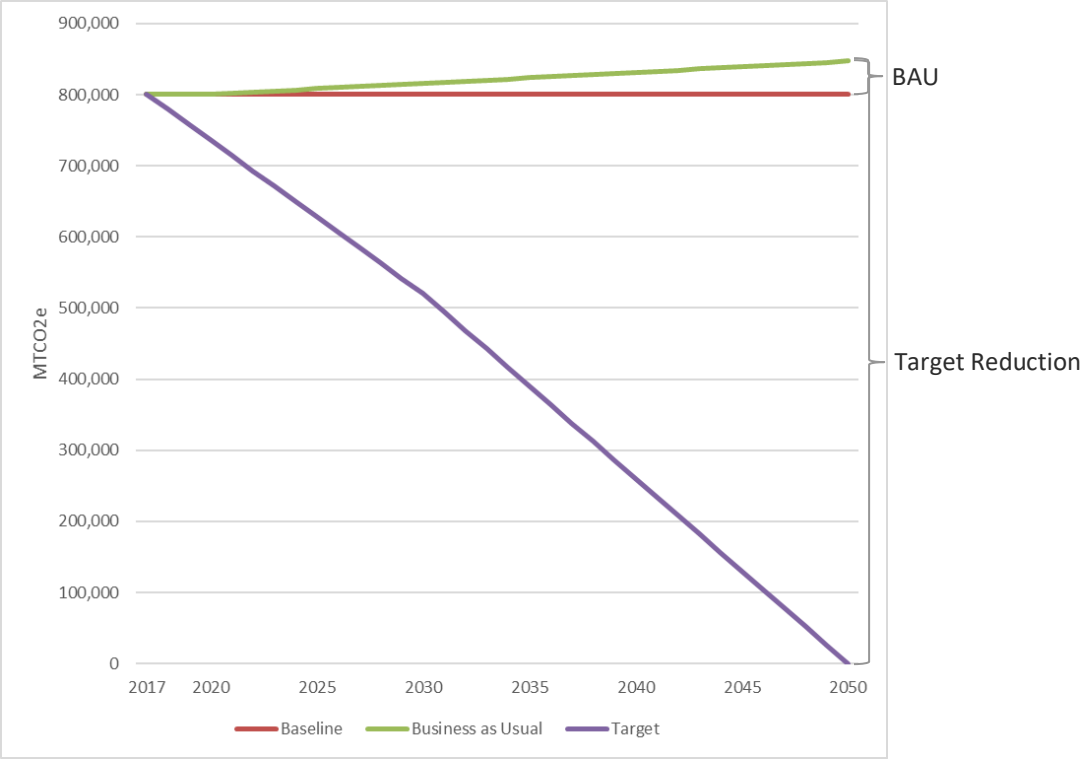


Table 5 shows the current baseline emissions and the city's future GHG targets.

Table 5. GHG Targets and Reductions Needed

GHG Emissions ($MTCO_2e$)	2017	2020	2030	2050
Business as Usual (BAU)	801,044	801,029	815,979	847,405
Emissions Target	-	-	520,679	0
Target % Below 2017	-	-	35%	100%
Δ BAU and Target (Reduction)	-	-	295,300	847,405

Emissions projections for 2020, 2030, and 2050 were estimated by sector from the 2017 GHG baseline inventory. The rate of change in GHGs for each sector was determined by one of three indicators: population, employment and a mix of population and employment.

The business as usual forecast assumes emissions rates for electricity and other fuels stay constant between 2017 and 2050. In reality, electricity rates, vehicle fuel efficiencies, and other fuel factors may change over time. 2017 emission rates per person and per job were carried forward to 2050. **Table 6** contains the indicators used for each sector.

Table 6. Forecast Indicators

Sector and Sub-sector	Source/Activity	Indicator	Growth Rate 2017 - 2020	Growth Rate 2020 - 2050
Residential Buildings	Electricity, natural gas, fuel oil, fugitive natural gas	Population	0.03%	0.31%
Commercial Buildings	Electricity, natural gas, fuel oil, fugitive natural gas	Employment	-0.11%	-0.06%
Fugitive Natural Gas	Residential and commercial fugitive natural gas	Population and employment	0.12%	0.21%
Transportation On-road*	Gasoline, diesel, VMT	Population	0.03%	0.31%
Transportation Aviation, Marine	Aviation and marine vessels	Population and employment	0.12%	0.21%
Solid Waste	Waste deposited in landfills	Population and employment	0.12%	0.21%
Water	Electricity, natural gas	Population and employment	0.12%	0.21%
Wastewater	Wastewater treatment, biosolid incineration	Population and employment	0.12%	0.21%

**Although on-road traffic VMT traffic is affected by jobs and work commute trips, regional VMT was attributed to New Bedford using population. Therefore, population is assumed to be the primary forecast driver.*

REFERENCES

American Fact Finder. Annual Estimates of the Resident Population April 1, 2010 to July 1, 2018.

California Air Resources Board, Landfill Tool v3.

EPA Mandatory Reporting Rule Emissions Factors, Updated Nov 2015.

EPA eGRID 2016.

EPA Greenhouse Gas Emissions From Large Facilities.

Email Correspondence with Capt. Brian Joseph, NB Port Authority, 6/28/2018.

Email Correspondence with Jim Costa, 5/22/2018.

Email Correspondence with Joan Jones, NB Airport, 4/23/18.

Email Correspondence with Maria Pina-Rocha / Carlos Amado, MIS/Assessor's Office, 5/16/18.

Email Correspondence with Mark Rooney, Eversource, 6/14/18.

Email Correspondence with Michele Paul and Shayne Timbell, SRTA, 5/3/2018.

Email Correspondence with Scott Alfonse, GNBRRM District, 5/16/2018.

Email Correspondence with Scott Durkee, NB Energy Dept, 7/2/18.

ICLEI. Global Protocol for Community-Scale Greenhouse Gas Emissions (GPC). 2014. World Resources Institute and ICLEI.

ICLEI. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions. Version 1.0. October 2012.

ICLEI. Local Government Operations Protocol. Version 1.1. May 2010.

IPCC 2006 Chapter 5: Incineration and Open Burning of Waste.

IPCC Fourth Assessment Report.

ISO. 2017 ISO New England Electric Generator Air Emissions Report.

Massachusetts 2016 Solid Waste Update. MassDEP. January 2018.

SRPEDD 2016 Regional Transportation Plan.

Summary of Waste Combustor Class II Recycling Program Waste Characterization Studies (Includes 2010, 2013 and 2016 Data).