

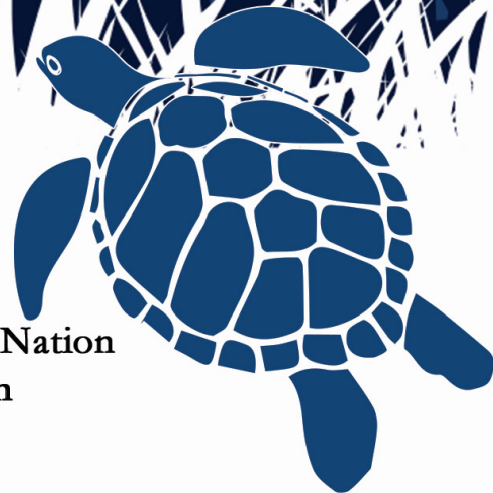
CLIMATE POLLUTION

REDUCTION GRANT

CPRG



Mashantucket Pequot Tribal Nation
Natural Resources Protection



Priority Climate Action Plan

March 2024

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Acronyms, Abbreviations and Definitions

CPRG:	Climate Pollution Reduction Grant
EV:	Electric Vehicle
GHG:	Greenhouse Gas
LIDAC:	Low Income Disadvantaged Community
MJDB:	Michael J. Daggett Building
MPMRC:	Mashantucket Pequot Museum & Research Center
MPIN:	Mashantucket Pequot Tribal Nation
MTCO _{2e} :	Metric Tons of Carbon Dioxide Equivalent
NO _x :	Nitrogen Oxides
NRP-RA:	Natural Resources Protection & Regulatory Affairs Department
PCAP:	Priority Climate Action Plan
PM _{2.5} :	Particulate Matter 2.5 Micrometers or Smaller
PW:	Public Works, Planning, and Infrastructure Management
TOE:	Top Operations Executive of Public Works, Planning, & Infrastructure Management

Executive Summary

The U.S. Environmental Protection Agency's (EPA) Climate Pollution Reduction Grant Planning Program (CPRG) program provides funding to states, local governments, and tribes to develop and implement plans for reduction greenhouse gas emissions and other harmful air pollution.¹ Phase 1 of the CPRG program provided funding to the Mashantucket Pequot Tribal Nation (MPTN) to design climate action plans that identify measures to reduce Greenhouse (GHG) emissions. This document provides the first deliverable, MPTN's Priority Climate Action Plan (PCAP). The intent of this PCAP is to identify a focused list of near-term, high-priority, implementation-ready measures to reduce GHG pollution. Plans must include an analysis of GHG emissions reduced through implementation of each of those priority reduction measures. An accurate baseline inventory of GHG emission sources is necessary to track reduction progress. The emissions inventory provided is for baseline year 2022 and includes estimates of criteria air pollutants as well as GHGs.

The reduction measures included in this document were chosen following several community engagement events in conjunction with multiple meetings with subject matter experts. The reduction measures selected are all within the Government and Residential sectors and include measures to increase building/home efficiency and measures to reduce vehicle emissions through electrification of fleet and personal vehicles. Within each reduction measure is a community outreach educational component.

Summary of Priority Reduction Measures

Building Efficiency Upgrades: Government

Lighting Efficiency Upgrades – Government Facilities

The intent is to replace all applicable lights with LED lights at a number of MPTN government buildings. If fully implemented, this reduction measure would reduce roughly 315.8 MTCO_{2e} and would cost approximately \$319,795.

Weatherization Upgrades – Government Facilities

The intent is to strategically improve the weatherization of designated MPTN buildings. If fully implemented, this reduction measure would reduce roughly 78.6 MTCO_{2e} and would cost approximately \$781,782.

GHG Reductions from Transportation: Government

Installation of EV Charging Stations – Government Buildings

The intent is to install EV charging stations at select government buildings, promoting the use of EVs by employees while providing the means for fleet electrification. If implemented in full, this reduction

measure would reduce roughly 661.0 MTCO_{2e} and would cost approximately \$299,500.

Vehicle Electrification – Government Fleet

The intent is to begin conversion of MPTN's government fleet from combustion vehicles to alternative fuels. If fully implemented, this reduction measure would reduce roughly 238.1 MTCO_{2e} and would cost approximately \$905,000.

Incentive Programs: Residential

Household Efficiency Upgrades – Voucher Program

The intent is to provide \$15,000 in funding to MPTN households to improve their energy efficiency. If implemented in full, this reduction measure would reduce roughly 1,262.3 MTCO_{2e} and would cost approximately \$2,296,500

Resident EV Incentive – Rebate Program

The intent is to promote tribal membership living in Mashantucket to transition from combustion vehicles to EVs. If implemented in full, this reduction measure would reduce roughly 391.9 MTCO_{2e}/yr. and would cost approximately \$256,500

¹ <https://www.epa.gov/inflation-reduction-act/climate-pollution-reduction-grants>

Greenhouse Gas Inventory

An accurate emissions inventory is necessary to track progress towards reducing GHG emissions. This inventory has been prepared using 2022 as its baseline year. MPTN selected the year 2022 because it marked a return of normal operations following the impacts from the COVID pandemic.

The primary focus of the GHG inventory is to quantify annual carbon dioxide equivalent (CO₂e) emissions. CO₂e is the quantity of CO₂ emissions summed with the emissions of other GHG components (e.g. methane (CH₄), and nitrous oxide (N₂O) after application of their CO₂ equivalent global warming potential factor. As presented within this inventory, emissions of CO₂e, as well as GHG component emissions and criteria pollutant emissions, are quantified in metric tons per year (MT/yr.).

The inventory includes sources of emissions that will be affected by the priority reduction measures identified within MPTN's Priority Climate Action Plan (PCAP). Priority reduction measures are those near-term climate actions that the Tribe believes are implementation ready. Source types inventoried include: stationary combustion, on-road vehicles and emissions generated by the production of electricity used.

The primary tool utilized to compile the inventory was EPA's Local/Tribal Greenhouse Gas Inventory Tool (the GHG Tool).² Both the community and the government operations modules were utilized. The community module was used to group emissions by sector. Sectors chosen for MPTN's inventory were: government, commercial, energy generation and residential. The government module facilitated aggregation of emissions at the facility level. The module also allowed for estimation of emissions from employees commuting to those facilities. Reduction measures proposed within MPTN's PCAP, in addition to programs established for residents, focus on reductions at government facilities.

In addition to facility and sector grouping, the GHG Tool aggregates emissions into scopes according to the International Panel on Climate Change (IPCC) guidelines.³ Sources inventoried are detailed below as accounted for within each of these scopes.

- Scope 1:** Sources emitting pollutants within the boundary of Mashantucket
- Fuel combustion emissions at all stationary sources within Mashantucket including residences.
 - Emissions from 'on-road' vehicles owned and operated by the Mashantucket Pequot Tribal Nation (both government and enterprise).
 - 'On-road' vehicle emissions from personal use vehicles owned by residents of Mashantucket.
- Scope 2:** Sources located within Mashantucket that, as a direct consequence of their operation, cause pollutants to be emitted elsewhere (e.g. use of grid-supplied electricity, heat, steam, and cooling)
- Emissions as a result of all electric usage within Mashantucket
- Scope 3:** All other emissions that generally occur outside of Mashantucket as a result of activities taking place within
- Emissions from 'on-road' vehicles generated by employees of the Mashantucket Tribal Nation: Government and Tribal Enterprises. Note: non-MPTN employees commuting to tenant businesses locations within Mashantucket are not included.
 - Emissions associated with electrical grid loss based on electrical use within Mashantucket.

² [Government Operations Module](https://www.epa.gov/statelocalenergy/tribal-greenhouse-gas-inventory-tool) and [Community Module](https://www.epa.gov/statelocalenergy/tribal-greenhouse-gas-inventory-tool), Version 2024.1, downloaded February 7, 2024 – <https://www.epa.gov/statelocalenergy/tribal-greenhouse-gas-inventory-tool>.

³ The Intergovernmental Panel on Climate Change – <https://www.ipcc.ch/>

Use of the two modules required that an inventory table summary be developed. MPTN's baseline year 2022 inventory, completed for inclusion within this PCAP, is presented as Table 1. This added effort provided the opportunity for a final quality control check when confirming that emissions from one module, when appropriately grouped, yielded the same totals as the other. Note that this table presents emission of the GHG components CH₄ & N₂O in 'true' metric tons (MT) whereas the GHG Tool summary data sheet, or tab, presents these pollutants as CO₂e.

The GHG Tool does not assist with quantification of criteria pollutants. Other tools and methods were utilized for this purpose. These tools and methods will be identified within the detailed methodology description for each source type within Appendix I.

The specific purpose of the current inventory is to establish a baseline for tracking future effectiveness of PCAP priority reduction measures implemented. Ultimately, the sources inventoried will be expanded for MPTN's Comprehensive Climate Action Plan (CCAP) to provide a complete accounting of all GHG contributing sources. a summary explanation of those sources not presently included, the current status of data collection and commentary on anticipated data gaps is also addressed within Appendix I.

Low Income Disadvantaged Community

The entire Mashantucket Pequot Tribal Nation is considered a Low Income Disadvantaged Community (LIDAC), therefore any positive activity conducted within Mashantucket directly benefits a LIDAC community.

Community Outreach for Reduction Measure Prioritization

Throughout the process of developing the MPTN PCAP, multiple methods were used to create a final list of reduction measures.

- Four brainstorming sessions were advertised and subsequently conducted with Tribal Membership. These workshops were held in November 2023; three were open to the Tribal Community and the fourth was held with the Elders Council, a subset of the community. In total, 46 community members participated in four workshops.
- With the intention of seeking additional engagement from the community, a presentation was made at a monthly meeting on November 21. There were 98 Tribal Members present during this presentation.
- Lastly, a sampling of one-on-one discussions were conducted with approximately (xxxxnumberxxx) community members.

These efforts yielded useful feedback and provided several reduction measures that had not originally been considered.

Following the community engagement activities in November, the resulting list was proposed to the Natural Resources Protection Committee for prioritization. After receiving their responses, the team made one last evaluation of the list based on the Committee's rankings, feasibility, and CO₂e reductions – in that order.

Priority Reduction Measures

Building Efficiency Upgrades: Government

Measures identified within this group involve energy efficiency improvements that can be made within government facilities. One of the key participants during Community Outreach efforts was MPTN’s Top Operations Executive (TOE). As a Tribal Member who oversees, among other programs, government Building Maintenance, he was able to provide unique insight regarding energy efficiency upgrades both necessary and readily implemented.

The program intends provide education relevant to weatherization improvements to appropriate MPTN governmental personnel as well as to tribal membership, primarily focused on window replacement and strategic placement of insulation.

Required Priority Action Plan Elements Common to all Measures within this grouping:

Geographic Location: Government buildings, identified below, within Mashantucket, CT

Key Implementation Agency: Public Works, Planning and Infrastructure Management (PW)

Milestones for Obtaining Authority: Key implementing agency has authority to implement once funded

Funding Source: Climate Pollution Reduction Grants – Implementation Grants

Lighting Efficiency Upgrades – Government Facilities

This measure focuses on reducing GHG emissions through lighting upgrades. The specific intent is to replace less efficient lighting fixtures with more efficient LED lighting fixtures.

For a number of years MPTN Building Management has reduced electrical usage within government buildings by, where possible, simple bulb replacement (e.g. incandescent to LED or T12 fluorescent to T8). However, fixture upgrades, particularly for standard office troffer lighting, has been beyond the scope of their services/budget. Recently, during a renovation of the Tribe’s Natural Resources Protection office, troffer fixtures were replaced. We calculate this single project will reduce cumulative CO₂e emissions by over eleven (11) metric tons (MT) by 2030.

Consulted with Building Management staff to identify government buildings where similar lighting upgrades would lead to improved energy efficiency and thus reduced emissions of GHGs.

Lighting Inventory
Fixture Count

	Troffer Lights					Other Fixture Replacement				Other Assumed Bulb Only Replacement			
	2x2	4' 2-bulb	4' 3-bulb	4' 6-bulb Gym Lights	8' 2-bulb	Double tube downlight	Low V. downlight 50W	Misc. forms 13 to 70 watt	4" vanity lights	6" Pot Lights	6" Round 2-Bulb	4" Round Pot Light	4" Direct. Beam Spot
Public Works	68												
MPMRC	185	526							72	128	88	12	
Community Center	485		116	21					74				
Public Safety	198	63	192		58	38	44	159					
Post Office		42											
Daggett Building			52		8				4	3	20		
Child Devel. Center	48	109	103										

Implementation Schedule and Milestones

- Obtain Funding
- Secure Local Permits
- Hire Contractors
- Implement work
- Monitor progress through Building Inspector inspections
- Track budget

Metric for Tracking Progress

- Fixtures Replaced
- Buildings Completed

Quantitative Cost Estimate

Quantitative cost estimates were generated by counting light fixtures in each government building and participating in multiple discussions with Keith Gove, Top Division Operating Executive of Public Works, Planning and Infrastructure Management (the department responsible for building maintenance/construction estimates). This would reduce the energy demand for each government building.

Seven (7) government buildings are earmarked for this measure. PW would procure materials and and hire a general contractor for installation. The Program would track progress through key milestones: scheduling deadlines, schedule revisions, and budget tracking. The total estimated cost for this measure is \$318,295 and broken out by building below:

1. PW - \$9,520
2. MPMRC - \$86,390
3. Community Center - \$91,740
4. Public Safety - \$87,815
5. Post Office - \$4,830
6. Daggett Utility Building - \$6,900
7. Child Development Center - \$31,100

Benefit Analysis

Method and Tools used to Estimate Pollutant Reductions

The lighting inventory above was utilized to determine the expected annual energy savings (kWh) if all fixtures/bulbs were upgraded. We then calculated emissions that would result from that amount of electricity use.

Emission factors utilized, for both GHG (CO₂e) and criteria pollutants, were obtained from EPA's Emissions & Generation Resource Integrated Database (eGRID). In addition to the typical GHG pollutants, eGRID provides factors (lb/MWh) for NO_x & SO_x. EPA had also posted PM_{2.5} data to eGRID, however only for year 2020.⁴ Please refer to detailed methodology write-up for MPTN's inventory provided within Appendix I of this document.

⁴ <https://www.epa.gov/egrid/egrid-related-materials#eGRID%20PM2.5>

Estimates of emission reductions are presented within the table below.

Estimate of Cumulative Reductions (MT)

	GHG	Co-Pollutants		
	CO ₂ e	NO _x	PM _{2.5}	SO ₂
Public Works	7.48	0.004	0.001	0.002
MPMRC	82.33	0.047	0.007	0.019
Community Center	86.47	0.049	0.007	0.020
Public Safety	89.75	0.051	0.008	0.020
Post Office	4.18	0.002	0.000	0.001
Daggett Building	11.04	0.006	0.001	0.002
Child Development	34.64	0.020	0.003	0.008
	315.89	0.179	0.027	0.072

Measure Implementation Assumptions

All existing fluorescent troffer fixtures were assumed to currently use T8 bulbs (32 W/bulb). Existing wattage information for other fixtures that will require replacement was provided by Building Management. Other lights, where it was assumed that only simple bulb replacement will be required, were assumed to have previously been updated from incandescent to fluorescent bulbs. Troffer replacement wattage was assumed to be equivalent to percent efficiency improvement noted for the NRP project, on a bulb-to-bulb basis.

Additional Benefits (No Disbenefits Identified)

- Cost savings
- Increased climate resilience

Weatherization Upgrades – Government Facilities

This measure focuses on reducing GHG emissions by making government building more energy efficient through improved weatherization. The intent is to provide education on weatherization improvements to both Tribal Membership and appropriate personnel.

Consultation with MPTN’s TOE, had identified two elements within select buildings that could significantly improve energy efficiency: window replacement and strategic placement of insulation. This would improve heat exchanges between inside and outside the building, therefore reducing the energy demand from each government building, while simultaneously improving climate resilience.

Implementation Schedule and Milestones

- Obtain Funding
- Provide Outreach and Education
- Secure Local Permits
- Hire Contractors
- Implement work
- Monitor progress through Building Inspector inspections
- Track budget

Metric for Tracking Progress

- Area of insulation addition
- Number of Windows Replaced

Quantitative Cost Estimate

Three (3) government buildings are earmarked for this measure: all with some component of insulation upgrades and two (2) in need of window upgrades. PW would procure materials lighting fixtures and hire an electrical contractor for installation. The Program would track progress through key milestones: scheduling deadlines, schedule revisions, and budget tracking. The total estimated cost for this measure is \$781,782 and broken out by building below:

Insulation

1. PW - \$6,150
2. Community Center - \$17,300
3. Public Safety - \$42,832

Windows

1. PW - \$114,000
2. Community Center - \$600,000
3. Education - \$1,500

Benefit Analysis

Method and Tools used to Estimate Reductions

Quantitative cost estimates were generated by counting relevant windows in each government building as well as identifying potential insulation upgrades/installations in addition to multiple consultations with Keith Gove, TOE.

We calculated the annual energy savings (Therms) utilizing the U.S. Department of Energy spreadsheet based tools provided on their website. We utilized separate specific tools, one for window⁵ replacement and another for insulation⁶ upgrades. The resultant energy savings in Therms provided by these tools was converted to million British thermal units (MMBtu). Emission reductions were then calculated utilizing the same emissions factors utilized to calculate emissions, specifically for scope 1, natural gas combustion sources, within our baseline year inventory. Please refer to Appendix I for a detailed methodology write-up for MPTN's baseline inventory, specifically, detail provided within of this document.

Estimates of emission reductions are presented within the table below.

Estimate of Cumulative Reductions (MT)							
	GHG	Co-Pollutant					
	CO ₂ e	NO _x	CO	PM ₁₀ / PM _{2.5}	VOC	SO ₂	Total HAPs
Insulation							
Community Center	12.5	0.023	0.019	0.002	0.001	0.0003	0.001
Public Safety	30.9	0.056	0.047	0.004	0.003	0.0008	0.002
Public Works	4.4	0.008	0.007	0.001	0.000	0.0001	0.000
Windows							
Community Center	23.0	0.042	0.035	0.003	0.002	0.0006	0.001
Public Safety	7.7	0.014	0.012	0.001	0.001	0.0002	0.000
	78.6	0.143	0.120	0.011	0.008	0.0021	0.004

⁵ https://energy.gov/sites/prod/files/2014/01/f7/energy_savings_windows_worksheet.xls

⁶ https://www.energy.gov/sites/prod/files/2014/01/f7/energy_savings_insulation_worksheet.xls

Measure Implementation Assumptions

Window sizes to be replaced and areas for additional insulation were provided by MPTN Building Management. Building Management also provided U-Factors proposed for window replacement. However, those factors provided were center of glass values and not indicative of the entire fenestration. Therefore, MPTN’s Building Code Official was consulted to provide typical fenestration U-factors at the time the facilities were constructed (early 1990’s) (note the proposed windows to be replaced at the Community Center are double pane whereas those at the Public Works building are single pane (U-factors 0.52 and 1.00 respectively). We then utilized the maximum U-factor that would be required under the Energy Conservation Code portion of MPTN’s Building Code for the proposed replacement windows.

Similarly, Building Management staff provided the calculations for the areas of insulation they believed should be upgraded. Both Building Management staff and the Building Official stated that the current R-value of the existing insulation within those areas to be R-19. Building Management staff believes that significant improvement will be gained by doubling the amount of insulation to R-38.

Summary of Upgrade Metrics

	Area (ft ³)	Current		Proposed		Energy Savings (Annual Therms)
		U-Factor (Fenstration)	R-Rating	U-Factor (Fenstration)	R-Rating	
Insulation						
Community Center	8,650		19		38	
Public Safety	21,416		19		38	1,166
Public Works	3,075		19		38	
Windows						
Community Center	3,056	0.52		0.36		867
Public Safety	256	1.00		0.36		290

Local values for heating and cooling degree days were also required by the tool. For these data we utilized the applicable values for base-year 2022 derived weather from data maintained by Norwich Public Utilities available on the Nation Weather Services website.

Additional Benefits (No Disbenefits Identified)

- Energy/Cost savings
- Improved Safety
- Improved Public Health
- Increased climate resilience

Transportation Electrification: Government

Measures identified within this group are intended to encourage transition from internal combustion engine vehicle energy efficiency improvements that can be made within government facilities. support electrification of light duty fleet vehicles and encourage employee commute with electric vehicles.

Required Priority Action Plan Elements Common to all Measures with this grouping:

Geographic Location: Government buildings, identified below, within Mashantucket, CT

Key Implementation Agency: Public Works, Planning and Infrastructure Management (PW)

Milestones for Obtaining Authority: Key implementing agency has authority to implement once funded.

Funding Source: Climate Pollution Reduction Grants – Implementation Grants

Installation of EV Charging Stations – Government Buildings

This climate action measure calls for the installation of electric vehicle charging stations at government buildings to support electrification of light duty fleet vehicles and encourage employee commute with electric vehicles. If implemented, this measure would install Level 2 charging infrastructure. This priority measure calls for the installation of twelve (12) dual port charges at government building parking facilities. The chargers will support the move towards electrifying government fleet vehicle. Charges will be available for use by employees during the workday. It is hoped that the available of these chargers with encourage employee by electric vehicles.

The intent is to further future proof these installations by installing electrical infrastructure (panel upgrades and conduit runs) to support and additional twenty (20) chargers.

Educational programs will be offered, before and after chargers are installed, to encourage their use by MPTN employee commuters. A primary focus will be on how the charging stations will operate, who can use them, how much it will cost (if anything), etc.

Implementation Ready Locations

Implementation Ready Locations (Single dual port charger)	Chargers to be Supported by Infrastructure Improvements
Community Center	
Council/Elders Parking	1
Upper Parking Lot	4
Michael J Daggett Building	
Utilities - Front Lot	1
NRP-RA - Back Lot	2
Museum & Research Center	
Upper Employee Lot	2
Patron Lot	4
Post Office	
Post Office	
Public Safety	
Upper Lot	2
Police Lot	
Public Works	2
Wastewater	
Child Development Center	2

Implementation Schedule and Milestones

- Obtain Funding
- Provide Outreach and Education
- Secure Local Permits
- Hire Contractors
- Implement work
- Monitor progress through Building Inspector inspections
- Track budget

Metric for Tracking Progress

- Number of EV Charging Units Installed

Quantitative Cost Estimate

Quantitative cost estimates were generated by counting light fixtures in each government building and participating in multiple discussions with Keith Gove, TOE (the department responsible for building maintenance/construction estimates). This would reduce the energy demand for each government building.

Seven (7) government buildings are earmarked for this measure. PW would procure materials and hire a general contractor for installation. The Program would track progress through key milestones: scheduling deadlines, schedule revisions, and budget tracking. The total estimated cost for this measure is \$299,500.

Benefit Analysis

Method and Tools used to Estimate Reductions

The AFLEET Charging and Fueling Infrastructure (CFI) Emissions Tool was utilized to estimate greenhouse gas emissions and other criteria air pollutant emissions. The Alternative Fuel Life-Cycle Environmental and Economic Transportation (AFLEET) Suite of Tools, developed by researchers at Argonne National Laboratory for the U.S. Department of Energy (DOE). The AFLEET Charging and Fueling Infrastructure (CFI) Emissions Tool estimates well-to-wheel greenhouse gas emissions and vehicle operation air pollutant emissions for proposals to the Federal Highway Administration's (FHWA) Charging and Fueling Infrastructure Discretionary Grant Program (CFI Program).

The tool provides annual reduction calculations for both GHGs (CO₂e) and criteria pollutants. CO₂e is reported in tons (short) whereas, criteria pollutants are reported in pounds. All had to be converted to metric tons (MT) for consistency within this assessment.

Estimates of emission reductions are presented within the table below.

Estimate of Cumulative Reductions

	GHG		Co-Pollutant				
	CO ₂ e	CO	NOx	PM10	PM2.5	VOC	SOx
2025-2030	661.0	2.82	0.075	0.0070	0.0056	0.2725	0.0011
2025-2050	8,813.4	37.54	0.997	0.0933	0.0750	3.6331	0.0149

Measure Implementation Assumptions

The type of chargers proposed, and utilized for this assessment, are L2 EVSEs. The Moderate Utilization category was selected to estimate annual reductions. Cumulative reductions assume that installation at the twelve (12) priority locations by 2025 and installation of the twenty (20) chargers supported by the upgraded utility infrastructure by 2030.

Additional Benefits

- Cost savings
- Increased climate resilience

Disbenefits

- Increased Demand on Power Grid

Vehicle Electrification – Government Fleet

This climate action measure calls for replacement of a select number of fleet vehicles to reduce emissions and to demonstrate to department managers the feasibility of additional fleet electrification. If implemented this measure would replace thirteen (13) light duty (passenger car/truck) vehicles within MPTN government’s current fleet with either extended range plug-in hybrid vehicles or all electric vehicles. Plug-in hybrids are necessary only for vehicles that are required for customary extended travel (off-site consultation, training or seminars).

The intent is to provide education on combustion vehicle replacement and retrofitting, including supporting information, to government department managers to encourage future vehicle needs to be met by replacement with EVs.

Implementation Schedule and Milestones

- Obtain Funding
- Provide Outreach and Education
- Secure Local Permits
- Hire Contractors
- Implement work
- Monitor progress through Building Inspector inspections
- Track budget

Metric for Tracking Progress

- Number of Vehicles Replaced by EV Vehicles

Quantitative Cost Estimate

Quantitative cost estimates were generated by examining the entire governments fleet of vehicles. The focus was on passenger cars, light (passenger) trucks and light load utility vans. Consideration was given to the function of the vehicle, assessing whether it was primarily used within the confines of Mashantucket. Two (2) passenger cars, seven (7) light pickup trucks and four (4) light load utility vans were identified as candidates for replacement.

Appropriate replacement vehicles were identified and representative vehicle ‘sticker prices’ from the internet were used to calculate costs (see table below).

Quantity	Current Type	Proposed EV Replacement	Estimated Replacement Cost	Total Estimated Cost
2	Passenger Car	Ford Escape	\$50,000	\$100,000
4	Cargo Vans	Ford E-Transit Cargo Van	\$70,000	\$280,000
7	Pickups	F-150 Lightning	\$75,000	\$525,000
				\$905,000

Benefit Analysis

Method and Tools used to Estimate Reductions

The AFLEET Charging and Fueling Infrastructure (CFI) Emissions Tool was utilized to estimate greenhouse gas emissions and other criteria air pollutant emissions (more detail provided within discussion of previous reduction measure). For this analysis the On-Road Fleet Footprint Calculator was used. This tool estimates the annual petroleum use, GHGs, and air pollutant emissions of existing and new on-road vehicles, taking into consideration that older vehicles typically have higher air pollutant emission rates than newer ones.

Current vehicles were entered into the tool (type, model year, baseline year fuel use, and VMT). Refer to Appendix I for detailed description of Source Data and Methodology used to develop the baseline inventory. Replacement vehicle data was then entered and reduction calculated are the difference. Please refer to Appendix I for a detailed methodology write-up for MPTN’s baseline inventory, specifically, detail provided within of this document.

Estimates of emission reductions are presented within the table below.

Estimate of Cumulative Reductions (MT)

	GHG		Co-Pollutant				
	CO ₂ e	CO	NO _x	PM ₁₀	PM _{2.5}	VOC	SO _x
2025-2030	238.1	2,806.2	110.1	6.7	4.1	179.9	2.5

Measure Implementation Assumptions

For the purpose of this analysis actual baseline data was entered for each vehicle. The following assumptions were made for replacement vehicles:

- Plug-in electric hybrids were assumed travel 80% of their baseline mileage solely on electric battery power. The energy requirement during this mode use was estimate at 33.7 kWh per 100 miles (or 100 MPGe) for cars (Ford Escape) and for trucks 70 MPGe (Ford F-150). Fuel efficiency estimated for remaining 20% of mile traveled was estimated at 40 miles per gallon (MPG) and 30 MPG for cars and truck respectively.
- We estimated that ten (10) of the vehicles would be conducive for replacement with all electric models and three (3) that would require the extended range afforded by a plug-in hybrid model.

Additional Benefits

- Energy/Cost savings
- Improved Safety
- Improved Public Health
- Increased climate resilience

Disbenefits

- Increased Demand on Power Grid

Incentive Programs: Residential

These pollution reduction measures are intended to provide each qualified MPTN household incentives to make energy improvements within their homes and to consider electric vehicles when purchasing new cars.

Required Priority Action Plan Elements Common to all Measures with this grouping:

Geographic Location: Households within Mashantucket, CT

Funding Source: Climate Pollution Reduction Grants – Implementation Grants

Household Efficiency Upgrades – Voucher Program

This pollution reduction measure intends to provide each qualified MPTN household with \$15,000 in funding to upgrade building energy efficiency. Examples include, but are not limited to, the installation of heat pumps, installation of renewable energy technology, improving home appliances, and weatherization upgrades.

This pollution reduction measure would include an educational component for the Mashantucket Tribal community. The workshops would serve two purposes: advertise the funding opportunity and educate potential participants.

This pollution reduction measure includes an educational component for membership, revolving around explanation of the details on the voucher program as well as energy efficiency upgrades.

Key Implementation Agency: Natural Resources Protection & Regulatory Affairs

Milestones for Obtaining Authority: Approval of Program by MPTN's Housing Committee and Tribal Council

Implementation Schedule and Milestones

- Obtain Funding
- Develop Program
- Provide Outreach and Education
- Secure Local Permits
- Hire Contractors
- Implement work
- Monitor progress through Building Inspector inspections
- Track budget

Metric for Tracking Progress

- Number of Voucher Issued
- Estimated GHG Reduction

Quantitative Cost Estimate

Quantitative cost estimates were generated by multiplying the voucher limit (\$15,000) with the number of households within Mashantucket in 2022 (153). The resulting amount is \$2,296,500 without the addition of administrative costs.

Benefit Analysis

Method and Tools used to Estimate Reductions

To calculate the estimated pollutant reductions for this measure The Costs of Home Decarbonization in the US was used to provide baseline data for project cost expectations and carbon reduction expectations related to home improvements through electrification.⁷ Based on 1,739 energy upgrade projects across the country (410 [~25%] in Northeastern U.S.)¹, the median project carbon emissions reduction was 1.6 MTCO_{2e} per year² and the median project cost was \$8,740³. From there, the extrapolation was made to achieve a project cost of \$15,000 and subsequent carbon emission reduction of 2.75 MTCO_{2e} per project per year. Applying this calculation to the 153 households in Mashantucket in 2022, the total carbon emission reduction for this measure is estimated to be 420.75 MTCO_{2e} per year. ($\$15,000/\$8,740 = 1.72 \rightarrow 1.72 * 1.6 \text{ MTCO}_2\text{e per year} = 2.75 \text{ MTCO}_2\text{e reduced per project per year} \rightarrow 2.75 \text{ MTCO}_2\text{e reduced per project per year} * 153 = 420.75 \text{ MTCO}_2\text{e reduced per year}$).

Cumulative project period emissions, determined assuming that the utilization of the voucher program would occur equally throughout the project period, are estimated as 1,262.25 MTCO_{2e}

Measure Implementation Assumptions

- A majority of the voucher program projects will be home energy electrification projects
- The project cost and carbon pollution reductions are scalable in the way the calculations were made.
- All homeowners on the reservation will take advantage of the program

Additional Benefits/Disbenefits

- Energy/Cost savings
- Improved Safety
- Improved Public Health
- Increased climate resilience

Disbenefits

- Increased Demand on Power Grid

⁷ https://eta-publications.lbl.gov/sites/default/files/the_costs_of_home_decarbonization_9.13.22.pdf

Resident EV Incentive – Rebate Program

This pollution reduction measure intends to incentivize up to 34 Tribal Members living in Mashantucket to replace their traditional combustion vehicles to electric vehicles.

This pollution reduction measure would include an educational component for Tribal Members living in Mashantucket. The workshops would serve two purposes: advertise the funding opportunity and educate potential participants.

The intent is to provide education on combustion vehicle replacement and retrofitting, including supporting information, to Tribal Membership.

Key Implementation Agency: Natural Resources Protection & Regulatory Affairs

Milestones for Obtaining Authority: Approval of Program by MPTN’s Planning Committee and Tribal Council

Implementation Schedule and Milestones

- Obtain Funding
- Create rebate guidelines
- Provide Outreach and Education
- Present program to community and implement

Metric for Tracking Progress

- Number of EV vehicles purchased

Quantitative Cost Estimate

Quantitative cost estimates were generated by referencing Connecticut’s CHEAPER Annual Report – Second Year: July 2021 – June 2022 (the percent of program participants), CT DEEP’s Cheaper website (the maximum applicable amount per rebate), and the average amount of vehicle purchases registered to Mashantucket from 2013-2022. The resulting amount is \$256,500 without the addition of an administrative costs.

Benefit Analysis

Method and Tools used to Estimate Reductions

The AFLEET Charging and Fueling Infrastructure (CFI) Emissions Tool was again utilized to estimate greenhouse gas emissions and other criteria air pollutant emissions. Replacement vehicle emissions were calculated for a plug-in hybrid (PHEV) and a full battery (EV) for both a passenger car and a passenger light truck. From these data the average PHEV and EV emissions were averaged using a weighted distribution based on the current residential mix of cars and trucks. Lastly, the emissions reductions per vehicle were estimated by subtracting the a simple average of the two replacement types from the estimated of emissions for the vehicle replaced.

Cumulative project period emissions were determined assuming that the purchase of electric replacements would occur equally throughout the project period.

Estimate of Cumulative Reductions (MT)

	GHG		Co-Pollutant				
	CO ₂ e	CO	NO _x	PM ₁₀	PM _{2.5}	VOC	SO _x
2025-2030	391.9	2.32	0.064	0.003	0.003	0.078	0.002

Measure Implementation Assumptions

For the purpose of this analysis model year 2016 and 10,000 annual vehicle miles traveled was assumed for the vehicle to be replaced. Emissions estimates for replacement vehicle types were calculated with the following assumptions: Plug-in electric hybrids were assumed travel 80% of their baseline mileage solely on electric battery power. The energy requirement during this mode use was estimate at 33.7 kWh per 100 miles (or 100 MPGe) for cars (Ford Escape) and for trucks 70 MPGe (Ford F-150). Fuel efficiency estimated for remaining 20% of mile traveled was estimated at 40 miles per gallon (MPG) and 30 MPG for cars and truck respectively.

Additional Benefits

- Energy/Cost savings
- Improved Safety
- Improved Public Health
- Increased climate resilience
- Education

Disbenefits

- Increased Demand on Power Grid

Table 1: GHG Emissions

Mashantucket, CT

Baseline Year 2022

Scope 1 Emissions

Stationary Combustion

Natural Gas Combustion		Tribal GHG Inventory Tool: Government Operations Module				
		N. G. (HHV) ¹ 1.036	Version 2024.1 Emissions (MT)			
		Energy MMBtu	CO ₂	CH ₄	N ₂ O	CO ₂ e
Government	MCF	Factor ->	52.917	0.005	0.0001	
	60,192		3,300	0.29	0.01	3,310
Community Center	7,254	7,515	397.7	0.04	0.00	398.8
Museum						
	Kitchen (Est.)	1,500	1,554	82.2	0.01	82.5
	Boilers	41,404	42,895	2,269.9	0.20	2,276.7
Post Office	180	186	9.9	0.00	0.00	9.9
Public Safety	2,314	2,397	126.9	0.01	0.00	127.2
Public Works	550	570	30.1	0.00	0.00	30.2
Tall Pine House	71	74	3.9	0.00	0.00	3.9
Sugar Shack	33	34	1.8	0.00	0.00	1.8
Wastewater	5,025	5,206	275.5	0.02	0.00	276.3
Water	1,861	1,928	102.0	0.01	0.00	102.3
Commercial	195,289	202,319	10,706	0.95	0.02	10,738
Energy Generation (CoGen)	1,262,360	1,307,805	69,205	6.15	0.13	69,412
Residential	6,454	6,686	354	0.03	0.00	355

Residential Heating Oil ²		Tribal GHG Inventory Tool: Government Operations Module				
		MMBtu/gal 0.1381	Version 2024.1 Emissions (MT)			
		Energy MMBtu	CO ₂	CH ₄	N ₂ O	CO ₂ e
Government	Gallons	Factor ->	10.21	0.0004	0.000083	
	958	132	9.8	0.000	0.000	9.8
Spiritual Center	958	132	9.8	0.000	0.000	9.8
Residential	2,779	384	28.4	0.001	0.000	28.5

Propane		Tribal GHG Inventory Tool: Government Operations Module				
		MMBtu/gal 0.091	Version 2024.1 Emissions (MT)			
		Energy MMBtu	CO ₂	CH ₄	N ₂ O	CO ₂ e
Residential	Gallons	Factor ->	5.72	0.0003	0.00005	
	426	39	2.4	0.0	0.0	2.45

Stationary Combustion Source Totals

Residential		384.6	0.03	0.00	385.8
Government		3,309.6	0.3	0.01	3,319.5
Commercial		10,715.9	1.0	0.02	10,747.9
Energy Generation		69,205.4	6.15	0.13	69,412.1
		83,615.5	7.4	0.16	83,865.4

Table 1: GHG Emissions

Mashantucket, CT

Baseline Year 2022

Mobile

Fleet Vehicles & Residents

Tribal GHG Inventory Tool: Government Operations Module

	Energy MMBtu		Version 2024.1 Emissions (MT)			
	Gasoline	Diesel	CO ₂	CH ₄	N ₂ O	CO ₂ e
Government	4,130	2,563	479.6	0.006	0.009	482.0
Community Center	168.7	6.9	12.4	0.000	0.000	12.4
Community Center Annex	41.4		2.9	0.000	0.000	2.9
Museum	18.5		1.3	0.000	0.000	1.3
Post Office	92.4		6.5	0.000	0.000	6.5
Public Safety	2356.5	363.1	192.4	0.002	0.002	193.1
Public Works	993.0	1443.2	176.5	0.002	0.004	177.5
Wastewater	93.9	67.9	11.6	0.000	0.000	11.7
Water	365.4	681.7	76.1	0.001	0.002	76.6
Commercial	4239.2	116.0	383.9	0.0	0.0	385.8
Residential	15,939		1119.6	0.041	0.027	1,128.0

Mobile Source Totals

Residential			1,119.6	0.04	0.03	1,128.0
Government			479.6	0.0	0.01	482.0
Commercial			<u>383.95</u>	<u>0.01</u>	<u>0.01</u>	<u>385.79</u>
			1,983.1	0.1	0.04	1,995.8

Scope 1 - Sector Totals

Residential	1,504.2	0.1	0.03	1,513.8
Government	3,789.2	0.3	0.02	3,801.6
Commercial	11,099.9	1.0	0.03	11,133.7
Energy Generation	69,205.4	6.1	0.13	69,412.1
	85,598.7	7.5	0.20	85,861.2

Table 1: GHG Emissions
Mashantucket, CT
 Baseline Year 2022

Scope 2 Emissions

Electric					
Electricity Use		eGRID subregion NPCC New England (NEWE)			
		eGRID2022			
		All Values MT			
	Energy kWh	CO₂	CH₄	N₂O	CO₂e
	Factor ->	536.428	0.063	0.008	540.480
Government	11,249,970	2,737	0.32	0.04	2,757.2
Child Development Center	316,200	76.94	0.01	0.00	77.5
Community Center	1,142,063	277.89	0.03	0.00	279.9
Community Center Annex	39,120	9.52	0.00	0.00	9.6
Community-Misc.	63,023	15.33	0.00	0.00	15.4
Museum	4,971,397	1,209.64	0.14	0.02	1,218.4
Post Office	26,949	6.56	0.00	0.00	6.6
Public Safety	934,800	227.46	0.03	0.00	229.1
Public Works	158,293	38.52	0.00	0.00	38.8
Spiritual Center	13,748	3.35	0.00	0.00	3.4
Tall Pine House	2,156	0.52	0.00	0.00	0.5
Tribal Health Services	56,894	13.84	0.00	0.00	13.9
Sugar Shack	10,733	2.61	0.00	0.00	2.6
Wastewater	2,575,228	626.60	0.07	0.01	631.1
Water	939,366	228.57	0.03	0.00	230.2
Commercial	121,743,601	29,623	3.48	0.44	29,837.1
Residential	2,784,297	677	0.08	0.01	682.6

Scope 2 - Sector Totals (eGRID2022 - Above)

Residential	2,784,297	677.5	0.1	0.01	682.6
Government	11,249,970	2,737.3	0.3	0.04	2,757.2
Commercial	121,743,601	29,622.6	3.5	0.44	29,837.1
	135,777,868	33,037.5	3.9	0.49	33,276.9
Energy Generation (Avoided Emissions)	(131,823,647)	(32,075.3)	(3.8)	(0.5)	(32,317.6)

Table 1: GHG Emissions

Mashantucket, CT

Baseline Year 2022

Scope 3 Emissions

Mobile

Employee Commute		Tribal GHG Inventory Tool: Government Operations Module			<i>Version 2024.1</i>
					<i>Emissions (MT)</i>
	Total One-way Commute (Mi.)	Commuting Employees	Average Commute (1-way)		CO₂e
Government	3,574.0	462	15.4		1,219.2
Child Development Center	264.6	21	12.6		59.2
Community Center	767.9	84	9.14		147.3
Community Center Annex	122.3	7	17.47		23.5
Foxwoods	1470.4	79	18.61		276.0
Museum	751.6	56	13.42		140.9
Post Office	25.8	2	12.90		4.9
Public Safety	1973.7	79	24.98		370.9
Public Works	407.9	39	10.46		76.9
Tall Pine House	19.8	3	6.60		3.7
Tribal Health Services	225.5	14	16.11		42.3
Wastewater	42.5	5	8.50		8.3
Water	348.3	27	12.90		65.4
Commercial	52461.6	3164	40.16		10,109.6

Energy Systems and Infrastructure Analysis Division, Argonne National Laboratory					<i>Emissions (MT)</i>
AFLEET Tool 2023					
	Total One-way Commute (Mi.)	# of Employees	Average Commute (1-way)	Total Yearly Miles	
All MPTN Employees	59226.3	3574	16.57	28,073,266	

Government	1,219.2
Commercial	10,109.6

Table 1: GHG Emissions

Mashantucket, CT

Baseline Year 2022

Electric

Electricity - Grid Loss⁴		eGRID subregion NPCC New England (NEWE)				
eGRID2022		Total Output Emission Rate (lb/MWh)				
Grid gross loss	Energy kWh	CO₂	CH₄	N₂O	CO₂e	
5.1%	Factor ->	539.367	0.072	0.009	543.989	
Government	11,249,970	147.9	0.02	0.002	149.2	
Child Development Center	316,200	4.2	0.0006	0.000	4.2	
Community Center	1,142,063	15.0	0.0020	0.000	15.1	
Community Center Annex	39,120	0.5	0.0001	0.000	0.5	
Community-Misc.	63,023	0.8	0.0001	0.000	0.8	
Museum	4,971,397	65.4	0.0087	0.001	65.9	
Post Office	26,949	0.4	0.0000	0.000	0.4	
Public Safety	934,800	12.3	0.0016	0.000	12.4	
Public Works	158,293	2.1	0.0003	0.000	2.1	
Spiritual Center	13,748	0.2	0.0000	0.000	0.2	
Tall Pine House	2,156	0.0	0.0000	0.000	0.0	
Tribal Health Services	56,894	0.7	0.0001	0.000	0.8	
Sugar Shack	10,733	0.1	0.0000	0.000	0.1	
Wastewater	2,575,228	33.9	0.0045	0.001	34.1	
Water	939,366	12.4	0.0016	0.000	12.5	
Commercial	228,886,236	3,009.4	0.40	0.050	3,035.1	
Residential	2,784,297	36.6	0.00	0.001	36.9	
Residential		36.6	0.00	0.00	36.9	
Government		147.9	0.02	0.00	149.2	
Commercial		1,600.67	0.21	0.03	1,614.4	
		1,785.2	0.2	0.0	1,800.5	

Scope 3 - Sector Totals

Residential	36.9
Government	1,368.3
Commercial	11,723.9
	13,129.2

<u>Sector Totals (CO₂e)</u>		<u>Scope Totals (CO₂e)</u>	
Residential	2,233	Scope 1	85,861
Government	7,927	Scope 2	33,277
Commercial	52,695	Scope 3	13,129
Energy Generation	69,412		132,267
	132,267		

Notes:

¹ Natural Gas Delivered to Mashantucket in 2022 had a HHV of 1,028 Btu/scft.

² As of July 1, 2022 Connecticut Home Heating Oil is required to be blended with 'Biodiesel'. This analysis does not account for this change. <https://afleet.es.anl.gov/home/>

³ <https://www.epa.gov/egrid/egrid-related-materials>

⁴ Huetteman, Justine, Travis Johnson, and Jeremy Schreifels. "Using eGRID for Environmental Footprinting - <https://www.epa.gov/site>

Table 1: CoPollutants
Mashantucket, CT
 Baseline Year 2022

Scope 1 Emissions

Stationary Combustion								
Natural Gas Combustion			AP-42, Ch1, §1.4 Natural Gas Combustion					
	N. G. (HHV)¹	Unit Specific	Factors (lb/MMBtu)					
	1.036	<- Factor	Emissions (MT)					
			NO_x	CO	PM_{2.5}	VOC	SO₂	Total HAPs
Government	MCF		0.097	0.081	0.0073	0.0053	0.0014	0.00295
Government	60,192		1.5	2.3	0.2	0.2	0.0	0.1
Community Center	7,254		0.33	0.28	0.03	0.0181	0.0049	0.0101
Museum			-	-	-	-	-	-
Kitchen (Est.)	1,500		0.07	0.06	0.01	0.0037	0.0010	0.0021
Boilers	41,404	0.036	0.70	1.58	0.14	0.1033	0.0282	0.0574
Post Office	180		0.01	0.01	0.00	0.0004	0.0001	0.0002
Public Safety	2,314		0.10	0.09	0.01	0.0058	0.0016	0.0032
Public Works	550		0.02	0.02	0.00	0.0014	0.0004	0.0008
Tall Pine House	71		0.00	0.00	0.00	0.0002	0.0000	0.0001
Sugar Shack	33		0.00	0.00	0.00	0.0001	0.0000	0.0000
Wastewater	5,025		0.23	0.19	0.02	0.0125	0.0034	0.0070
Water	1,861		0.08	0.07	0.01	0.0046	0.0013	0.0026
Commercial	195,289		17.7	14.9	1.3	1.0	0.3	0.5
Energy Generation (CoGen)	1,262,360	0.008	4.9	2.0	2.1	0.2	0.9	1.7
Residential	6,454		0.3	0.2	0.02	0.02	0.00	0.01

Residential Heating Oil²		AP-42, Ch1, §1.3 Fuel Oil Combustion (Residential furnace)						
	MMBtu/gal	% Sulfur	(lb/ 10³ gal)					
	0.1381	0.3%	NO_x	CO	PM_{2.5}	VOC (NMHC)	SO₂	Total HAPs
Government	Gallons		18	5	1.7	0.713	42.6	0.0410
Government	958		0.0078	0.0022	0.0007	0.0003	0.0185	0.00002
Spiritual Center	958		0.0078	0.0022	0.0007	0.0003	0.0185	0.00002
Residential	2,779		0.0227	0.0063	0.0021	0.0009	0.0537	0.00005

Propane		AP-42, Ch1, §1.5 Liquefied Petroleum Gas Combustion; Updated July, 2008						
	MMBtu/gal	Sulfur gr/100 ft³	(lb/ 10³ gal)					
	0.091	0.54	NO_x	CO	PM_{2.5}	VOC (NMHC)	SO₂	Total HAPs
Residential	Gallons		13	7.5	0.7	0.8	0.054	0.26845
Residential	426		0.0025	0.0014	0.0001	0.0002	0.0000	0.0001

Stationary Combustion Source Totals							
Residential		1.6	2.3	0.2	0.2	0.1	0.1
Government		1.6	2.3	0.2	0.2	0.1	0.1
Commercial		17.7	14.9	1.3	1.0	0.3	0.5
Energy Generation		4.9	2.0	2.1	0.2	0.9	1.7
		25.7	21.4	3.8	1.5	1.3	2.5

Mobile

Energy Systems and Infrastructure Analysis Division, Argonne National Laboratory								
AFLEET Tool 2023								
MT								
	Gasoline	NO_x	CO	PM₁₀	PM_{2.5}	VOC	SO_x	CO_{2e}
								Well to Wheel
Government	4,130	0.28	0.972	0.029	0.011	0.078	0.003	585.9
Community Center	168.7							
Community Center Annex	41.4							
Museum	18.5							
Post Office	92.4							
Public Safety	2356.5							
Public Works	993.0							
Wastewater	93.9							
Water	365.4							
Commercial	4239.2	0.3	1.3	0.0	0.0	0.1	0.0	468.9
Residential	15,939	0.73	10.16	0.105	0.027	0.854	0.007	1,371.3

Mobile Source Totals								
Residential		0.7	10.2	0.1	0.03	0.9	0.01	1,371.3
Government		0.3	1.0	0.0	0.0	0.1	0.0	585.9
Commercial		0.26	1.32	0.04	0.02	0.10	0.00	468.90
		1.3	12.4	0.2	0.1	1.0	0.0	2,426.1

Table 1: CoPollutants
Mashantucket, CT
 Baseline Year 2022

Scope 1 - Sector Totals

Residential	2.3	12.5	0.1	0.2	1.0	0.1	1,371.4
Government	1.8	3.3	0.0	0.2	0.2	0.1	586.0
Commercial	18.0	16.2	0.0	1.4	1.1	0.3	469.4
Energy Generation	4.9	2.0	-	2.1	0.2	0.9	1.7
	27.0	33.9		3.9	2.5	1.3	2,428.5

Scope 2 Emissions

Electric		eGRID subregion NPCC New England (NEWE)					
Electricity Use		eGRID2022					
		All Values MT					
		NO_x	PM_{2.5}			SO₂	
			(2020)				
		0.309	0.046			0.122	
Government	1.6		0.24			0.62	
Child Development Center	0.04		0.01			0.02	
Community Center	0.16		0.02			0.06	
Community Center Annex	0.01		0.00			0.00	
Community-Misc.	0.01		0.00			0.00	
Museum	0.70		0.10			0.28	
Post Office	0.00		0.00			0.00	
Public Safety	0.13		0.02			0.05	
Public Works	0.02		0.00			0.01	
Spiritual Center	0.00		0.00			0.00	
Tall Pine House	0.00		0.00			0.00	
Tribal Health Services	0.01		0.00			0.00	
Sugar Shack	0.00		0.00			0.00	
Wastewater	0.36		0.05			0.14	
Water	0.13		0.02			0.05	
Commercial	17.1		2.55			6.74	
Residential	0.4		0.06			0.15	

Scope 2 - Sector Totals (eGRID2022 - Above)

Residential	0.4	0.1	0.2
Government	1.6	0.2	0.6
Commercial	17.1	2.6	6.7
	19.0	2.8	7.5
<i>Energy Generation (Avoided Emissions)</i>	(18.5)	(2.8)	(7.3)

Scope 3 Emissions

Mobile		Employee Commute						
		Energy Systems and Infrastructure Analysis Division, Argonne National Laboratory						
		AFLEET Tool 2023						
		Well to Wheel						
	Total One-way Commute (Mi.)	NO_x	CO	PM₁₀	PM_{2.5}	VOC	SO_x	CO_{2e}
All MPTN Employees	59226.3	5.93	99.20	1.07	0.27	7.02	0.068	14,259
Government								
Commercial		5.9	99.2	1.1	0.3	7.0	0.1	14,259.1

**Table 1: CoPollutants
Mashantucket, CT
Baseline Year 2022**

Electric

Electricity - Grid Loss⁴		eGRID subregion NPCC New England (NEWE)					
eGRID2022 Grid gross loss		NO_x	CO	PM₁₀	PM_{2.5}	VOC	SO_x
5.1%		0.327			0.046		0.094
Government		0.09			0.01		0.03
Child Development Center		0.00			0.00		0.00
Community Center		0.01			0.00		0.00
Community Center Annex		0.00			0.00		0.00
Community-Misc.		0.00			0.00		0.00
Museum		0.04			0.01		0.01
Post Office		0.00			0.00		0.00
Public Safety		0.01			0.00		0.00
Public Works		0.00			0.00		0.00
Spiritual Center		0.00			0.00		0.00
Tall Pine House		0.00			0.00		0.00
Tribal Health Services		0.00			0.00		0.00
Sugar Shack		0.00			0.00		0.00
Wastewater		0.02			0.00		0.01
Water		0.01			0.00		0.00
Commercial		1.82			0.26		0.52
Residential		0.02			0.00		0.01
Residential		0.02			0.00		0.01
Government		0.09			0.01		0.03
Commercial		0.97			0.14		0.28
		1.1			0.2		0.3

Scope 3 - Sector Totals

Residential	0.02	0.00	0.01
Government	0.09	0.01	0.03
Commercial	6.90	0.41	0.35
	6.8	0.4	7.0

Notes:

¹ Natural Gas Delivered to Mashantucket in 2022 had a HHV of 1,028 Btu/scft.

² As of July 1, 2022 Connecticut Home Heating Oil is required to be blended with 'Biodiesel'. This analysis does not account for this change

³ <https://afleet.es.anl.gov/home/>

³ <https://www.epa.gov/egrid/egrid-related-materials>

⁴ Huetteman, Justine, Travis Johnson, and Jeremy Schreifels. "Using eGRID for Environmental Footprinting - https://www.epa.gov/sites/default/files/2020-08/documents/egrid_footprinting.pdf

Appendix I
MPTN Inventory of Greenhouse Gas and Criteria Emissions
Source Data, Methodology & Status
Base Year 2022

Overview

Emissions Inventories are prepared for a variety of reasons. For instance, MPTN's Air Quality Program has maintained an inventory to track emissions from non-residential combustion sources for more than twenty years. Those efforts focused on criteria pollutants to assess applicability and insure compliance with tribal and federal Clean Air Act requirements. This Greenhouse Gas (GHG) inventory has been prepared for inclusion within MPTN's Priority Climate Action Plan (PCAP). The objective is to establish a baseline so that implementation of the priority reductions measures identified within the PCAP can be tracked. Ultimately, the sources inventoried will be expanded for the MPTN's Comprehensive Climate Action Plan (CCAP) to provide a complete accounting of all GHG contributing sources.

The primary focus of this GHG inventory is to quantify annual carbon dioxide equivalent (CO₂e) emissions. CO₂e is the quantity of CO₂ emissions summed with the emissions of other GHG components (e.g. methane (CH₄), and nitrous oxide (N₂O)) after application of their CO₂ equivalent global warming potential factor. As presented within this inventory, emissions of CO₂e, as well as GHG component emissions and criteria pollutant emissions, are quantified in metric tons per year (MT/yr.).

Typical GHG inventories created by States are generally geared to capture emissions from larger sources and, if included, rely on broad assumptions and estimates when capturing smaller contributions. This MPTN PCAP inventory captures all emissions, even those generally describes as fugitive, for the sources included. Except for those rare instances where assumption was necessary (e.g. personal vehicle use), emissions calculations are based on actual source activity data (e.g. utility bills and vehicle fueling records).

The inventory aggregates emissions within scopes according to the International Panel on Climate Change (IPCC) Guidelines. Source types within each scope have been grouped by sector: government, commercial, energy generation and residential. MPTN's PCAP reduction measures, in addition to those established for residences, focus on reductions at government facilities. Therefore, where possible, each sector was further broken down by individual facility/business.

Government building utilities are metered independently and complete facility breakout was possible. However, most commercial operations are associated with Foxwoods Resort Casino. Separating emissions resulting from tenant operations within that complex proved difficult. Tenant utility services are generally provided for within their lease; though in recent years, MPTN Utilities has begun requiring individual 'sub-meters' for new tenant gas services. Therefore, some tenant businesses could be separated, at least for emissions resulting from fuel combustion.

Facility separation within the commercial sector was not critical – no priority reduction measures are proposed for the commercial sector. However, MPTN has been working toward development of a comprehensive inventory to identify emissions resulting from all facilities/businesses. We view this 'PCAP Inventory' as an interim step towards that goal. Therefore, we wanted to maintain facility separation, where possible, if only to maintain a level of consistency as we progress within this initiative. Ultimately, complete facility breakout will only be possible through statistical estimation (perhaps through comparison of connected load versus usage to similar businesses that are metered).

Emissions emitted by commercial facilities that could not be separated are inordinately attributed to the Foxwoods.

A more detailed discussion regarding data gap analysis and data manipulation steps is provided within the companion quality assurance, quality control tracking document prepared in compliance with the projects Quality Assurance Assessment Program developed for this effort.

Source Activity Data

The purpose of this section is to document the sources of data utilized to generate the GHG emissions inventory for Mashantucket. Below is a summary discussion of the original sources for these data and methods used to fill any data gaps. A much more detailed discussion regarding manipulation steps and data gap analysis is provided within the companion quality assurance, quality control tracking document prepared in compliance with the projects Quality Assurance Assessment Program developed for this effort.

Scope 1 – Stationary Combustion

Natural Gas

Government/Commercial

MPTN Utilities provides services throughout Mashantucket. Natural gas distribution is one of these services. Source data consists of photocopied monthly ‘read sheets’ provided directly by the utility staff who read the meters. These data are routinely entered into and maintained within an electronic spreadsheet to facilitate tracking and comparison.

Data gaps related to meter malfunction, that impact the 2022 base year of this assessment were noted for some government facilities: Public Safety, Public Works, one of the Pequot Health Care buildings. These data gaps were filled by substituting the next complete rolling year of data (generally spanning 2021-2022). Otherwise isolated/individual monthly reads missed or erroneous reads had no bearing of the annual total use.

Some gaps also occurred within the data for the commercial facilities we attempted to breakout from Foxwoods totals: Big Night Entertainment and one of the other ‘Combined Tenants.’ No attempt was made to substitute for these gaps. Any non-recorded flow for these ‘sub-meters’ was captured by the upstream master meter (i.e. recorded sub-meter use is subtracted from the master meter, non-recorded flow is not). Therefore, the sector totals are accurate and emissions are attributed to Foxwoods rather than the tenant.

Residential

Prior to this effort to inventory (GHG) emitted within Mashantucket, residential gas usage was not tracked. For this project, MPTN Utilities provided residential meter ‘read sheets’ going back to January, 2021.

Within the baseline year 2022, there was one month (May) of missing residential data. Since monthly meter-reads are cumulative and emissions are inventoried on an annual basis, this data gap had no impact for this assessment (within our database, June reads were subtracted from April and monthly use noted as the average over the two months).

Other Fuel

Government/Commercial

Most all government and commercial facilities were constructed within the past 35 years and utilize natural gas. The only facilities not connected to natural gas are the Pharmacy (one of Pequot Health Care’s buildings) that utilizes electricity for heat and hot water, and the Tribal Spiritual Center that utilizes home heating oil for heat and hot water. Records of fuel deliveries to the Spiritual Center have been provided by MPTN’s Building Management department.

Residential

Fuel use data are not available for residences unless they are connected to utility natural gas. Of the 147 homes occupied in 2022, 79 utilized natural gas for heating and hot water. The first step to estimate emissions from the remaining 68 homes was to determine what fuel, if any, is used for heating. MPTN’s Land Use Commission (LUC) maintains construction records that detail the type of heating systems installed within newer homes. However, older homes needed to be assessed.

Older homes within Mashantucket generally fall within two categories:

1. Previously existing homes that were constructed prior to being incorporated into Mashantucket.

These homes, located on Coachman Pike, Shewville Road and Fanning Road, were constructed in the early 1980s. There is no natural gas service along these roadways. However, since they were originally located in the Town of Ledyard, Town Assessor records were used to identify the type of heating system installed [i.e. Electric, Home Heating Oil, or Liquefied Petroleum Gas (LPG)].

- Initial housing phases that were constructed prior to installation of natural gas service lines and LUC’s permitting process.

These homes, located on Elizabeth George, Amos George and Ephraim’s Path, were constructed with a mix of heating systems; some with home heating oil furnaces and others heated by electricity. Some of these homes had upgraded their systems to natural gas. Identifying which of the homes within this group heat with electricity or a fuel other than natural gas was the most significant task associated with Scope 1 – Stationary Combustion.

Detailed electricity data exist for all residents going back to 2016. Therefore, it was generally easy to identify electrically heated homes by plotting historic usage and observing seasonal trends. Staff even reviewed records of cord wood delivery to assess whether supplemental heating with wood masked some of the expected winter electric heating peaks. It turned out that the five (5) biggest wood burning homes did indeed heat with electricity. Lastly, for homes with non-definitive charts, staff conducted surveys, looking for on-site features indicative of fuel use (i.e. oil fill pipes, propane tanks), or direct inquiry with the home owner. Ultimately, forty-one (41) homes were identified as heating with either residential heating oil or liquefied petroleum gas (LPG).

Unit Types		Emitting in 2022	
Single Family Home	128	Gas	79
Manufacture Home	11	Elect	28
Attached Dwelling	8	Oil	35
Outbuilding	1	LPG	6
	148		148

To estimate energy use within those homes we utilize the average energy used by homes heating with natural gas (632 CCF). Assuming an equivalent efficiency of LPG and natural gas burners we estimated that 710 gallons/yr. was used within homes heating with LPG. Assuming that natural gas burners are 82% efficient and heating oil burners are 72% efficient we estimated that 794 gallons/yr. was used within homes heating with residential fuel oil.

Additional notes Regarding Home Heating Oil

The State of Connecticut, similar to Rhode Island and New York, has begun to mandate blending of bio-diesel with residential home heating oil. In Connecticut, the mandate commenced July, 2022 (the middle of our base year) requiring a minimum of 5% biodiesel blend. Some reports indicate that the industry had already begun blending up to 8% biodiesel at the time the mandate was implemented. The inventory presented within the MPTN PCAP does not factor reductions associated with this change.

Emissions presented within this PCAP inventory are those calculated by the GHG Tool with fuel input as diesel. Unfortunately, the GHG Tool lacked specific definition for distillate fuel oil. Our understanding is that the term distillate oil can mean a range of fuels more typically refined as #1 or #2. We note that within the ‘Factors’ tab of the GHG Tool the difference, 10.21 kg CO₂ for diesel, and 10.281CO₂ for distillate, are relatively minor.

Future refining of the inventory for MPTN’s CCAP should, perhaps through consultation with CT DEEP, seek more accurate factors for home heating oil delivered within CT.

Scope 1 – Mobile

MPTN Fleet Vehicles

Government/Commercial

MPTN’s Public Works, Planning and Infrastructure Management Department (PW) maintains both government and tribal enterprise (commercial) fleet vehicles. Their Transportation Manager maintains an inventory of all

current and former fleet vehicles and provided this information. Fuel use data were obtained from MPTN Finance Department’s reconciled credit receipts. The amount of fuel and the odometer reading are logged for each transaction at the pump. Departments reconcile each transaction monthly, identifying for Finance, which vehicle was fueled. These finalized records were provided by MPTN Finance for calendar years 2021 and baseline year 2022.

Fueling record data provided by both MPTN Finance and PW are accurate in regard to amount of fuel dispensed. Errors/omissions with regard to odometer readings were frequent. Occasionally, it was determined that the vehicle operating department improperly referenced the vehicle fueled within their monthly reconciliation. Though corrected when noted, generally through odometer readings, these vehicle mis-identifications occurred between vehicles of like make/model and of similar year and therefore are not deemed to impact this assessment. By far, the most significant data gap involved drivers not entering, or entering their personal identification number instead of, the odometer reading. For the most part these gaps could be filled by averaging previous and subsequent fuel records. In conclusion, we deem that records of fuel use to be highly accurate, though vehicle miles traveled (VMT) for some vehicles to be less so.

PW maintains diesel fueling dispensers for their vehicles at their facility. Records of quantity dispensed and vehicle fueled were similarly provided.

At this time, no other businesses within Mashantucket are known to operate fleet vehicles.

Residential

A list of all vehicles registered in Mashantucket for the baseline year 2022 was provided by the Tribal Clerk’s Office. Fleet Vehicles, previously accounted for, had to be removed. Data included make, model, model year and body style.

Fuel use and VMT data were not available for residential vehicles and had to be estimated. First, the assumption was made that all vehicles combust gasoline. We then estimated an average VMT for the baseline year of 10,000 miles/year for passage cars and light trucks; and, 3,000 miles/year for motorcycles and recreational vehicles. Note that we’ve seen recommendations to use 12,500 miles as an estimated annual use for personal vehicles. We decided to reduce that value down to 10,000 because a majority of Mashantucket residents are employed either within Tribal government or commercial enterprises located within Mashantucket. Therefore, personal use for commuting is both much lower than the typical average and those emissions, as a result of commuting, are already captured within the inventory - albeit under Scope 3 – Mobil (‘on-road’).

CTDOT Roadway Inventory Data, CT 2018 Annual VMT per Vehicle: 10,973

US DOT, Bureau of Transportation Statistics: 9.8k CI 1, 10.9k CI 2A, 9.3k CI 2B

Fuel use estimates were then calculated utilizing the average miles per gallon (MPG) default values provided on the Mobile entry tab within the GHG Tool.

Vehicle Type	Average MPG	
	Gasoline & Other Fuels	Diesel & Biodiesel
Passenger Car	24.1	32.4
Light Truck	18.5	22.1
Heavy-Duty Vehicle	10.13	12.96
Motorcycle	50	N/A

Scope 2 – Electric

Mashantucket Pequot Tribal Nation Utilities (MPTN Utilities) provides utility services throughout Mashantucket. Electric distribution/delivery is accomplished via a service contract with the public utility Eversource. Eversource is responsible for monthly electric meter-reads and provides these data to MPTN Utilities and Finance. Finance provides billing services for MPTN Utilities. For the purposes of this project Finance provided these monthly meter-read records in the form of Microsoft Excel spreadsheets dating back to 2016. These data were combined and manipulated utilizing standard Excel data tools. Plots were made to evaluate any erroneous reads. The few erroneous reads noted appeared to be corrected by adjustment to the subsequent months read. No erroneous reads were noted to span, thus impact, the base year 2022 data.

There were two challenges regarding the electric data provided. The first, was a result of Eversource not requiring billing addresses for all meters (meter-reads are provided to MPTN Utilities/Finance for collection) Thus, the meter-reads were recorded based on the actual meter number. The addresses listed had been established by Eversource at the time of meter installation and were at times redundant and often nonsensical. We also found, over the time period for which the data were provided, that some meters had been replaced. Therefore, some effort was required to match meter numbers to actual facility addresses. Residential addresses were not an issue as their addresses were accurate. MPTN Planning department staff, who had previously mapped (e.g. GIS) the location of each meter, help us sort through ambiguous meters. Some, particularly the miscellaneous community meters, required ground truthing.

MPTN Utilities supplements its electricity purchases by generating electricity with a combined heat and power facility (CoGen) located within Foxwoods Central Plant. This plant consists of two 7.4 MW natural gas fired turbines and a third 2 MW steam turbine. All electricity generation within Mashantucket is ‘behind the meter,’ meaning it simply offsets the amount of power needed to be purchased (i.e. it does not need to be subtracted from billing meters). Greenhouse gases related to this generation are Scope 1 emissions accounted for within the applicably stationary source sector ‘Energy Generation.’

In addition to fuel use, accounted for in Scope 1, the operator of the CoGen units provided daily electric generation data.

Scope 3 – Mobile

Commuting - MPTN Employees

A list of all MPTN employees (both government and enterprises), with town of residence and the department employed, was obtained by MPTN’s Human Resources Department. Common web-based mapping services were utilized to determine the average one-way commute distance from each town.

Method and Quality of Calculation

This section describes the methods and tools used to calculate annual baseline year emissions from the source activity data.

Scope 1 – Stationary Combustion

GHG Emissions

EPA’s Local/Tribal Greenhouse Gas Inventory Tool (the GHG Tool) was utilized to organize sector and facility input data and quantify GHG emissions. Specifically, Version 2024.1 of both the community module and the government operations module were used.¹ The community module organized emission contributions by sector. Sectors chosen for MPTN’s inventory are: government, commercial, energy generation and residential.

The government module facilitated aggregation of emissions at facility level. The government module also allowed for estimation of emissions resulting from employees commuting to those facilities. Use of the two modules further allowed for an additional quality control check as calculated emissions from both modules could be compared.

Separate government module spreadsheet files were also maintained; one for government facilities and another for a breakout of commercial sector facilities (where possible). Emissions emitted by commercial facilities that could not be separated are inordinately attributed to the Foxwoods facility.

The analysis also provides some unit breakouts within facilities (i.e. Foxwoods, the Museum and CoGen). These unit breakouts have no bearing on emissions of GHG but were made to facilitate more accurate calculation of criteria pollutants.

¹ <https://www.epa.gov/statelocalenergy/tribal-greenhouse-gas-inventory-tool>

Criteria Pollutants

Annual emissions of criteria pollutants are also presented. No specific tools were utilized to calculate these emissions. Emission calculation was a simple matter of multiplying the activity data (in this case fuel use) by the applicable emission factor. For the most part emission factors used are those referenced within EPA's AP 42, Chapter 1, 5th edition for External Combustion Sources. However, during permitting, MPTN's Air Quality Program is often provided unit specific factors (typically either vendor guarantees and/or are based on actual unit testing). When available for units that significantly contribute to the total facility emissions, these factors, instead of the default AP 42 values, were used and unit emission listed as a sub-group of facility emissions. Questions regarding unit specific factors should be addressed to the MPTN Air Quality Program.

It should be noted that emissions from spark ignition reciprocating internal combustion generators were not broken out for this analysis. Though there are a significant number of emergency generators located within Mashantucket, the baseline year 2022 showed no significant need for their use (i.e. run only for testing/maintenance). Since the primary focus of this inventory was to assess GHG emissions, the added effort to estimate baseline criteria emissions from these types of units was not made. All units are natural gas fired. Therefore, GHG emissions during the baseline year have been attributed for.

Lastly, it should be noted that the GHG Tool used a higher heating value (HHV = 1.036 Btu/MCF) for natural gas than the HHV of gas delivered to Mashantucket (1.028 Btu/MCF in 2022). For the scope of this project this fact is of little significance and is only noted for those who may be familiar with the inventory maintained by MPTN's Air Quality Program. Criteria pollutant factors for natural gas, within AP-42, Ch. 1 §1.4, are stated in pounds per 10⁶ cubic feet, hence we utilized the GHG Tool's HHV to adjusted those to pounds per MMBtu.

Scope 1 – Mobile

GHG Emissions

Mobile Scope 1 emissions are those that originate within Mashantucket. For the purposes of this analysis, emissions from both 'fleet' vehicles, operated by government and tribally own commercial enterprises, and emissions from residential personal vehicles were calculated. GHGs were calculated utilizing the GHG Tool. Source data described within the section above was simply formatted for bulk input utilizing the templates provided within the GHG Tool.

Fleet Vehicles

The GHG Tool requires characteristics for each vehicle (model year, vehicle type, fuel type) and baseline year activity data (fuel consumption and vehicle miles traveled). Vehicle characteristics, including the unique vehicle identification number (VIN), were provided by MPTN's Fleet Maintenance. The National Highway Traffic Safety's web-based VIN decoder tool was used to confirm vehicle information and to obtain gross vehicle weight/vehicle class. The applicable vehicle types used for entry into the GHG Tool are: Passenger Car, Light Truck (Vans, Pickup Trucks, SUVs), and Heavy-Duty Vehicle. Guidance regarding GHG Tool specific vehicle class was not provided. A Department of Energy reference states, "that EPA classifies vehicles as Light Duty (GVWR < 8,500 lb) or Heavy Duty (GVWR > 8,501 lb)."² This value falls between FHWA's Class 2G: 8,001 – 9,000 lb. MPTN's fleet Vehicles falling within Class G were found to be transit/cargo vans. Given the use of these types of vehicles we decided to include these within the Light Truck category. Class 2F pickups were also classified under the Light Truck category (e.g. Ford F-150, Ram 15000 and Chevy Silverado 1500). Vehicles of Class 2H (9;001 - 10;000 lb) or above were categorized as Heavy Duty.

As noted within the previous section we believe records of fuel use to be highly accurate, less accurate are VMT for some vehicles. We do not believe this to be an issue for GHG emissions. The GHG Tool appears to calculate emission solely based of vehicle fuel use. We assume that VMT was included to estimate fuel use when not available by noting that the GHG Tool provided a table of miles per gallon estimates.

Resident Personal Use Vehicles

² <https://afdc.energy.gov/data/10380>

Vehicle class was assigned in a similar manner as it was for Fleet Vehicles. However, VINs were not provided and therefore classification, particularly between Light Truck and Heavy-Duty Vehicle, was made comparing similar models as assigned for Fleet Vehicles. Recreational Motors were classified as Heavy Duty.

Criteria Pollutants

Fleet Vehicles

In order to calculate criteria pollutants emitted by fleet vehicle use, a spreadsheet tool called AFLEET was utilized. The Alternative Fuel Life-Cycle Environmental and Economic Transportation (AFLEET) spreadsheet tool was developed by Argonne National Laboratory for the U.S. Department of Energy (DOE). AFLEET estimates petroleum use, greenhouse gas emissions (GHGs), air pollutant emissions, and cost of ownership of light-duty and heavy-duty vehicles.³ The most recent version of the spreadsheet version was used (August 9, 2023).

By default, AFLEET's petroleum use and GHG calculations are well-to-wheels (WTW). Therefore, CO_{2e} emissions shown under the AFLEET heading within Table 1 are, as would be expected, higher than those pump-to-wheels (PTW) emissions calculated by EPA's GHG Inventory Tool. PTW stage represents the vehicle's operation activities.

The AFLEET Tool uses emissions data from EPA's MOVES to calculate PTW emissions for pollutants: NO_x, CO, PM₁₀, PM_{2.5}, VOCs, and SO_x. Emissions of PM₁₀ & PM_{2.5} include both tailpipe and tire and brake wear (TBW), Emissions of VOCs include both tailpipe and evaporative. It should be noted that both fuel use and VMT are used as activity data for the calculation of these emissions. As noted above VMT data are believed to be accurate estimates, not as precise as fuel use data.

Data input was similar to that for EPA's GHG Tool except that the vehicle class designations were more in line with FHWA categories. For our purposes:

Passenger Car

Passenger Truck – up to Class 2F: 7;001 - 8;000 lb (e.g. SUVs & Ford F-150 and smaller pickups)

Light Commercial Truck – Other Class 2 vehicles greater than sub-class 2F (e.g. Ford F-250s and larger)

Single Unit Short-Haul Truck – Class 3 vehicles and above

To accomplish source breakdown (i.e. sector or facility) separate spreadsheets were utilized. Criteria pollutant data is reported for each individual vehicle calculated as pounds per year. These data were summed and converted to MT for reporting. Where applicable TBW and evaporative emissions were added to tailpipe emissions for reporting.

Resident Personal Use Vehicles

The only differences to note regarding input for residential vehicles is that motorcycles were not included. AFLEET does not provide motorcycle as a vehicle type. Also, model year input within AFLEET is limited to 1993 model year vehicles and newer. There were six (6) vintage vehicles registered within Mashantucket that were included within the calculation spreadsheet as model year 1993.

Scope 2 – Electric

GHG Emissions

Once the source data were sorted, entry into the GHG Tool was a simple matter of combining monthly usage and totaling the baseline year 2022 total kilowatt hours (kWh) used.

In addition to fuel use, accounted for in Scope 1, the operator of the CoGen units provided daily electric generation data. These data were utilized to determine Scope 2 – Electricity Use 'emissions avoided.' Though depicted within inventory as negative values, these emissions are not subtracted from any other totals and are provided simply to illustrate that the significant Scope 1 Energy Generation sector emissions shown are offsetting emissions that would otherwise appear under Scope 2 (Foxwoods).

³ <https://afleet.es.anl.gov/home/>

As will be discussed in more detail below, as we finalized this PCAP inventory we noticed that updated emission factors for the New England regional sub-grid had been posted. Emission factors utilized by the GHG Tool are only as recent as 2021. Factors for our baseline year 2022 became available the same day the most recent version of the GHG Tool was posted (January 30, 2024).⁴ We therefore included within Table 1 resultant calculations using both sets of factors 2021 & 2022).

Criteria Pollutants

EPA’s Emissions & Generation Resource Integrated Database (eGRID) is a comprehensive source of data including emission rates for almost all electric power generated in the United States. eGRID data was utilized to calculate emissions of criteria pollutants. In addition to the typical GHG pollutants, eGRID provides factors (lb/MWh) for NO_x & SO_x. EPA has also posted PM_{2.5} data to eGRID, however only for year 2020.⁵ EPA used data provided through the National Emissions Inventory (NEI) to determine PM_{2.5} at electric generating units in 2020.

As mentioned above, baseline year 2022 became available after the latest update of EPA’s GHG Tool. Therefore, all MPTN’s Tool modules (sector and facility spreadsheets) are 2022 activity data calculated with 2021 eGRID factors. MPTN’s Inventory provides calculation with the updated 2022 eGRID factors.

In addition to the desire to use the correct factors for our baseline year data, we noted the following reported within 2022 ICO New England Electric Generation Air Emissions Report:⁶

The winter months of 2022 (January and December 2022) were marked by a significant increase in oil-fired resource generation compared to the previous winter. Fast-start oil generators also operated more often in July and August during the top five High Electric Demand Days (HEDD)^[footnote omitted], which were marked by high loads and unplanned outages of natural gas generating facilities. Oil-fired resources generated 1,845 GWh in 2022 compared to 227 GWh in 2021.

The report later summarized the result on emissions:

The average annual emissions (ktons) for SO₂ increased by 60% from 2021 to 2022... However, the average annual emissions for CO₂ and NO_x decreased slightly, by 0.2% and 1% respectively.

The specific changes are depicted within the capture eGRID tables below.

Subregion Output Emission Rates (eGRID2021)																
eGRID subregion acronym	eGRID subregion name	Total output emission rates							Non-baseload output emission rates							Grid Gross Loss (%)
		lb/MWh							lb/MWh							
		CO ₂	CH ₄	N ₂ O	CO _{2e}	Annual NO _x	Ozone Season NO _x	SO ₂	CO ₂	CH ₄	N ₂ O	CO _{2e}	Annual NO _x	Ozone Season NO _x	SO ₂	
NEWE	NPCC New England	539.4	0.072	0.009	544.0	0.327	0.316	0.094	900.5	0.073	0.009	905.1	0.411	0.361	0.130	4.5%
Subregion Output Emission Rates (eGRID2022)																
eGRID subregion acronym	eGRID subregion name	Total output emission rates							Non-baseload output emission rates							Grid Gross Loss (%)
		lb/MWh							lb/MWh							
		CO ₂	CH ₄	N ₂ O	CO _{2e}	Annual NO _x	Ozone Season NO _x	SO ₂	CO ₂	CH ₄	N ₂ O	CO _{2e}	Annual NO _x	Ozone Season NO _x	SO ₂	
NEWE	NPCC New England	536.428	0.063	0.008	540.480	0.309	0.283	0.122	923.348	0.073	0.010	928.058	0.457	0.329	0.249	5.1%

Table 1 includes emission calculations using both sets of factors 2021 & 2022. Also note that PM_{2.5} factors utilized with Table 1 are from 2020.

Scope 3 – Mobile

⁴ <https://www.epa.gov/egrid/summary-data>

⁵ <https://www.epa.gov/egrid/egrid-related-materials#eGRID%20PM2.5>

⁶ https://www.iso-ne.com/static-assets/documents/100006/final_2022_air_emissions_report.pdf

The GHG Tool, government operations module, was used to estimate emissions as a result of employee commuting. All employees were assumed to commute by single occupancy vehicles. Employees known to work from home were not included. Employees with a one-way commute exceeding 100 miles were also assumed to work from home.

Scope 3 – Electric (Grid Losses)

eGRID Use Paper:

As electricity travels along transmission and distribution lines from the producer to the consumer, some electricity is lost due to dissipation in the equipment and lines. In general, the longer the distance over which electricity is transmitted, the more electricity is lost. The amount of electricity losses can also vary based on other factors, like the voltage of the wires and the electricity load traveling across the wires. These losses are referred to as transmission and distribution (T&D) losses or line losses. eGRID refers to these losses as grid gross loss. The guidance document *Using eGRID for Environmental Footprinting of Electricity Purchases*⁷ specifies that these emissions should be included as Scope 3 emissions.

Comprehensive Climate Action Plan (CCAP)

The following is a summary explanation of those sources not presently included, the current status of data collection and commentary on anticipated data gaps that will need to be addressed. Reduction measures related to these sources have yet to be established.

1. Scope 1 – Mobile (“Non-road”)

Detailed data for the baseline 2022 year have been obtained for government sources (Public Works & Landscaping). Equipment lists are electronic; however, fueling records are paper files. We have yet to secure records for ‘non-road’ equipment within the commercial and residential sectors. Foxwoods, by far the largest commercial emitter within Mashantucket, contracts landscaping service to MPTN’s Public Works. Also, most, if not all, units that formerly utilized propane (e.g. fork and aerial lifts) have been replaced by electric units. Non-road emissions within the residential sector will need to be estimated. Estimates can be honed through effective outreach and surveys in the future.

2. Scope 1 – Wastewater Treatment

MPTN Utilities provides sanitary waste collection and treatment within Mashantucket. Scope 1 – Combustion and Scope 2 – Electric emissions associated with these facilities are captured within our current inventory. Biogenic emissions calculated within the GHG Tool are based on the population of the community. The vast majority of wastewater within Mashantucket is derived from the transient population visiting the amenities associated with Foxwoods. We considered calculating an equivalent population but were unable to locate reference to the gallons/person utilized by the GHG Tool. Further, we questioned whether the GHG Tool calculations were applicable for emissions from SBR type plants. Influent and effluent data are available for the baseline year 2022 and following clarification/education these emissions will be added in the future.

It should be noted that these systems also collect/treat wastewater from Tribal enterprises located outside the borders of Mashantucket (specifically, the clubhouse at Lake of Isles Golf and Two Trees Inn). Further, there are Thirty-two (32) residences that are not connected to the system and serviced by individual on-site septic systems.

3. Scope 1 – Fugitive Emissions

⁷ https://www.epa.gov/sites/default/files/2020-08/documents/egrid_footprinting.pdf

Our goal for the final comprehensive inventory will be to include/estimate direct fugitive emissions from sources such as refrigeration, air conditioning, fire suppression, industrial gases and natural gas distribution.

4. Scope 2 – Electric Usage (‘Market-based’)

Though we understand the market-based concept, particularly as it relates to statutory goals established by States, at this time we fail to see a direct purpose for MPTN to concern itself with incorporating market-based offsets. We have yet to find specific market-based factors for Eversource.

5. Scope 3 – Solid Waste

Accurate estimates for solid waste production proved to be difficult to obtain. Within Mashantucket, solid waste disposal is contracted and hauled to management facilities within the State of Connecticut, specifically the Lisbon incinerator. We were able to obtain emissions per ton for that facility, but were informed by MPTN’s contracted waste hauler that they do not maintain specific tonnage records recovered from Mashantucket.

6. Scope 3 – Agriculture, Land Management and Forest Cover

MPTN agricultural activities are located outside of Mashantucket. In the future however, we will look to update our base-year inventory to include landscaping and residential fertilizer use.

The GHG Tool contained a tab to include urban forest activities within the inventory. We seek to include such things within our inventory ultimately developed for MPTN’s CCAP.

7. Scope 3 – Tenant employee commuting to Mashantucket

Though it will be impossible to quantify these emissions as accurately as has been done for Mashantucket employees within this PCAP inventory, at minimum we should be able to secure counts of total employees and estimate travel distance by utilizing the average commuting distance of Mashantucket employees.

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